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1. Introduction

To date, one can speak of the formed theoretical basis of innovation and associated relations of intellectual property (Pohlmann and Opitz, 2013; Pentheroudakis, 2015; Noeland Schankerman, 2013; Papageorgiadis and Sharma, 2016). At the same time, the innovative regional policy to improve the economy with an integrated approach is still under development (Miller, 2012; Stephan, 2011). This problem can be addressed through the creation and integral development of the regional growth zones with the concentration of physical and social capital. The generation of an innovative economy in Russia should start with the creation of support for innovation policy in the regions. The authors suggest improving the management, implementing its planning and solving the major socially significant and economic problems of regional development, developing a methodology for assessing the rationalization of the innovation system structure in the region considering all economic and social aspects. Thus, the development of the national economy with all the innovations based on the cluster approach is gradually becoming an alternative strategy in the regional policy of Russia.

According to the research hypothesis, a separate regulatory act in the form of the regional cluster policy is essential for the development of the economy in the regions of Russia.

The analysis of contradictions in the development of innovation policy at the national and regional levels allows addressing the following research questions:

- What is the main course of economic innovation development in Russia?
- What is the scientific basis for the concept of the national innovation policy (NIP)?
- What are the possibilities of using the cluster approach in regional programs and strategies for social and economic development?

2. Research Background

The transition of the country's regions to innovative development requires ensuring effective mutual action of all components of the innovation implementation process in the region, regulation of all components of the innovation cycle, ensuring continuity and diffusion of scientific and technical knowledge, their availability and commercialization opportunities. The creation of regional innovation policy as an integral part and a relatively independent unit should contribute to the integrated innovation policy.

Global technological improvement of production based on the latest developments in the scientific and technical fields, formation of the national research sector with high competitiveness (McAdam, Reid, and Shevlin, 2014; Glushak, Glushak, Shuklina, and Gerashchenkova, 2016), ensuring the orientation of the economy towards the innovation development path, formation of innovative behavior for all representatives of society, and assistance in creating and disseminating innovations in all sectors of the economy serve as a target when creating a national system of innovations and technological development. This allows ensuring the scientific and technological primacy of Russia in the world in areas that determine its competitive advantages and national security.

The critical areas for economic innovation development of Russia are presented by the institutional elements of the NIP of the Russian Federation: higher education, research and development sector, business sector, infrastructure, and state innovation policy. For this purpose, it is necessary to increase the demand for innovation in most sectors of the economy, increase the productivity of the sector generating fundamental knowledge and applied science, to eradicate the fragmentation of the innovation infrastructure (Migueléz and Moreno, 2015; Glushak, Glushak, Shuklina, and Gerashchenkova, 2016). The national innovation system usually involves a set of interrelated organizations (structures), the essence of which lies in the
production and commercialization of science and technology within state borders.

To date, the National Innovation Policy (NIP) is understood as a complex of national public, private, non-governmental organizations and their interaction mechanisms, in which new knowledge and technologies are created, stored and disseminated (Helmers and Schautschick, 2013). Thus, the NIP is a complex of interacting economic entities developing and introducing innovative products (services) that operate based on the relevant legal framework under current government policy. The NIP infrastructure should also include innovation management bodies at the federal and regional levels.

Innovation policy is defined as a combination of two interrelated structures: enterprises engaged in production (Glushak, Glushak, Shuklina, and Gerashchenkova, 2016; Huang and Zhang, 2014) and commercial application (McAdam, Reid, and Shevlin, 2014; Belás, Bartos, Habánik, and Novák, 2014) of scientific knowledge and technology (Candelin-Palmqvist, Sandberg, and Mylly, 2012; Smith and Thomas, 2017), and the complexes of institutions ensuring the interaction of all parties of the innovation activity.

Many types of Russian goods and services are not competitive enough not only in the global market but also in several internal segments of the market, which are dominated by imported goods (Huang and Zhang, 2014; Crescenzi and Alexander, 2016). The inaccuracy of individual components of the economic and legal mechanisms is an intractable problem for the Russian economy. It is due to the absence of a corresponding social order resulting from the refractoriness of the Russian economy to the innovative path of development.

The absence of a system for coordinating innovation processes that could provide productive communications between the interested parties of innovation activity is a fundamental problem hindering the diversification and the innovative development of the economy, hampering social and economic changes in Russia. Therefore, the regions are deprived of a developed innovation policy, do not have a complex strategy of innovation development, and, accordingly, cannot effectively develop. There is no clear separation of functions between the federal and regional authorities in the field of mutual strategic development of regional and national innovation policies.

In the era of high technology, no state can be an absolute leader in all areas of science at once. Every state must choose its priorities. Russia has great potential for this, especially in the sphere of high technologies. High-tech enterprises and organizations are the last chance for Russia to get out of a severe economic crisis. However, with such an enormous potential, it is necessary to prioritize where to send initially the material and financial resources.

According to the authoritative Russian scientists, material and financial resources should be directed first on the development of transport and communication, secondly – on energy, thirdly – on the structural and functional materials, then – on the projects in the field of biotechnology, and finally – on mechanical engineering. Development of the innovation economy in Russia is a complex issue with an economic, social and political dimension, which can be addressed through the creation, development, and integration of regional growth zones by combining physical, human and social capital in them. The generation of the innovation economy must be initiated with the reproduction, control, and implementation of knowledge to meet the new needs of an individual and society.

3. Methods

The authors' approach is that the development of an innovative economy in Russia is considered as a complex problem with an economic, social and political component, which can be addressed through the creation, development, and integration of regional growth zones by combining physical, human and social capital in them.

The cluster approach in the economic policy of modern Russia is the dominant effective method for the dynamic formation of a competitive economy based on public and private partnerships with an extensive use of the scientific and innovative potential of the region. The clustering mechanism allows creating new economic complexes based on previously functioning territorial-industrial complexes to modernize using network linkages (Rebrina, 2015).

The study used the following methods of research to examine the cluster mechanism:

- cluster identification methods related to the problem of identifying the most significant regional subjects and satellites "rotating" around them;
- cluster development monitoring method under the concept of “Cooperation continuum” by Waits and Howard (Waits and Howard, 1996);
- cluster mapping method (method of diagnosing and identifying the internal strengths and weaknesses of the cluster).

4. Results

The study has revealed that:

- the primary purpose of the regional innovation policy involves the creation of conditions for the stable development of regional economies based on the productive use of intellectual potential, generation, dissemination, and implementation of new knowledge;
- to achieve this goal, first, it is necessary to develop and legally approve the innovation policy of the regions with a priority focus on the development of the scientific and technology complex and high-tech industry, on increasing the competitiveness of products for domestic and foreign markets. Particular attention should be paid to higher education, supporting it at the global level, as well as addressing the personnel problems;
- regional innovation policy is a subsystem of the national innovation policy, including a set of interrelated (interacting) subjects of the innovation process.
An innovative economy creates an environment in which clusters are formed by the cross-sectoral basis rather than by industry and are intended for the development of a new configuration of the sector in the region.

The modern cluster approach is the most optimal for the competitive development of enterprises and institutions forming the cluster and for the region in which this cluster is located.

Innovative regional programs that meet the requirements of the leading areas of regional development is the main factor that contributes to the implementation of methods for regulation of innovation processes in the regions, along with the identification of growth points of innovation activity, based on which regional economic clusters can be formed. It is necessary to consolidate the legislative level the innovative nature of the regional economy, to form an approximate ratio between large, medium and small businesses in the main production and to identify measures to comply with these ratios during the transition to the innovation scenario. In this regard, the authors recommend the executive authorities of the region and the local government to implement the following activities:

- develop a concept of the innovation system in the regions;
- develop action plans for the implementation of projects of public-private partnership for a permanent co-operation of business, scientific and educational institutions, and the government;
- analyze the competitiveness of products manufactured by enterprises of the region to determine the levels of economic growth that could become the basis for cluster formation;
- address the issue of creating regional development agencies enabling the implementation of cluster ideas in the regions;
- adopt assistance programs for regional companies as a basis for emerging clusters;
- implement a cluster approach in the regional programs and strategies for social and economic development;
- create conditions for joint activities of local scientific and educational institutions, as well as business communities when creating innovative projects;
- prepare research programs for the implementation of regional proposals in foreign markets;
- implement the draft programs for education and training professionals to meet the challenges of the regional economies.

Today there is a need for direct public-private partnership programs. All the existing partnerships involve joint investment from the private and public sectors in the form of finance or resources (equipment, personnel, intellectual property).

5. Discussion

To date, Russian regions with high potential for the implementation of pilot RIP projects have already adopted regional legislation on innovative activities. Without neglecting the Russian conditions for a region (or several regions), it is necessary to address specialized areas for solving the development problems, the creation of the RIP. However, the innovative activity of the territory still can be the only factor guaranteeing its development.

Integration of federal and regional components contributes to the formation of a unified innovation system of Russia. These components are designated as a federal-regional economic system, a subsystem that includes all economic entities interacting in the process of disseminating new economically significant knowledge, which can be used depending on the economic policy of the government and the established legal and regulatory framework.

The regional innovation programs serve as the primary factor ensuring the implementation of methods for regulating innovative processes in the regions, meeting the requirements of the leading directions of development of the regions, as well as identifying the growth points of innovation activity, based on which the regional economic clusters can be formed.

As for the Russian researchers (Rebrina, 2015; Glushak, Glushak, Shuklina, and Gerashchenkova, 2016) concerning the problem under consideration, it can be said that they primarily focus on clusters within the framework of the regions’ development. They emphasize that the cluster development strategy should not contradict the regional development strategy, while cluster enterprises should specialize in competitive products, considering the territorial localization of the industry. The analysis of this study confirms the findings obtained from the results of other studies.

The authors define cluster policy as a new effective opportunity to increase competitiveness and diversify the economy.

References


A Methodology for Assessing the Innovative Potential of a High-Tech Organization under the Economy Digitalization Impact

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Abstract

Objective: systematization of concepts, principles, and methods for assessing the innovative potential of a high-tech organization and the conditions for its automation based on the effective use of capabilities of information and communication technologies, predictive analysis and forecasting. Hypothesis: primary data on the innovative potential of an organization might contain indicators that are convertible into specific, concise and informative key innovation indicators. The authors suggest a differential-integral approach to developing a complex of predictors – key innovation indicators. The study presents an enlarged diagram of the algorithm implementing the concept of automated evaluation of the innovative potential through the use of predictive analytics methods of the corporate information and analytical system.

Keywords: innovative potential of the enterprise; key innovation indicators (KII); knowledge-based organization; predictors; competitiveness; predictive analysis; digitalization of economy.

1. Introduction

The article focuses on theoretical and practical issues of developing the innovative potential assessment methods customized for knowledge-based organizations. The relevance of the study is due to the fact that the role and importance of innovative potential development in ensuring the competitiveness of a high-tech enterprise has changed significantly, as the ability to timely and rapidly rebuild the internal environment (processes, structures, methods, resources) to maintain and strengthen the competitive position in the market in the long run. Accordingly, the role of accessing the innovation potential has also increased. Within that framework, the authors show the features of knowledge-based and high-tech industries, the significance of which depends entirely on the level of the enterprise innovative potential. Development of information and communication technologies becomes a source of transformation for the industry and the economy as a whole, along with the change in the technology development paradigm. Enterprises are moving from individual components of smart systems embedded in the production process to the use of cyber-physical systems to integrate the physical production process with software electronic systems and their continuous online operation. This process involves a one-time synchronization of a large data set, the Big Data, to optimize the entire production process. This results in the new forms of organization and control of the value created throughout the entire product lifecycle. As an example, the “Industry 4.0” program developed and implemented in Germany combines technological advances in the field of digitalization, automation, intelligent systems, communications, and virtual reality. “Industry 4.0”, as an initiative to restructure industry with entirely new rules to increase its competitiveness in the global economy (Kaplan, 2001; Platform Industrie 4.0, 2016), is of interest for improving the high-tech industries in Russia, including in aviation propulsion engineering.

In more than 30% of federal districts of the Russian Federation, enterprises use special management software, of them with roughly equal shares – the means for control of automated manufacturing and/or individual technical means and technical processes and CRN, ERP, SCM systems. In the production of machinery and equipment, this share accounts for 67.8% (Rosstat, 2016).

It is predicted that by 2025 in Russia, the effect of using the artificial intelligence (AI) and robots in production will account for 19-34% of the total expected GDP growth, although to date it is only 3.9%, which is 2-3 times lower than in the countries of the European Union and the Asia-Pacific region. The studies conducted by the McKinsey Global Institute have shown that by 2025 the Chinese GDP might increase by up to 22% due to Internet technologies. In the United States, the increase in the value generated by digital technologies could reach the amount of 1.6-2.2 trillion dollars (Aptekman, 2017; Platform Industrie 4.0, 2016; Milgrom, & Roberts, 1990). However, even Russia currently discovers some positive trends.

Transition to the digital economy is inevitable, and in this regard, the role and importance of developing the innovative potential in ensuring the competitiveness of an enterprise and a high level of competitiveness of goods and services produced will change significantly in the long term.

Digitalization of economy is an ambitious innovation in itself. It is a system of high-tech innovative development and intellectual productions based on formation and effective use of the enterprise innovation potential. In this regard, the starting point and the vector for development of the enterprise innovative potential must be determined with a high degree of reliability and
realism. The starting point for the development of innovation potential is the state of an enterprise at a specific point in time which should be evaluated to find new product concepts and processes determining its general course of development.

To date, there are several innovative potential assessment methodologies, which lack the unambiguity of opinions and definitions and the unity of assessment indicators sets. The problem is that a characteristic feature of the assessment process is its high complexity and labor intensity, which makes these methods unpopular for practical use. The lack of convenient tools for analyzing the innovation potential has also created difficulties for its objective and timely assessment. Today the advent of intelligent process monitoring and production technologies control, along with "cloud" storage technologies, has changed the situation radically, since they allow implementing fundamentally new approaches to the analysis and evaluation of the innovative potential of a knowledge-based organization (IPKO) in real time.

The object of study is the innovative potential of knowledge-based enterprises in aviation propulsion engineering. The subject of study is the research methods for assessing the innovative potential of an enterprise through modern information and communication technologies. The authors identify such features as a high proportion of intellectual component; the specificity of the organizational mechanism of innovative performance; quality and speed of the information analysis support, the need for the perfect mechanisms for information exchange. The study reveals the essence of the concept of "innovation potential of a knowledge-based enterprise" as an enterprise capable and willing to create a favorable and competitively stable internal environment for the rapid development and rapid implementation of innovative solutions, against the disturbing external factors. The authors formulate the basic principles of assessment, such as the principles of consistency, complexity, predictivity, prevention, purposefulness, objectivity, reliability, accuracy, and expediency.

2. Materials and Methods

Predictive analysis enables an enterprise to gain knowledge and acquire appropriate abilities to make informed management decisions. Primarily, this is important to innovation activities initiating the phenomenal growth of intangible assets (Kuznetsov, 2012; Hermann, & Pentek, 2016). This raises the need for the key innovation indicators (KII), which focus on the long-term strategic growth and are not only predictive but also stimulatory in their nature. The peculiarity of this approach is that primary data can contain financial and non-financial, short-term and long-term, quantitative and qualitative, etc. indicators; however, they should convert into specific capacious and informative KII. How important is the revision of the approach to the selection of key innovation indicators and the indicators of innovative capacity of an enterprise? This can be identified based on the fact that predictive models still cannot cover the entire range of unknown factors, even with the most complex models and detailed statistics (Rosstat, 2016). However, the predictive analysis method combined with data mining, which aims at identifying the hidden rules and patterns in large data volumes, and machine learning, gives excellent results if applied properly and with the rational data organization. The preliminary stage of KII selection involves the use of a differential-integral approach and a dynamic estimation method.

To date, predictive analytics is widely used in marketing, in assessing the client’s solvency when granting loans, in forecasting business profitability, in insurance and healthcare. Predictive analytics is of particular importance to industrial organizations in terms of optimization of production processes, technical and repair maintenance of production. Moreover, predictive analytics can be successfully applied to the development of new products and technologies, to select products and methods of their production that can be offered to customers in future, which is associated with an effective organization of innovation and development of the IPKO. Additionally, modern predictive models allow accounting and evaluating relational aspects.

The essential task of predictive analysis is to identify predictors affecting the predicted event. The predictor is, in fact, the parameter – the distinctive properties or indicators of the system under study that can be measured. IPKO should become such parameters in assessing the innovative potential of an enterprise against the industry specifics. Furthermore, the IPKO considers not only organizational aspects of innovation activity and the innovative susceptibility of an enterprise but also the indicators characterizing economics and finance, the ability of an enterprise to ensure the return of investments in innovations at a given time with an estimated yield.

3. Results

Knowledge-based and high-tech industries are distinguished by a number of features, the significance which depends entirely on the level of the innovation potential development. These include:

- a high proportion of the intellectual component, in particular, the presence of intellectual property on high technology, high-tech materials, ready-made high-tech products;
- the need to ensure high economic efficiency of research and development carried out throughout the life cycle of an enterprise, as well as at all stages of the life cycles of products;
- high quality and complexity of technological processes, the need for their continuous improvement and updating, including equipment: computer numerical control (CNC) machine tools, robotic systems, robots, intelligent and information and communication technologies;
- the increased risk of projects related to the development and introduction of new high-tech products, considerable venture risks, the need for harmonious adaptation to the external environment;
- the need for highly qualified, intellectual and creative personnel, constituting a large proportion of an enterprise staff, motivated towards self-development in the innovation process;
- high absolute and relative costs for scientific research, experimental, design and technological works, high cost of projects, the need to develop all types of resources;
- the specificity of the organizational mechanism of innovation, including the type of the institutional governance structure and its innovative focus; innovation infrastructure, the system of interdependence between units, between the subjects of innovation processes and the market, between the subjects and performers of management implementing the innovative ideas;
- the need to create perfect information exchange mechanisms between the subjects of innovation processes and the methods to transform information into knowledge or intellectual capital of a knowledge-based organization.

Competitiveness of the knowledge-based and high-tech products in the twenty-first century is determined by increased demands on the quality of products, growth in research and development, accelerated introduction of new products to the market, reduced lead times, reduction of costs, and management optimization. When creating a new product and technology, it is essential to provide a solution to such problems as optimization of time for design and manufacture of new products, production methods, resource costs, and better product quality. It is worth recalling B. Gates, who said "In the 1980s, it was possible to win the competition by improving the
quality of products, in the 1990s through re-engineering; at the beginning of the 21st century it is possible only by increasing the speed of information processing” (as cited in Krasnov, 2011). This problem might be solved with the use of digital technologies and ensuring effective interaction between all units of an enterprise and, in particular, between the elements and stages of the innovation process.

For this purpose, Russian industrial organizations, including knowledge-based ones, are implementing ERP systems to ensure the establishment of a database. The advantages of the ERP system are the availability and consistency of data, control of personnel, reduction of errors related to the human factor, a set of ready toolkits. ERP systems perform the following tasks: basic (directly related to production) and extended (related to financial management, human resources, supplies, etc.).

Unfortunately, the analytics required to prepare, develop, and make timely and effective management decisions in these systems is extremely limited. Thus, there is a need for integration of the analytical systems and applications. This is achieved by combining several systems: ERP, CRM (customer relationship management), management of human resources, finance, supply chain and e-commerce (Schroeck et al., 2013). New ERP solutions that have appeared recently try to get rid of analytical failure by providing pre-delivered business content and additional applications. However, these solutions do not contain predictive and forecasting capabilities. Such systems are of little use when assessing the innovative potential of a knowledge-based organization.

Development of intelligent production technologies, latest high-tech communication, networking interaction between machines, equipment, buildings and information systems, cloud computing and high-speed networks create new opportunities for the transfer of management and decision-making to intelligent systems. Figure 1 illustrates the revolutionary transformations in automation.

![Figure 1](image)

Revolutionary transformations in the automation pyramid

Compiled by the authors on basing on ‘Communication technologies of a smart enterprise within the framework of the concept industry 4.0 and the internet of things’ (Lopukhov, 2015)

Credibility and reliability are enhanced by automating monitoring and analysis of the environment, the production process and its own state in real time. Conditions are also being created for the effective use of predictive analysis and forecasting, based on statistical analysis, situational modeling, data mining, text analysis, object analysis, real-time optimization, machine learning algorithms, etc.

Thus, subject to the use of special analytical applications, such as Teradata® Analytics for SAP®, which allow real-time transfer of data from ERP applications and SAP to analytical and reporting corporate applications, it is possible to carry out a highly-credible evaluation of the innovative potential of a knowledge-based organization.

To reveal the concept of “innovation potential of a knowledge-based organization”, the authors will proceed from the following:

1. The need to consider the etymologically dual nature of the innovative potential of an enterprise, associated, first, with the resource abundance of R & D efficiency and the implementation of specific technological processes for the use of the latest materials and competitive products in production. Secondly, with the ability and willingness of an enterprise to accumulate and effectively use various types of resources to achieve the predetermined goals and scopes.

2. Knowledge-based and high-tech organizations are those that are able to create favorable conditions in the internal environment to ensure high competitiveness through the timeless development and rapid implementation of the innovative solutions, against the background of disturbing external factors.

3. Innovative development of an enterprise and the creation of its competitive advantages depend on the level of effectiveness of the innovation potential implementation.

4. Competitiveness of the knowledge-based organizations, as an internal ability to form and use the cumulative competitive potential in the long term, ensuring a favorable market position, soon will be defined by their digitalization level.

The innovative potential of a knowledge-based organization is the ability and willingness of an enterprise to create a favorable and competitive internal environment for the rapid development and implementation of innovative solutions as a response to disturbing influences and the accumulation of information about the aggregate of all types of resources and conditions to ensure the creation and implementation of R & D results.

It appears that such a definition of IPKO is close to the analytical automation concept with smart sensors in equipment, industrial Internet of Things; cloud and mobile monitoring technologies, etc.

Implementation of the concept of IPKO assessment automation is subject to the system of basic provisions and principles which are unique characteristics of this concept. This study has led to the development of such fundamental provisions, which are partly presented in Table 1.

<table>
<thead>
<tr>
<th>Principles for assessing the IPKO</th>
<th>Description of the principles</th>
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<tbody>
<tr>
<td>Consistency</td>
<td>IPKO is an integral, complex dynamic system that takes into account all internal and external relations, along with the interdependence and mutual subordination of its individual elements. In its turn, it is an element of a more complex system – the aggregated capacity of the organization (ACO).</td>
</tr>
<tr>
<td>Complexity</td>
<td>It allows displaying complexity and multidimensionality of a complex object in the IPKO model. Complex assessment is a comprehensive qualitative and quantitative characteristic of the innovation activity results of an enterprise, reflecting its multidimensional character and the difference of actual indicators from the benchmark.</td>
</tr>
<tr>
<td>Predictivity and forecasting</td>
<td>These research methods provide the construction of descriptive and predictive models characterizing the IPKO based on patterns or linkages between variables in large data arrays (Data Mining approach).</td>
</tr>
<tr>
<td>Preventiveness (advance character)</td>
<td>Preventing problems or their development; solving potential problems. Prescribes preventive measures to reduce the risks of situations dangerous for the development of IPKO under the influence of external and internal factors, especially those related to the multidimensional problem and several factors affecting the object of analysis and evaluation.</td>
</tr>
<tr>
<td>Purposefulness</td>
<td>Determines the choice of decisions and the sequence of their development; integrates activities in its most complex options for the practical use of assessment results in the management of innovative activities of an enterprise and specific measures to preserve or increase the level of innovation potential.</td>
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</table>
The basic seven principles are consistency; complexity; predictivity and forecasting; preventiveness, purposefulness; objectivity, reliability and accuracy, and appropriateness.

Generally, the indicators of innovative potential are divided into two groups: the indicators of innovative activity and the indicators characterizing the potential capabilities of an enterprise.

The indicators characterizing the innovative activity of an enterprise, its innovative competitiveness include cost, time, structure and renewal indicators (Table 2).

Table 2. Indicators characterizing the innovative activity of an enterprise

<table>
<thead>
<tr>
<th>Groups of indicators</th>
<th>Indicators characterizing the innovative activity of an enterprise</th>
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<tbody>
<tr>
<td>Cost indicators</td>
<td>Unit costs for R &amp; D in sales. Production intensity indicator</td>
</tr>
<tr>
<td></td>
<td>Specific costs for the acquisition of licenses, patents, know-how</td>
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<td></td>
<td>Cost for the acquisition of innovative firms</td>
</tr>
<tr>
<td></td>
<td>Availability of funds for initiative development</td>
</tr>
<tr>
<td>Innovation dynamics indicators</td>
<td>TAT (“turn-around time”). Indicator of innovation</td>
</tr>
<tr>
<td></td>
<td>The processing time of a new product (new technology) development</td>
</tr>
<tr>
<td></td>
<td>The length of the Pre-production period for a new product (technology)</td>
</tr>
<tr>
<td></td>
<td>The duration of the production cycle for a new product</td>
</tr>
<tr>
<td>Renewability indicators</td>
<td>The number of development projects or innovative products and processes implementation</td>
</tr>
<tr>
<td></td>
<td>Indicators of the product portfolio renewal dynamics (the proportion of products manufactured for 2, 3, 5 and 10 years)</td>
</tr>
<tr>
<td></td>
<td>The number of acquired (transferred) new technologies (technical achievements)</td>
</tr>
<tr>
<td></td>
<td>The volume of exported innovative products</td>
</tr>
<tr>
<td></td>
<td>The volume of new services provided</td>
</tr>
<tr>
<td>Structure indicators</td>
<td>The composition and number of research, development and other scientific and technical structural units (including experimental and test complexes)</td>
</tr>
<tr>
<td></td>
<td>The composition and number of joint ventures engaged in the use of new technology and the creation of new products</td>
</tr>
<tr>
<td></td>
<td>Number and structure of the R &amp; D personnel</td>
</tr>
<tr>
<td></td>
<td>The composition and number of temporary creative initiative teams, groups</td>
</tr>
</tbody>
</table>

Table 1. Basic principles for assessing the innovative capacity of a knowledge-based organization

Compiled by the authors based on generalization and systematization of theoretical and practical experience.

<table>
<thead>
<tr>
<th>Typical groups of indicators</th>
<th>Indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scientific and technical potential</td>
<td>- the share of new products in the total volume of production;</td>
</tr>
<tr>
<td></td>
<td>- the number of license agreements, etc.</td>
</tr>
<tr>
<td>Commercialization indicators</td>
<td>- the share of new products in the total volume of production;</td>
</tr>
<tr>
<td></td>
<td>- the number of license agreements, etc.</td>
</tr>
<tr>
<td>Duration of works</td>
<td>- the value of the innovation lag</td>
</tr>
<tr>
<td>Characteristics of innovative management of an enterprise</td>
<td>- qualifications and experience of managers;</td>
</tr>
<tr>
<td></td>
<td>- efficiency and quality of implementation of the innovation management functions;</td>
</tr>
<tr>
<td></td>
<td>- intellectualization of managerial tasks, etc.</td>
</tr>
</tbody>
</table>

Table 3. The most common use of the indicators to evaluate the innovative potential of an enterprise in Russia

Compiled by the authors based on the study of evaluation practices of innovation activity of the knowledge-based companies.

- Professional development index – the share of highly qualified employees;
- The ratio of inventions per employee – the number of inventions per employee engaged in research work, which is not indicative, because inventions are not equivalent in terms of costs or results;
- The index of professional compliance – the proportion of employees with basic education;
- The level of financial support for innovation – the share of research and development costs in the structure of total costs.

Moreover, in practice, additional relevant indicators are used, such as patents support costs, savings on the process of continuous improvement.

As for the savings on the process of continuous improvements, this is mostly an indicator of quality rather than a characteristic of an innovation process.

Less commonly used indicators include the employees’ receptivity to innovations (employees’ initiative, positive perception of innovations, their ability to produce new ideas) and the organizational culture and motivation (management support for the innovative activity of employees, development of standards of behavior and values for each unit, the level of incentives for innovation of employees). The TAT innovation indicator, which is derived from the phrase “turn-around time” (“manage to turn”), is another widely used indicator. It shows the time from the moment of awareness of the need or demand for a new product to its delivery to the market.

Another important aspect is the analysis of demand for innovations, since the accuracy of the production program development, the strategy and sales volumes of new products and, accordingly, the economic activity depend on its results.

The assessment of the innovation potential is based on the diagnosis of the intra-organizational environment. In this situation, of particular importance is, first of all, the organization of innovation, which is determined by a number of characteristics: the technical level and renewal rates of products and technology; the level of organization of production and efficiency of production methods; state of science and research; constant search and development of new products and services that are in demand in the market and the ability to meet the needs of the
market; the organization’s susceptibility to innovation; the desire to master new high-quality products at affordable prices for the consumer; the relevance of information support of the innovation process.

The indicator of innovative competitiveness, as the ability of an enterprise to form competitive advantages through effective innovation, is characterized by the following external signs:

1. Comparative level of innovative competitiveness (compared to the level of competitiveness of the rival companies).
2. The reputation of an enterprise.
3. Organization relationship with its buyers.
4. Demand for innovative products in the domestic and foreign markets.
5. Market prices of the innovative products.
6. Economic policy in the countries importing and exporting innovative products and services.
7. Taxation.
8. An ability to receive government orders and fundings.
10. The effectiveness of the patent system and patent search within the country and abroad.
11. The efficiency of project expertise and product certification, etc.

Several enterprises additionally use specialized innovative potential indicators (Lapteva, 2014; Norreklit, 2003): the ratio of intellectual property; the ratio of personnel engaged in research and development; the ratio of property intended for research and development; the rate of new technology development; the index of new products development; the rate of innovation-based growth; the ratio of innovation financing; the ratio of innovation self-financing; the ratio of research intensity of production and the new product; the growth of high-tech products profitability; the autonomy ratio.

The need to deal with an indefinite number of indicators leads to the formation of large arrays of diverse information on the innovative potential of an enterprise available from various sources. It is necessary not only to describe this information and study the data structure but also to find hidden linkages and patterns, build predictive models. Furthermore, it will be necessary to continuously compare them with the actual implementation to optimize these models.

The quality and speed of information and analytical support are of particular importance during the assessment of IPKO of the knowledge-based organizations, which indicates the need and possibility of using advanced digital technologies for this purpose.

As noted by Bruskin (2016), digital analytics systems working with big data will contain real-time intelligent models. This is possible within the framework of predictive analysis. The integrated scheme of its algorithm is presented in Figure 2.

To date, several predictive analysis software tools can be purchased in the market. Those tools allow processing of both structured and unstructured data, training, building and evaluating hypotheses. Implementation of the presented integrated algorithm is carried out within the framework of a corporate information system with advanced analytics. There are four levels in the structure of this system:

- integration in hybrid networks (artificial intelligence systems);
- high-speed data processing tools;
- specialized data access;
- typical solutions related to analysis, modeling, forecasting, machine learning, predictive analysis.

The assessment of the innovative potential of an enterprise is integral, therefore, to increase its objectivity, the selection of indicators should be based on the principles of hybridization and synthesis when the assessment of internal environment indicators is carried out under the influence of the external environment.

Given that the IPKO is part (sub-potential) of the total...
capacity of an enterprise and an integrity linking different combinations of elements and their interaction with each other and the external environment, creating conditions for the formation of key competencies of innovation activity and growth of the innovation competitiveness, the selection of KII, participating in its assessment, should be carried out as a synthesis of indicators previously separated by various sources into a model that allows describing the result of their interaction.

In the study, the authors have tested the differential-integral approach and the dynamic evaluation method for the formation of the KII complex involved in the evaluation of the innovative potential of a knowledge-based organization. The analysis has shown that the following indicators can be included in the KII:

- the share of innovations in the value chain of the business;
- TAT, the period from the awareness of the need or demand for a new product to its introduction to the market;
- The innovation competitiveness index;
- The perfection of the innovation activity model organization;
- The perfection of the information exchange mechanisms between the subjects of innovation processes and the methods of converting information into knowledge;
- The importance of innovative products for the national economy;
- The share of own innovative developments in the intellectual property structure of an enterprise.

Specific methods can be used for innovation evaluation of a new product or technology, which can be included in the predictors – the KII.

4. Discussion

The study paid close attention to the theoretical and practical developments of domestic and foreign scientists and specialists. Despite the significant scientific contribution to the solution of these problems, this paper does not provide a holistic and comprehensive method of innovative potential evaluation, especially considering the peculiarities of the knowledge-based organizations.

At the beginning of the last century, J. Schumpeter formulated the major types of innovative changes in the industrial sector (Schumpeter, 2008), which still remain relevant. However, intellectualization provides a competitive advantage due to the growth of organizational intelligence (Kuzmin, 2009), which has become a dominant factor in modern development, fostering another type of change: a change in intellectual capital. Intellectual capital is a basic component of innovation potential. To confirm these words, let us cite the results of Strassman's research, which showed the ratio of the cost of fixed and intellectual capital to the market value of such well-known companies such as Microsoft, Symantec, Oracle, IBM. Thus, the cost of fixed capital averaged 14% in their market value, therefore, the remaining 86% account for the value of knowledge accumulated by the companies (Strassman, 1999).

In this regard, the issue of methodological support for the assessment of the innovative potential of a knowledge-based organization remains relevant, which allows for the rapid identification of internal capabilities, and their further innovative development.

The issues of determining the essence of the innovative potential of a knowledge-based organization, the methods and indicator sets for its assessment remain controversial. Given that the methodology is the study of the system of concepts and their relationships, the basic principles and methods of their implementation in an enterprise and construction of the innovative activities, it is necessary, first of all, to decide on the terminology of the IPKO concept.

The main problem, in fact, lies in the discrepancy of concepts and the lack of structure in the source data, along with high labor intensity and low speed of information processing. Therefore, the present paper substantiates the approach based on the integration of two directions: development of the methodology of high-tech innovation capacity assessment and the use of digital technologies for this purpose which differ in versatility and speed.

5. Conclusions

The innovative potential is an integral part of managing the development of a knowledge-based organization, ensuring competitively sustainable economic activity. However, the lack of convenient tools for analyzing the state of the IPKO, the high complexity and labor intensity of the relevant information processing create particular difficulties for timely and objective assessment. The analysis of existing methods of high-tech innovative organization capacity assessment has shown that the ambiguity of definitions, different approaches to the formation of complexes of assessment indicators, inadequate procedures and algorithms make them unpopular in practical use due to their insufficient development. Thus, the authors decided to carry out a detailed analysis and define the methodology for assessing the innovative potential of a knowledge-based organization, which allows quickly identifying internal capabilities for their further innovative development.

The most important problems of knowledge-based and high-tech organizations involve the optimization of terms for design and production of new products and methods of their creation, resource costs and products quality improvement along with their introduction to the market. The preventive and predictable character of the innovation potential development thus become integral attributes of its evaluation. The development of smart production technologies, the latest high-performance communication technologies, the creation of networks between the machines, equipment, buildings and information systems, cloud technologies and high-speed networks contribute to the emergence of new opportunities for the transfer of IPKO evaluation and decision-making functions to intelligent systems. In this regard, the paper justifies an approach based on the integration of two directions: development of the innovative potential evaluation methodology of a knowledge-based organization and the use of digital technologies for this purpose.

Implementation of the concept of innovative potential analysis and evaluation of high-tech company automation with the use of smart sensors in equipment, industrial technologies of the Internet of things: "cloud technologies"; mobile monitoring technologies based on high-speed data processing technologies, analytical applications, and typical solutions such as: retrospective analysis, predictive analysis, scenario modeling, optimization modeling, machine learning, forecasting and planning. The authors propose to use the key innovation indicators, formed by the differential-integral approach, as predictors. The study presents an integrated predictive analysis algorithm, integrated into a corporate information-analytical system of a knowledge-based organization. The proposed approach can significantly improve the preventivity, objectivity, speed and predictive assessment of the innovation potential of a knowledge-based organization.

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References


Connectivity of Information between Annual and Sustainability Reports: Russian Company’s Analysis

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Abstract

Direct connectivity between information disclosed financial position, financial capital formation and using and information about availability, quality and affordability of other capitals underlies the integrated thinking and improve the quality of information available to stakeholders.

The article contains an empirical study of the annual reports of the largest Russian companies for 2011-2017 against the principle of integrated reporting “Connectivity of information”. It means that an integrated report should show a holistic picture of the combination, interrelatedness and dependencies between the factors that affect the organization’s ability to create value over time.

The objectives of this study are: to analyse relationship between the management’s interpretation of annual report’s financial information and the objective financial position and non-financial information of sustainability reports of Russian companies against to the principle of integrated reporting “Connectivity of information.”

Correlation analysis of the relationship between the management’s interpretation of annual report’s financial information and the objective financial position was conducted for 30 Russian companies at the first stage of this study.

At the second stage, a correlation analysis was carried out between the management’s interpretation of annual report’s financial information and the results of a semantic analysis of narrative description from sustainability reports in three areas: environment, human resources, and contributions to the development of local area (place of residence). The study showed an implicit correlation for most companies to comply with the principle of connectivity of information.

Keywords: integrated reporting; connectivity of information; information quality; semantic analysis; correlation analysis; sustainability report; financial position.

1. Introduction

In the context of the integration of Russian business into the global economy, the problem of the quality of information disclosure in the annual reports becomes especially urgent. Russia is currently in the process of the transition to the international standards of integrated reporting (hereinafter IO) and GRI standards (Global Reporting Initiative), which obliges the companies participating in this project to be more open to stakeholders. The basic idea of stakeholder’s approach is to take into account the connectivity and interdependencies between stakeholder’s interests and an organization’s ability to create value over time (Efimova, 2012). Efimova (2013, 2014) pointed out that the capacity of the organization to respond to key stakeholders’ legitimate needs and interests drives up their credibility.

It is critical to underscore that integrated corporate information is very significant to predict risks and possibility to create value over time according to the interests of all stakeholders (Kogdenko and Melnik, 2014).

Business sustainability and development can be achieved through company’s transparency that increase investment attractiveness and cooperation with providers of financial capital.

Integrated report is the best way to achieve a quantum leap in improving information interaction between companies and all its stakeholders.

There are seven Guiding Principles in international standards of integrated reporting (hereinafter IR): Strategic focus and future orientation; Connectivity of information; Stakeholder relationships; Materiality; Conciseness; Reliability and completeness; Consistency and comparability.

The article contains an empirical study of the annual reports of the largest Russian companies for 2011-2017 against the principle of integrated reporting “Connectivity of information”. It means that “an integrated report should show a holistic picture of the combination, interrelatedness and dependencies between the factors that affect the organization’s ability to create value over time” [IR]. Direct connectivity between information disclosed financial position, financial capital formation and using
and information about availability, quality and affordability of other capitals underlies the integrated thinking and improve the quality of information available to stakeholders.

Over the last years, because of the attention to the corporate transparency of Russian companies has increased significantly the quality of annual reports was improved (Malinovskaya, 2015). However, majority of companies define its own approach to the corporate disclosure of information and establish the structure of description and content elements of reports by themselves. One of the main reason of such problem is that IR and GRI standards are advisory rather than mandatory and there are no clear guidelines how to apply them. How companies are ready to follow IR principles and understand them will affect their ability to embed integrated thinking into an organization’s activities and achieve the connectivity of information. Connectivity of information should combine financial measures and interpretations with other components or narrative that explains the financial implications of significant effects on other capitals and other causal relationships (e.g., expected revenue growth resulting from efforts to enhance human capital) may be used to demonstrate the connectivity of financial performance with performance regarding other capitals. In some cases, this may also include monetizing certain effects on the capitals (e.g., carbon emissions and water use).

Integrated thinking takes into account the connectivity and interdependencies between the range of factors that affect an organization’s ability to create value over time. Such factors include all various operating and functional units and the capitals that the organization uses or affect.

According to integrated thinking management’s interpretation of financial information in annual reports should have connectivity with other parts of Sustainability Report. Disclosure of the information how capitals increased, decreased or transformed during the time under the influence of each other and internal and external environment allows to expand management thinking, to consider all resources to create value and to report about it to stakeholders.

2. Problem Statement

The primary purpose of an integrated report is to explain how an organization creates value in the short, medium and long term and to encourage management to embed integrated thinking to show a holistic picture of how the organization does it. Implementation of IR can solve a lot of problems of connectivity of numerous, disconnected and static reports (environmental, social and governance reports) and to find a balance between company’s resources to create value and sustainability and development, financial position and business model.

In the work of Mellony, Caglio and Perego (2017), a text mining analysis was carried out that was conducted on a sample of 148 listed companies that participated in the IRC’s (The International Integrated Reporting Council) Pilot Programme since 2013. Scientists pointed out that company’s disclosure level has grown up and they try to follow the concepts and principles underlying <IR>. On the other hand insights showed that context of integrated reports on the one hand were too heavy (more than 184 pages in average), but not complete (did not disclosure all relevant information), transparent and too optimistic. This means that presenting information was not enough balanced to meet this stakeholder’s needs.

Particularly, organizations with a worsening financial situation on the one hand present IR that are noticeably longer, less readable, and more optimistic than others, but they are more comprehensive in disclosure non-financial information. This fact points to a closed type of management interaction with external users of information. Perhaps, this problem is connected with the unwillingness of the management of companies in disclosing the real picture of the business and present their forecasts about the possibilities of restoring financial stability in the foreseeable future.

Lately the interest to evaluation and analysis of the quality of corporate information disclosed with the use of text or semantic analysis has increased significantly. Semantic analysis helps to study the linguistic structure of the text, determine the tone and mood of corporate reports that helps to assess their impact on the ability to identify situations when there are attempts to avoid management from disclosing the real financial position of the company (Plotnikova, Shilovskaya and Dvorak, 2017).

There is a sufficient number of foreign studies related to determining the relationship between the quality of information disclosed in corporate reports of companies and their financial position. Li (2010), Das and Chen (2007), Tetlock (2007) dedicated to the study of the influence of the quality of information disclosed in annual reports of companies to the valuation of their shares traded on the securities market. Goel and Uzuner (2016) found out correlation between text tonality of annual reports and possibility of false statements. Pisano and Alvino (2015) indicated a positive relation between the quality evaluation of information disclosed of the financial condition of Italian companies and the forecast precision of financial analysts. In all these studies the methods of economic and mathematical modeling were used as a methodological tool for analysis.

But all these studies limited because considered only the relationship between financial information and the financial position of companies. There is a clear shortage of theoretical and methodological researches that which would be directed to establish the connectivity of information between financial and non-financial information of Russian corporate reports.

The result of author’s assessment pointed to an insufficient quality of information disclosure of Russian annual reports to achieve adherence to the IR principle "Connectivity of information". Obviously, a research is required that can give a more accurate assessment of the quality of the disclosed information in the annual reports, according to not only the connectivity of information, but also all IR principles.

It is important to pay attention to the insufficient study of the chosen topic of the research in the context of the activities of Russian companies, meaning, to identify the compliance of company reports with the principles of integrated reporting using semantic analysis tools, since earlier such studies were conducted only on the basis of foreign companies (in particular, Italian [Pisano and Alvino, 2015] and American [Caserio, Panaro and Trucco, 2016]).

3. Research Questions

Given the gap in the existing literature, research questions for this present study are:

- Is there relationship between the management's interpretation of annual report's financial information and the objective financial position of Russian companies?
- Is there relationship between the management's interpretation of annual report's financial information and other non-financial information of sustainability reports of Russian companies against to the principle of integrated reporting "Connectivity of information"?
- Is there relationship between the objective financial position of Russian companies and other non-financial information of sustainability reports of Russian companies against to the principle of integrated reporting "Connectivity of information"?

4. Purpose of the Study

The purposes of this study are:

- to analyse relationship between the management's interpretation of annual report's financial information and...
5. Hypotheses development

5.1. Relationship between the management's interpretation of annual report's financial information and the objective financial position of Russian companies

According to the first hypotheses it is important to determine whether there is a relationship between the quality of the management's interpretation of annual report's financial information and the objective financial situation of Russian companies. The quality of the management's interpretation of financial information can be evaluated by the results of semantic analysis of certain words in the annual report's text. Financial position in determined by financial ratios which characterize the financial result and financial or material position of the company.

5.2. Relationship between the management's interpretation of annual report's financial information and non-financial information of sustainability reports of Russian companies

Under the second hypothesis, it was proposed:

- to reveal relationship between the management's interpretation of annual report's financial information and narrative description of how an organization manages an environment protection;
- to reveal relationship between the management's interpretation of annual reports financial information and narrative description of how an organization manages human resources (management and motivation);
- to reveal relationship between the management's interpretation of annual reports financial information and narrative description of how an organization contributes to the benefits of local area (place of residence).

5.3. Relationship between the objective financial situation and non-financial information of sustainability reports of Russian companies

Under the third hypothesis, it was proposed:

- to reveal relationship between the objective financial situation of Russian companies and narrative description of how an organization manages an environment protection;
- to reveal relationship between the objective financial situation of Russian companies and narrative description of how an organization manages human resources (management and motivation);
- to reveal relationship between the objective financial situation of Russian companies and narrative description of how an organization contributes to the benefits of local area (place of residence).

6. Data collection procedures

As the test object, there were selected consolidated financial statements and annual reports of 30 Russian companies for 2011-2017 which are included in the final rating of the quality of information disclosed in the integrated reporting by Russian companies, conducted by the Russian Regional Network on integrated reporting.

Narrative descriptions of annual and integrated reports disclosing information of how an organization manages an environment protection, manages human resources (management and motivation) and contributes to the benefits of local area (place of residence) for the period 2011-2017 were used to analyze the connectivity of information. In the final base for analysis were included 840 texts.

On the basis of the selected information, the relationship between the description of natural, human, social and relationship capitals and textual financial information of the company was established.

7. Research methodology

7.1. Ratio analysis

To determine the financial condition, seven coefficients were calculated, three of which characterize the financial result of the company: Return on Sales (ROS), Return on average assets (ROA), Return on investments (ROI). And four coefficients which characterize the financial or material position of the company: Current ratio (CR), Financial stability index (FS), Turnover of current assets (TR), Working capital to current assets ratio (OFR).

For comparability of data, the same period of 2011-2017 was chosen.

7.2. Semantic analysis

The texts of the financial performance reviews and narrative descriptions of how an organization manages an environment protection, an organization manages human resources (management and motivation), an organization contributes to the benefits of local area (place of residence) were extracted from annual and integrated reports.

To determine the level of expression of management's opinion in the financial reviews, the method of carrying out a text analysis with the distribution on the Loughran-McDonald Words list was used (Loughran and McDonald, 2015). According to this technique, there are several semantic fields or groups that determine the tonality of the words. These include: Positive...
words; Negative words; words of Uncertainty; Constraining words; Litigious words and Modal words (detailed the research technique with examples of words is described in the author's previous works (Plotnikova, Shilovskaya and Dvorak, 2017).

According to the semantic analysis report, the shares of the words of each semantic group in the total number of words of the text of the financial reviews were calculated with the help of a specialized computer program developed with the participation of the authors (Plotnikova, Shilovskaya and Dvorak, 2017).

7.3. Correlation analysis

In the process of analysis, it is important to define whether there is a correlation between specific groups of words, or rather their share in the total number of words in the reports, and financial indicators of the companies. The correlation analysis allows us to achieve this goal, which establishes not only the dependence, but determines its strength and type. To do this, use the Pearson’s correlation coefficient. This coefficient makes it possible to estimate the relation tightness between the two analyzed parameters. Its value varies from -1 to 1, where one means perfect direct (increasing) linear relationship, minus one – the perfect decreasing (reverse) linear relationship.

One of the most important criteria reflecting the connectivity of information is the existence of a strong relationship between financial information and other information disclosed in corporate reports. To determine the level of expression of the management’s interpretation of financial and non-financial information, the method of carrying out a text analysis with the distribution of words on the Loughran-McDonald Words List was suggested to use. To establish whether there is a relation between the management’s interpretation of annual report’s financial information and the objective financial position of the company.

Table 01.

<table>
<thead>
<tr>
<th>Negative</th>
<th>ROA</th>
<th>ROS</th>
<th>ROI</th>
<th>CR</th>
<th>TR</th>
<th>FS</th>
<th>OFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>3%</td>
<td>3%</td>
<td>3%</td>
<td>7%</td>
<td>13%</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>Reverse</td>
<td>40%</td>
<td>33%</td>
<td>37%</td>
<td>27%</td>
<td>30%</td>
<td>23%</td>
<td>20%</td>
</tr>
<tr>
<td>Positive</td>
<td>17%</td>
<td>20%</td>
<td>17%</td>
<td>30%</td>
<td>13%</td>
<td>13%</td>
<td>30%</td>
</tr>
<tr>
<td>Reverse</td>
<td>13%</td>
<td>13%</td>
<td>13%</td>
<td>13%</td>
<td>17%</td>
<td>23%</td>
<td>10%</td>
</tr>
<tr>
<td>Uncertainty</td>
<td>Direct</td>
<td>17%</td>
<td>17%</td>
<td>20%</td>
<td>13%</td>
<td>17%</td>
<td>13%</td>
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<tr>
<td>Reverse</td>
<td>27%</td>
<td>27%</td>
<td>23%</td>
<td>20%</td>
<td>10%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Litigious</td>
<td>Direct</td>
<td>17%</td>
<td>7%</td>
<td>13%</td>
<td>23%</td>
<td>23%</td>
<td>13%</td>
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<tr>
<td>Reverse</td>
<td>23%</td>
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<td>27%</td>
<td>20%</td>
<td>20%</td>
<td>10%</td>
<td>25%</td>
</tr>
<tr>
<td>Modal</td>
<td>Direct</td>
<td>7%</td>
<td>10%</td>
<td>7%</td>
<td>17%</td>
<td>20%</td>
<td>13%</td>
</tr>
<tr>
<td>Reverse</td>
<td>23%</td>
<td>23%</td>
<td>23%</td>
<td>22%</td>
<td>13%</td>
<td>17%</td>
<td>30%</td>
</tr>
<tr>
<td>Constraining</td>
<td>Direct</td>
<td>13%</td>
<td>13%</td>
<td>13%</td>
<td>13%</td>
<td>7%</td>
<td>13%</td>
</tr>
<tr>
<td>Reverse</td>
<td>20%</td>
<td>13%</td>
<td>13%</td>
<td>20%</td>
<td>7%</td>
<td>17%</td>
<td>17%</td>
</tr>
</tbody>
</table>

According to Table 01, it can be seen that, on average, 30-40% of companies in the sample have almost all coefficients observed a reverse relationship between all financial coefficients and the number of negative words. The trend is quite obvious: when the financial situation of companies is worsening, more negative words become visible in their reports.

The dependence of the number of positive words and financial position is primary direct (but not obvious) for the share of companies in the range of 20-30%, depending on the coefficient. This situation is considered to be natural, as management uses mostly the positive words to reflect their opinions on the report when the financial situation is improving.

There is an assumption that the text analysis aimed at determining the positive opinion of company management with the help of positive words should not be too significant. This is due to the fact that negative words are practically not used to make a positive statement, but positive words, on the contrary, are often used to mitigate negative statements, in addition to their main purpose – describing positive events. At least, this can explain the inverse relationship between the number of positive words and the financial position of 10-20% of companies. Or it indicates the possibility of distortion of information about the real financial condition.

By the presence of words which indicate the uncertainty of the situation, it is possible to assess the management’s level of uncertainty in a given situation. According to Table 01, the correlation between this group of words and the financial situation on the average in 20% of the companies is the reverse. For profitability indicators, the number of companies with stronger and reverse correlation increases to 27%. For another 17% of companies in each group, this dependence is direct.

In the first case, if the financial situation worsens, the number of uncertain words in the report will increase. In the second case, management carefully expresses its opinion and makes forecasts using more words which indicate uncertainty in general or uncertainty in the described events, despite the fact of the improving financial condition.

The presence of litigious words in the text of the report indicates the company’s involvement in legal proceedings. This dependence was manifested in those companies which disclosed such information in detail. For some companies, the relation is direct, this indicates a discrepancy between the situation of worsening financial situation and the increase in the number of words of this group in the text.

The number of modal words for most companies does not have a strong relation with the financial position of the company. As the data in Table 01 shows, for those companies from which it is found (that is, about 10-20%, depending on the group of

8. Findings

Interpretation of the results of the correlation analysis is presented in Tables 01-07. Tables show the share of companies in the total sample amount, in which the correlation coefficient between each specified parameter and the fraction of words of each group in the total sum of the words of the report is more than 0.5. This indicates that there is a strong or fairly moderate relationship between the parameters. All values of the correlation coefficient less than 0.5 are not significant for this analysis. There are two types of correlations direct and reverse. In gray, cells where the number of companies with correlated parameters exceed the value of 25%.
companies and the financial ratio), the relation is most reverse. Companies use more emotions when describing their decrease financial situation. This is proven by research of American companies. (Caserio, Panaro and Trucco, 2016)

The words from the group reflecting pressure or constraining indicate the existence of certain requirements for the organization or conditions that in some way restrict its activities or oblige to perform any actions.

The relationship between the financial position and the proportion of constraining words is reversed and it is observed on average in 10-20% of companies. This proves that the increase phrases that indicate pressure from the external environment or the emergence of new liability, and the decrease financial situation are related.

8.2. Results of the analysis of the relationship between the management's interpretation of annual report's financial information and non-financial information of sustainability reports against to the principle of integrated reporting "Connectivity of information" and the objective financial position of companies

For the purposes of our study, the relationship between financial information and the other information disclosing narrative description about the company’s ESG activities were established using a correlation analysis of the relationship between the results of a semantic analysis of the management’s interpretation of annual report's financial information and sustainability report disclosing information of how an organization manages an environment protection, manages human resources (management and motivation) and contributes to the benefits of local area (place of residence).

According to the Table 02, the relationship between the texts of the companies' financial reviews and narrative description of how an organization manages an environment protection is not obvious. This is confirmed by the total values of the share of companies with a significant correlation (>0.5) between certain groups of words in each cell of the table.

The most marked is the reverse relationship of the number of uncertain words in the texts of financial reviews with positive and negative words from environmental reports (13-27%). One of the possible reasons of this tendency may be the growth in production and sales that have a positive effect on the financial situation, which leads to a noticeable increase in production capacity. This is due to the fact that there is decrease in the company's environmental performance and the companies do not present this directly. However, the willful non-disclosure also will not be a way out of a situation for the most companies. For these purposes, the presentation of information in the format of a cautious expression of opinion and the use of words reflecting the uncertainty of the present position will be the decision to this problem.

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Table 02. The results of the relationship between the management's interpretation of annual report's financial information and narrative description of how an organization manages an environment protection

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Table 03. The results of the relationship between the objective financial position of companies and narrative description of how an organization manages an environment protection

Table 03 shows the reverse relation between negative words in text of the environmental reports and indicators of the company’s financial result. That is, while improving the financial position of these companies is associated with improving environmental performance, according to management's description of the environmental activities.

There is also a direct relation between constraining words and the company's financial position (33-37% companies). This indicates that improving the company's financial position and enhancement the emphasis on increasing the descriptions of standardized procedures or procedures that limit the company’s activities in the texts on environmental activities are related.

The Table 04-05 shows the lack of relationship between the texts of the companies' financial reviews and narrative description of how an organization contributes to the benefits of local area (place of residence), as well as with charity activities. This allows us to conclude that the companies are enthusiastic about the description of their achievements related to the sponsorship and charitable financing of the city and regional infrastructure of the places of residence, without linking this description with their real financial position.

During the analysis of the relationship of financial information with information about the company's work with human resources and its contribution to their development and...
 motivation, one should pay attention to the prevailing direct correlation between the positive words in companies’ financial reviews and the most semantic groups of words from texts about company’s human resources. The reason for this relationship may be a situation where the good financial position of the company, as an important condition for the feasibility of social measures, is consistent with the description of measures to work with staff and increase their motivation.

The results of the correlation analysis between the objective financial position of companies and narrative description of how an organization manages human resources are much better than with the management's interpretation of annual reports financial information. According to table 07, the most notable is the direct relationship between the litigious words and the...
indicators of the company’s financial result (30%). There is an assumption about the emergence of this connection due to the developed legal support for such companies. On the one hand, a possible influence factor is a successful litigation campaign. On the other hand, such a factor may be the editing of the texts of reports by lawyers themselves, which may reinforce the relevant terminology. For example, such dependence was manifested in such companies as Gazprom, NK Rosneft or Acron, etc.

The relation between the modal words in the narrative description of how an organization manages human resources and the company’s financial position is mainly reverse to 23-30% of the objects of research. Such companies show that when the financial situation decreased, descriptions of activities related to personnel development became more emotional.

The constraining words is directly related to the financial situation also nearly 30% of companies (indicators of ROA, ROI, TR).

9. Conclusion

Summarising the results of the analysis, we concluded that the level of informational transparency of corporate annual reports of Russian companies is insufficient. The relationship between the level of the management’s interpretation of financial information and the real financial situation was found on average in all indicators of only 20% of companies.

The share of companies with a marked correlation between certain semantic groups of words in financial reviews and texts on environment protection reports ranges from 10-30% on average. This can be explained by the fact that these companies do pay attention to the description of the contribution to environmental protection and at the same time connect the management’s interpretation financial information with the narrative description of how an organization manages an environment protection. In comparison with the results of the correlation analysis associated with the description of the company’s contribution to the development of the places of residence and charity activities, where this range is 3-27%, the results of the correlation analysis on environment are significantly better in terms of the number of established significant pair correlations.

The share of companies with significant pair correlation coefficient with texts on human management also does not go beyond the range of 7-30% of companies on average for all groups of words.

The results of the correlation analysis between the objective financial position of companies and non-financial information of the sustainability reports are much better than with the management’s interpretation of annual reports financial information.

As the results, we come to the conclusion that companies pay most attention to the description of environmental activities. In our opinion, this is related to the demands of society and a certain standardization of environmental reports, which obliges companies to monitor the quality of the information disclosed and reflect the impact of the financial indicators of its activities on the external environment. Although it should be noted that this trend is typical for a small number of companies in total sample.

The narrative description of how an organization contributes to the benefits of local area (place of residence) and manages human resources is mostly voluntary, which allows the management of companies to show it in a more profitable and convenient format. The study showed that this approach does not allow to establish the relationship between financial information and the sustainable development report.

The specified results of the correlation analysis for all the company’s ESG reports may be associated with the peculiarities of the presentation of the management’s interpretation in the texts of reports. Generally, sections within one report have a different structure of the material presentation and are prepared by employees from unrelated departments (for example, financial managers and environmentalists), which leaves its stamp on the style and presentation of information.

Each company has its own specifics, which is determined by the industry and its activity, corporate culture, leadership style, etc. Despite the existence of uniform standards and common guidelines for developing corporate reports, each company interprets in their own way the amount and level of disclosure of the information, which subsequently aggravates the problem of connectivity between reports. It should be noted that this problem also strongly influences the possibility of a semantic analysis of textual and descriptive information since its results will directly depend on the specific feature of the statement's opinion.

All of the above indicates a clearly insufficient ability of most Russian companies to comply with the principle of connectivity of information. To enhance it, it is necessary to it should be logically structured, well presented, written in clear, understandable and jargon-free language, and includes effective navigation devices, such as clearly delineated (but linked) sections and cross-referencing. That can improve the ability to search, analyze and link information.

In the present study, at the first stage, a correlation analysis was conducted between objective financial position, expressed using financial coefficients, and the management’s interpretation of annual report’s financial information. At the second stage, a correlation analysis was carried out between the management’s interpretation of annual report’s financial information and the results of a semantic analysis of narrative description from sustainability reports in three areas: environment, human resources, and contributions to the development of local area (place of residence), and also the objective financial position of companies. The study showed an implicit correlation for most companies. According to the authors, it is possible to improve the quality of research results according to the methodology used, when conducting additional analytical researches to establish the compliance of the quality of reports against the principle of integrated reporting “Connectivity of information”. They consist in the development of an additional description that demonstrate the connectivity of financial performance with performance regarding other capitals. That is, the description is not so much how they are interrelated, but the level and direction of the influence of each of them on each other. This section is similar to the content elements of the Integrated report “Performance”.

References


Corporate Governance Structure and Firm Performance in the Indonesian Capital Market

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*Corresponding authors

Abstract

This research examines the effect of the board of institutional, the independent board and the board size to the firm performance. Using fixed effects data panel regression, this research investigated 293 firms listed on the Indonesia Stock Exchange during 2010-2015. Firm performance was proxied by market measure (Tobin’s Q). The findings of this research suggested that the board of institutional, the independent board of commisioners had positive impact only to Tobin’s Q value, while the board size could increase both Tobin’s Q. On the other hand, this research found that the debt, and risk gave no impact to firm performance. This research also found that the board size had non-linear relationship with investment as proxied by IOS. While the IOS variables were able to mediate the effect of the board size to firm performance.

Keywords: board of institutional; independent board of commisioners; board size; firm performance.

1. Introduction

The attempts to achieve the economic growth rate have been numerously conducted by the government. Indonesia where about is still relying on commodity exports, and they should immediately diversify the economy to overcome the worsening of world commodity prices (Handriani and Robiyanto, 2018b, Handriani and Robiyanto, 2018a). A manufacturing industry has a cash feature that is able to earn a high income and hire a lot of labors, while, in this situation, it reduces the unemployment rate.

A current research conducted by Patiro and Budiyanti (2016) produced information that the manufacturing industry in Indonesia grew very well in the early of 1990s. Its growth is always above 9 percent annually. Sadly, when the economic crisis hit Asia in 1998, the manufacturing industry slumped sharply to minus 11.4 percent. Recovering from the crisis, the manufacturing industry rocketed but the climb was still not as large as in the early 1990s. A manufacturing sector is a fairly stable sector and one of the sectors supporting the country's economy amid the uncertainty of the world economy with its growth rate and its contribution to Gross Domestic Product (GDP) since 1999, and still keep being secure right away.

Although in 2008-2009, there was a global financial crisis, but Indonesia's manufacturing industry was quite stable and did not experience the sharp decline of the Asian crisis in 1998 which resulted once in Indonesia's manufacturing industry. Based on data from BPS (2016) or known as Central Bureau of Statistics of Republic Indonesia, the contribution of non-oil/gas manufacturing sector to GDP in 2015 reached 18.18 percent with the value Rp 2.098 trillion. This contribution increases when it is compared to the year of 2014 which reached only 17.89 percent with the value Rp 1.884 trillion.

The internal effort of the company is to maintain the organization's governance and its capital structure. The optimal utilization of capital structure has an effect on company debt level. According to Pecking Order theory, the order of capital structure is one of the most important theories incorporated debt. This theory supports the existence of adverse selection, namely the existence of hierarchy toward the funding of the company. The hierarchy prefers its choice on internal funding to external funding. When the external sources of funding are needed, the companies which support this theory will prefer debt to equity, as the lower agency costs related to debt problems.

Hence, this paper examines the effect of capital structure on the performance of manufacturing companies. In particular, it directly tests the effects of good corporate governance on corporate performance, and follows the agency theory introduced by Jensen and Meckling (1976) as well as Jensen (1986)’s free cash-flow theory. These theories predict that the choice of capital structure can affect the company’s performance.

Corporate governance is a mechanism that has a purpose to convince investors to have corporate management activities in harmony with the interests of investors. As a corporate governance mechanism, it is expected to provide trust that investors will receive in return on the fund they have invested. A corporate
governance is based on the agency theory with regard to convincing investors that managers will benefit by investing money in profitable projects and how investors' mechanisms for managers' control functions (Shleifer and Vishny, 1997). Monks and Minow (2011) argued that corporate governance clarifies the relation.

2. Literature review and hypothesis development

Agency theory is developed by Jensen and Meckling (1976) which explained the agency relationship that arises on the contract between the agent (management) and the principal (owner). In a contract, there is a delegation of some decision-making authorities from the principal to the agent. For each party is assumed as a utility maximizer, then there is no reason to fully believe that the agent will act on behalf of the best interests of the owner. It can be seen, for example, on managers as agents who do not work earnestly in maximizing the value of the company. Aligning to this behavior, in order to maximize the wealth of the principal, the agent is an agency problem. This problem in turn will give a rise to agency costs consisting of monitoring cost, bonding cost, and residual loss (Jensen and Meckling, 1976, Wahyudi et al., 2018).

A corporate governance, which is a concept based on agency theory, is expected to serve as a tool to give investors a trust that they will receive in return on the fund they have invested. A corporate governance deals with how investors believe that managers will benefit them, making sure that managers will not embezzle or invest in unprofitable projects with funds invested by investors. As what has been stated, agency theory highlights the aspects of internal corporate governance mechanism (Eisenhardt, 1989). Therefore, this research uses internal corporate governance structure which is proxied with institutional ownership, independent board of commissioners, and board size. While the dependent variable is firm performance, which is proxied in Tobin’s q and the variable of investment decision based on company growth is proxied with (Klibig) as introduced by Handriani (2016). The independent variables are firm size, debt, age, and risk. In other hand, the independent variable that describes the corporate governance policy is the structure of corporate good governance, which consists of; first, institutional ownership that is proxied by using the percentage indicator of the number of shares owned by institution, second, the composition of independent board of commissioners that is proxied by using the percentage indicator of the board of commissioners comes from outside the company, third, the size of the board of commissioners that is proxied by using indicators of the number of members of the board of commissioners of a company.

The problem will be formulated into a simultaneous model, i.e. a model formed by one dependent variable described by one or more independent variables, where a dependent variable at the same time will act as an independent variable for other tiered relationships (Ferdinand, 2005). The corporate governance structure, firm size, debt, age, corporate risk are independent variables.

A corporate governance control mechanism is divided into two, namely internal and external mechanisms. The external mechanism includes: capital markets, funders, consumers, and regulators. Walsh and Seward (1990) argued that the external control mechanism is a firm control based on market for corporate through a capital market effectiveness (Fama and Jensen, 1983), product and service markets (Grossman and Hart, 1982), and managerial labor market (Fama, 1980).

Internal mechanisms, consist of: controls exercised by the board of commissioners (Fama and Jensen, 1983) including subordinate committees, boards of directors, managements and shareholders, or it is through an attractive and competitive incentive scheme for management (Fama, 1980). The agency theory highlights the aspects of internal corporate governance control mechanism (Eisenhardt, 1989). Therefore, this study uses an internal corporate governance structure consisting of the institutional ownership, the composition of independent board of commissioners, and the size of the board of commissioners.

2.1. Corporate governance and firm performance

Corporate governance has been well known in the community. In general, it is a good structure and system for managing a company with the objective of increasing shareholder value and accommodating various stakeholders such as creditors, suppliers, business associations, consumers, workers, government and wider community. This concept is quickly accepted by the public even the performance of a company's stock is now determined to what extent its seriousness in implementing corporate governance (Utama and Utama, 2005). However, some academic research have proven that there is no significant relationship between corporate governance structure, mechanisms, and financial performance (Balasubramanian et al., 2008, Bebchuk and Cohen, 2005, Black and Khanna, 2007, Blackley, 2000, Gompers et al., 2003, La Porta et al., 2002, Yermack, 1996, Handriani and Robiyanto, 2018b, Handriani and Robiyanto, 2018a, Utama and Musa, 2011, Brahmana et al., 2018).

2.2. Measuring institutional ownership and firm performance

This research is based on the agency theory. The concept of agency problem conducted by Jensen and Meckling (1976) stated that the agency problem will occur if the proportion of institutional ownership of company stock is less than 100%, which makes the managers become selfish and the implementation is not based on maximizing corporate value in making investment decision. At a very high level of ownership, there is a tendency of institutional investors to enforce certain policies that are not optimal, regardless of the interests of minority shareholders through the voting power they possess. Shleifer and Vishny (1997) argued that the degree of institutional ownership in substantial proportions will affect the market value of the firm. The basis of this argument is that the greater the institutional ownership, the more effective the control mechanism on the performance of management.

The institutional ownership as one of the proxy variables of corporate governance structure acts as a control mechanism for the future investment determinants of the company. A company investment requires opportunity, plan or project that can be selected to achieve its objectives, namely profitability. The companies with large investment opportunities indicate its bright future outlook, then it will have a positive impact on the value of the company. This is what Modigliani and Miller (1958) argued that corporate value is determined by the ability to generate high profitability and investment. Therefore, at a very high level of ownership, there is a tendency of institutional investors to impose certain policies that are not optimal by neglecting the interests of minority shareholders through the voting power they possess.

Having consistent with the concept, corporate governance is a control mechanism for firm performance if the increasing mechanism of institutional ownership control increases the firm performance. In this research, firm performance is proxied by Tobin’s q = Market Value of Equity (MVE) + Debt / Total Asset. The institutional ownership is proxied by the percentage of the number of shares held by the institutional investor, and the investment is proxied by the Investment Opportunity Set (IOS), following Chen et al. (2000), Handriani and Robiyanto (2018b), Handriani and Robiyanto (2018a), Mackie-Mason (1990), Skinner and Soltes (2009), Utama and Sulistika (2015) used investment-based proxies, research and development expense to book the value of total assets is believed in a high level of...
investment activity related to the value of a company Investment Opportunity Sets (IOS).

Concerning to those cases mentioned above, then hypotheses 1a, 1b and 1c are formulated as follows:

Hypothesis 1a is an institutional ownership positively affects to firm performance, hypothesis 1b is an institutional ownership affects to investment and hypothesis 1c is an investment mediates the influence between institutional ownership and firm performance.

2.3. Board independent and firm performance

The previous study was conducted by Beiner et al. (2004) on a set of companies listed on the Swiss Stock Exchange, with the aim of examining the impact of board size on company performance. The result of the study suggested that the board size is an independent control mechanism. Hypothesis 2 in this study is in accordance with agency theory proposed by Jensen (1986) who explained that conflict of interest of manager with shareholder's interest occurs with the assumption that shareholders and agent (each manager) wants a high return on investment projects but in a different interest towards the risks.

A corporate governance is the structure and control mechanism for managing a company by means to improving corporate prosperity and accountability, whose ultimate goal is to make shareholders value (Handriani and Robiyanto, 2018a). The independent board is one of the variables of internal corporate governance structure that is expected to affect the investment. The independent board in this study is proxied by the percentage of the number of independent board members of the total number of boards of commissioner's members.

Thus, it can be assumed if firm's board size is high, it will have a positive effect on firm performance and corporate investment. Hence hypotheses 2a, 2b and 2c are formulated as follows:

Hypothesis 2a is independent board has a positive effect on firm performance, hypothesis 2b independent board which has a positive effect on investment and hypothesis 2c is investment mediates the influence between independent board and firm performance.

2.4. Board size and firm performance

A research on the impact of board size on firm value has a significant positive impact on firm value. The previous research stated that a company with large board size is able to make a better decision so as to improve performance for the achievement of company value (Eisenberg et al., 1998, Jensen, 1994, Lipton and Lorsch, 1992, Yermack, 1998). The latest research in line with the above results are Garg (2007), Haron et al. (2013) which found the evidence of board size and independence of members of the board of commissioners both for companies with family ownership and non-family ownership have a strong and significant positive effect on the financial performance of the company.

Thus, based on the description above, it can be assumed that if the firm's board size is high, it will have a positive effect on firm performance and investment, then hypotheses 3a, 3b and 3c can be proposed as follows:

Hypothesis 3a is the board size has a positive effect on firm performance, hypothesis 3b is board size affects to investment, and hypothesis 3c is investment mediates the influence between board size and firm performance.

2.5. Firm size and investment

The problem of firm size is an important factor in the perspective of capital structure. The size of a company is an important indicator in an economic system that has generated interest among researchers. Prior empirical research has explored the size of the firm and has provided much evidence that firm size has a significant effect on investment. The previous researches were run by Axtell (2001), Coad (2009), Kaizoji et al. (2006). In general, the result of previous researches allowed us to draw the conclusion that firm size plays an important role in corporate investment policy. This means that the company has a huge potential to choose different investment opportunities in getting a positive NPV from a number of investments. The NPV will contribute to cash inflows, and then accumulate in increased profitability. Thus, based on the description above, it can be assumed that if firm size is high, it will have positive effect on investment, then the fourth hypothesis proposed in this study is firm size has a positive effect on investment.

2.6. Debt and investment

A debt policy is the decision of the extent of debt usage to manage and run the company's activities by using debt to equity ratio, where it can be obtained by dividing the total liabilities by the company with their own capital. The management of the company should pay attention to the amount of the loan considering the other parties who have an interest in the company's ability to pay the interest and loan principal.

The measurement of the company's debt level is based on the data derived from the company's balance sheet and the ratio which is typically used in financial leverage. This is because the higher the level of debt, the more funds available to pay dividends. The highest dividend payouts can provide a positive signal that cause a raise on one's company's value (Ernayani et al., 2017). To measure the amount of financial leverage in which it measures the extent to which the company is financed by debt.

An investment policy is a decision that concerns to the allocation of internal and external funds to various forms of investment. Thus, based on the description above, it can be assumed that if the company's debt is high, it will have a positive effect on the investment, then the 5th hypothesis proposed in this study is debt has a positive effect on the investment.

2.7. Age and investment

Theoretically, long-standing companies will be trusted by investors rather than newly established companies, since they are assumed to be able to generate higher profits than newly ones. As a result, newly established companies will find it difficult to obtain funds in the capital market so that they rely more on their own capital. The age of the company is expected to affect its investment desire because older companies have a good experience of investment activity.

The long-standing companies will increase their profits due to the experience of previous management in business, so they have a force to run a profitable investment, with a good investment capability, the company is certainly good at managing risks as well. Thus, based on the description above, it can be assumed that firm age has a positive effect on investments, then the 6th hypothesis filed in this study is firm age has a positive effect on investment.

2.8. Systematic risk and firm performance

Systematic risk is associated with risk factors that affect the market as a whole. The systematic risk comes from factors that systematically affect most companies such as; war, inflation, recession, exchange rate changes, and high interest rates (Brigham and Houston, 2012). These risks affect the securities as a whole, and most stocks tend to be negatively affected by these risks, so the consequences cannot be diversified (Brigham and Houston, 2012).

A research by Kapoor and Pope (1997) stated that
systematic risk or market risk affects firm performance. A company as business institutions is particularly vulnerable to the pressures of these macroeconomic fundamental factors. In this study, systematic risk is proxied by using Beta (β). The concept used is single-index model, the value of Beta (β) of each company is calculated by regressing the stock return of each company with market return during the study period. Thus, it is assumed that if systematic risk is high, it will negatively affect the investment. Henceforth, the seventh hypothesis proposed in this study is systematic risk negatively affects the investment.

2.9. Investment and firm performance

An investment decision is a capital expenditure of a current situation to get the result or profit in the future. The shareholders always want managers to be able to choose and create investment decisions that can increase future profits. These benefits will improve the company's performance from the viewpoint of investors so as to provide a positive signal to investors that will increase stock prices and firm performance. Thus, it is assumed that when the investment is high, it will have a positive effect on firm performance. Then the 8th hypothesis proposed in this study is the investment positively affects on firm performance.

### Table 1. The Test Results of Goodness of Fit Model

<table>
<thead>
<tr>
<th>Source: The result of data processing by LISREL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chi-Square and Probability</strong></td>
</tr>
<tr>
<td>1. Minimum Fit Function Chi Square</td>
</tr>
<tr>
<td>2. Normal Theory Weighted Least Square Chi Square</td>
</tr>
<tr>
<td><strong>Goodness of Fit Indices (GFI)</strong></td>
</tr>
<tr>
<td>1. Adjusted Goodness of Fit Index (AGFI)</td>
</tr>
<tr>
<td>2. Parsimony Goodness of Fit Index (PGFI)</td>
</tr>
<tr>
<td><strong>Root Mean Square Error of Approximation (RMSEA)</strong></td>
</tr>
<tr>
<td>1. P-Value for Test of Close Fit (RMSEA)</td>
</tr>
<tr>
<td><strong>Expected Cross Validation Index (ECVI)</strong></td>
</tr>
<tr>
<td>1. ECVI (0.22) &lt; ECVI for Saturated Model (0.28)</td>
</tr>
<tr>
<td>2. ECVI for Independence Model (2.38)</td>
</tr>
</tbody>
</table>

The table of results above shows that all **index goodness** of fit model structured are fit. This is seen from the model results value, which is appropriate by **cut off value** description.

### 4.1. Hypothesis Test

The hypothesis result can be seen based on the magnitude of t-value on Table 2.

### Table 2. Direct Influence of Corporate Governance; DEBT; SIZE; AGE; RISK; FP and INV

<table>
<thead>
<tr>
<th>Source: The result of data processing by LISREL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variables</strong></td>
</tr>
<tr>
<td>Institutional Ownership to Firm Performance</td>
</tr>
<tr>
<td>Independent Board to Firm Performance</td>
</tr>
<tr>
<td>Board Size to Firm Performance</td>
</tr>
<tr>
<td>Investment to Firm Performance</td>
</tr>
<tr>
<td>Institutional Ownership to Investment</td>
</tr>
<tr>
<td>Independent Board to Investment</td>
</tr>
<tr>
<td>Board Size to Investment</td>
</tr>
<tr>
<td>Size to Investment</td>
</tr>
<tr>
<td>Debt to Investment</td>
</tr>
<tr>
<td>Age to Investment</td>
</tr>
<tr>
<td>Risk to Investment</td>
</tr>
<tr>
<td><strong>Unstandardized Coefficient Standardized t-Value</strong></td>
</tr>
<tr>
<td>Estimate</td>
</tr>
<tr>
<td>0.01</td>
</tr>
<tr>
<td>0.81</td>
</tr>
<tr>
<td>0.48</td>
</tr>
<tr>
<td>0.34</td>
</tr>
<tr>
<td>4.01</td>
</tr>
<tr>
<td>0.12</td>
</tr>
<tr>
<td>0.14</td>
</tr>
<tr>
<td>0.25</td>
</tr>
<tr>
<td>0.02</td>
</tr>
<tr>
<td>0.02</td>
</tr>
</tbody>
</table>

The first is the indirect influence on institutional ownership on firm performance through investment variables. Second, the influence of independent board to firm performance through investment and the third is the indirect influence on board size to firm performance through investment as measured by the Sobel Test shown in Table 3.

5. Discussion and conclusion

This study aims to examine the effect of good governance on firm performance. Test result on the first hypothesis is that institutional ownership has a positive effect on firm performance, which is supported empirically. This can be shown with a t-value of 2.74. While hypothesis 2 is shown with t-value of 1.74 and hypothesis 3 is shown with t-value 4.66. The results show that, institutional ownership is a positive determinant for company performance. However, an independent board has no significant positive effect on firm performance, and contrary, the board size has a positive effect on firm performance. The results of this study can be interpreted that corporate governance as a variable affecting firm performance would affect the reputation of companies in Indonesia.

In line with agency theory proposed by Jensen and Meckling (1976), it stated that the agency problems will occur when
The proportion of managerial ownership of a company's stock is less than 100%, so the managers tend to act in their self-interest and are not based on corporate value in funding decision making. Management did not assume the risk of making a decision, the risk was fully borne by the shareholders. Another cause of this conflict was that shareholders were concerned only with the systematic risk of the company's shares, as they invested in a well-diversified portfolio. Yet managers more concerned about an overall corporate risk.

The results of the second hypothesis test obtained an empirical support because it had a positive and significant influence. The third hypothesis is the influence of good governance toward investment including institutional ownership to investment indicated by the value of 3.37, whereas the independent board hypothesis to investment is shown with the value of 2.39 and board size hypothesis is shown with value 2.44. The results of this second hypothesis was that the corporate governance affected on investment activities of companies in Indonesia. The companies that made investments would certainly attract investors. In line with the signaling theory, that the level of investment chosen was one that maximized net present value. A future profit is financed from external and internal funding sources. Therefore, its utilization needs a good monitoring mechanism conducted by institutional ownership, independent board, and board size.

The results of fourth hypothesis was that the firm size had a positive effect on investment and it got an empirical support, shown by t 1.68. Thus, this study supported the results of previous research done by Jensen (1986), Kallapur and Trombley (2001), Kester (1984), Lewellen et al. (1987), Pindyck (1988), Siegel et al. (1988). The manufacturing companies in Indonesia had started investing and being diversified since the company was newly established. The company managers would always know more about the value of assets and opportunities than investors. This would show a fundamental thing as investment managers in getting to know that a project had a positive NPV.

A debt testing had a positive effect on investment and it got empirical support, shown by t 4.87. Thus, this study supported Fama and French (1998) on investment decisions. Fama (1978) stated that corporate value is solely determined by investment decisions. That opinion could be interpreted that the investment decision was important, because it achieved the company’s goal to increase shareholders’ value through corporate investment activities. The purpose of investment decisions was to obtain a high level of profit with a certain level of risks. A high profit accompanied by manageable risks were expected to increase the value of the firm, meaning that it would increase shareholder wealth. The use of funding sources for investments in accordance with Pecking Order Theory was first introduced by Donaldson (1961).

This theory demonstrates a hierarchy in fund-raising firms in which firm has a specific preference order capital used to finance their business (Myers and Majluf, 1984). Due to asymmetry information between the company and potential investors, the company will prefer retained earnings in advance to pay dividends and investment opportunities. If the company requires external funds, it will prefer to choose the debt before external equity. The internal equity is got from retained earnings and depreciation. Then debt is obtained from a creditor loan, while external equity is obtained from the company which issues a new share. In short, this theory prefers internal financing (funding derived from the results of the company's operations in the form of retained earnings).

The sixth hypothesis, age affects on investments, it did not get empirical support. Getting proven with the value of t 0.53. This hypothesis showed that firm age had a positive effect and it was not significant to investment. The older companies had better market access and would be able to increase their investment activity. This study was in line with the research by Humphrey-Jenner and Powell (2011), Pervan and Višić (2012), Srivastava and Laplume (2014).

The seventh hypothesis tested that the risk negatively affects investment obtained an empirical support to the t value at 0.76. The optimum capital structure implication targeted by the firm. It indicated that the balance between risk and return so that the stock price was maximized. The results of this study were consistent with Lyandres and Zhdanov (2013) and Raz and Amir (2014).

The test of the eighth hypothesis had a positive effect on investment to firm performance empirical supported to the t-value at 2.25. The implication of the research is that manufacturing companies in IDX have a positive effect on investment to firm performance, since large companies tend to have lower volatile income and net cash flow (Fama and French, 2000). This is consistent with research conducted by Ameer (2014) and Sadath and Charya (2015).

### Table 3. Direct influence of corporate governance; DEBT; SIZE; AGE; RISK; FP and INV

<table>
<thead>
<tr>
<th>Variable</th>
<th>Statistical Test</th>
<th>p-value</th>
<th>Standard Error</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutional Ownership to Investment Firm Performance</td>
<td>0.75</td>
<td>0.6461</td>
<td>0.0346</td>
<td>p-value &gt; 0.05</td>
</tr>
<tr>
<td>Independent Board to Investment Firm Performance</td>
<td>0.14</td>
<td>0.0109</td>
<td>0.0357</td>
<td>p-value &lt; 0.05</td>
</tr>
<tr>
<td>Board Size to Investment Firm Performance</td>
<td>0.45</td>
<td>0.3267</td>
<td>0.0349</td>
<td>p-value &gt; 0.05</td>
</tr>
</tbody>
</table>

### References


Impact of Human Resource Management Practices on Enhancing Organizational Performance

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Abstract

Studies dedicated to examining the relationship between human resource management (HRM) and organizational performance have predominantly laid stress on the private sector firms with little studies examining international governmental organizations (IGOs). Therefore, this study examined the effects of HRM practices on the attitudes of workers in an international government organization (IGO). The study obtained the results by analyzing data from staff survey and from interview sessions in a cross-sectional study focusing on one of the top and largest IGOs. Based on an extensive organization-wide survey supported by interview sessions, the study investigated the effects of HRM practices on the attitudes of workers. The IGO has a quasi-governmental role in delivering required public services that cover healthcare, social services, education and emergency assistance. Based on empirical evidence, there are significant effects of some HRM practices (training and development) that showed higher significance to others like staffing and recruitment. The findings showed that HRM practices do have significant effects on the attitudes of employees in a synergistic and complementary way that overcome their individual effects. This paper reached to the conclusion that HRM practices have a positive and significant effect on the attitudinal outcomes of workers. Added to this, there are factors that could have a moderating effect (positive/negative) on the practices, which is raised from the reverse causality question.

Keywords: HRM practices; HRM outcomes; international governmental organization (IGO); organizational performance; employee attitudes.

1. Introduction

In scholar and practitioner circles, organizational performance has been the most debatable topic, particularly in the public administration sector. This is compounded by the organizational reforms and the adoption of new public management that literature has highlighted (e.g., Saridakis & Cooper, 2016), making performance management as the core element that organizations need to gauge and adopt. The focus of the research is on Intergovernmental Organizations (IGOs), which are referred to as the organizations, operating in various national locations and whose member stages joint the institutions under their own volition. Such multinational entities include the United Nations (UN), they all provide differing mandates and hold different responsibilities in maintaining a stabilized global socio-economic environment among the governments of the member states. In fact, most IGOs are entities that provide services to the public and operate throughout national boundaries, employ expatriates and address cultural differences, depending on the member state governments’ donations for programs funding. Although managers of IGOs are garnering increasing attention in HRM, studies that touch upon this distinct organizational context are sadly lacking. Thus, in this study, the relationship between HRM-performance in IGO, as a public entity is examined. An increasing number of public management authors have dedicated their work to comprehending the influence of management on performance in the firms’ context (Boyne, 2010).

Studies of research caliber evidenced a positive relationship between specific management practices adoption and organizational performance (Katou, Budhwar and Patel 2014). Moreover, HRM relationship have extensively examined, particularly when it comes to the causal linkage between them. The topic is quite popular among management studies, with major of them illustrating and evidencing a positive relationship between the two variables (Marchington & Wilkinson, 2005). However, despite this face, there are some issues pertaining to theory and methodology that remain unanswered (Boxall et al., 2011; Paauwe, 2009). More specifically, HRM studies have confined their examination to the private sector firms, with little to no research dedicated to the public ones. Regardless of the significant differences between the two firm types, there is no clear difference in HRM studies as to how to address such differences in their effects on HRM practice in contrastingly workplace environment (Vanhalta & Starvrou, 2013). According to some scholars, HRM literature has ignored HRM in the public sector, depending on the appropriation of business models of firms as the general HRM scholarship context (Brown, 2004, p.305). This debate as to the comparison between the two organization types did not bar the consensus in the past thirty years as to the reform that has been introduced to the public service delivery throughout the countries around the globe (Boyne, Entwistle & Ashworth, 2010, p.4).

Such reforms have been viewed as by different scholars including with the consensus being that the reforms are directed towards changing traditional public administration to the New Public Management (NPM) model. In this regard, NPM managerialism entails the use of new business practices that embraces new management systems for the public sector employees that are result-centered and emphasis (Osborne, Radnor & Nasi, 2013).

2. Public sector for HRM

Majority of countries have formed a lackadaisical view of HRMs traditional personnel administration model within public
organizations, modifying the rule bound culture to one that is
based on performance (Shim, 2001). Hence, the novel HRM
practices enable them to adopt a more versatile approach when
it comes to the case of IGOs, majority goes for the generous
system of payment, high the security levels and optimum
entitlements (Walther, 2015). New employee management
approach matches with the extensive notion of the HRM impact
on IGOs performance at two levels (Gould-Williams, 2010).

The increasing focus on HRM practices in the public sector
domain has urged scholars to address the way the differences
in organizational environments may affect their performance.
The scholars have therefore intensified their examination on the
differences inherent in manufacturing against service firms,
public against non-profit and private firms, and the like
(Lengnick-Hall et al., 2009). In a related study, entitled “Strategic
HRM in for-profit and non-profit organizations in a knowledge-
intensive industry”, Rodwell and Teo (2004) focused on the
influences of specific HRM practices adoption on the
performance of organizations – for-profit firms compared in
Australian context. Based on their obtained findings, have
significant of HRM practices-organizational performance
relationship for both organization types. They reached to the
conclusion that HRM practices adoption leads to more intense
commitment and external orientation to the demands meted out
by clients (Rodwell & Teo, 2004).

Moreover, Leggat, Bartram and Stanton (2011) explored the
difference between the organizational context in light of the
effects on the outcomes of HRM and the performance among
employees. They revealed a positive relationship between
specific of HRM. They made use of a mixed method study mode
involving interviews and questionnaire survey distributed among
CEOs, in the State of Victoria as well as in community health
service organizations within the state. The authors also
employed 42 practices that encapsulated HRM bases. Based on
their conclusion, there is a significant HRM-perceived health-
care quality relationship, with HRM outcomes as mediator
(Leggat et al., 2011). They highlighted the fact that there is a
considerable gap between the HRM policies and the real
practices in the hospitals and the HRM this calls for their
effective enforcement when it comes to the newly introduced
policies.

Although the interest in the differences between the
organizational types has only recently emerged among HRM
scholar circles, HRM studies have not clarified the ambiguities
concerning the firms (Beattie, Rona & Stephen, 2013). Consensus lies in the claim that adopting eal lead to a dynamic
firms HRM. Modification in government structure and operations
match the NPM adoption and replaces the HRM systems used
by the private sector (Colley, Mc Court & Waterhouse, 2012).
Based on the argument of authors, the public administration
traditional model subjected personnel management to
bureaucracy, where the entire activities were formalized through
a pre-defined, systematic was rife with rational-legal that was
formed on a platform of specialization, arbitrary dismissal pre-
vention, dependence on work position authority and selection
via merit (Schoeder, 1992). The combined bundled version of
some HRM practices has effects on the selection, development,
retention and motivation of employees in a systematic and
synergistic manner coupled with optimum work-related activities
abilities, which in turn lead to enhanced performance of the
organization (Boxall, 2012).

The best HRM practice conceptualization has basically
undergone an evolution in the U.S. private sector firms, with
stress laid on addresses (Doherty & Norton, 2013; Croonen,
Grunhagen & Wollan, 2015). The development originated from
Huselid’s (1995) pioneering seminal work within which he
conducted a survey among senior human resource profes-
sionals working in 968 U.S. public firms. He focused on the
HRM-organizational relationship, and defined HRM measures
as for the organizational performance measurements, they
included employee turnover and labor productivity. The author
found a positive HRM practices-economic profit per employee
relationship after which the topic garnered increasing attention
and Huselid’s findings were replicated.

Majority of academics throughout the countries around the
globe have become more concerned with the HRM-
organizational performance relationship field, where several
work has been done and several others have highlighted the
specific issues in well-known journals emphasizing the influence
(Paauwe, Wright & Guest, 2013). In a related research, Katou
and Budhwar (2010) the employee skills, attitudes and
behaviors were examined for their mediating effects on the
HRM-firm performance relationship. Measuring employees skills
were the constructs of competence, cooperation with mana-
gement and cooperation among employees, measuring attitude
were the constructs of motivation, commitment and satisfaction
and lastly measuring employee behavior were the constructs of
retention and presence. The authors employed hierarchical
multiple regression modeling and found positive relationships
between HRM practice. Katou and Budhwar (2010) also
evidenced that HRM practices had no direct effects on
organizational performance but rather the effects were mediated
by the skills, attitudes and behaviors of employees.

3. HRM of performance
for public organizations

Specifically, Baptiste (2008) studied the local North England
government with the help of surveys distributed to 100
employees to investigate the HRM practices influence over the
effectiveness and decision making of the organization in order
to provision of public services. The author made use of HRM
practices comprising of six sets and considered them. He
measured organizational performance, its effectiveness was
measured by employee well-being. The results obtained from
the revealed of HRM practice instigated attitudinal charac-
teristics of employees in their well-being, creating a domino
effect that culminates in improved performance (p.296). In other
words, the study found an indirect relationship between HRM
performance, and performance with employee well-being as the
mediating variable (Baptiste, 2008).

A similar method was adopted by other studies in their quest
to examine HRM-organizational performance level relationship
but with different variables. For instance, in Beaupre and
Cloutier (2007), the authors examined the HRM practices
adoption in the Quebec public service sector, with the help of
economic performance. The authors’ exploratory study investi-
gated managerial reform in the Quebec government back in
1999 and their influence in the formation of Autonomic Service
Units (ASUs).

Another stream of research from this field indicated that
HRM practices positively influence individual employee
performance, which means that such practices positively
influence the outcomes of individual employees. Nevertheless,
the studies made use of HRM outcomes including commitment,
job satisfaction and commitment as intermediate variables that
relate HRM practice to performance significantly.

4. HRM and individual employee performance
outcomes

Research dedicated to the HRM practices effects on the
outcomes of individual employees were confined to examining
such effects on the relationship between HRM and performance
on the basis of the premise that influence. HRM refers to a
distinct set of management policies and practices that are
applied in the organization to realize the expected outcomes of
employees.

In the context of Netherlands, Steijn and Leisink (2006)
observed data from the Dutch Ministry of Interior concerning the
job status details of 28,312 employees in the public sector. The
authors looked into the employees of leadership and the perceptions for each employee regarding the HRM practices and their influence on their commitment to the public sector organizations. The authors managed to measure three employee commitment components on the basis of Meyer and Allen's (1997) measurements. They brought forward three primary organizational commitment kinds and considered them as the study’s dependent variables, namely affective commitment related to quitting their positions in the firm. Studies have primarily indicated HRM effects on performance in the public sector by studying various variables as the mediating/moderating variable between practice and performance, while some others made use of comparative method to investigate the distinction of the public organizations from the private ones. In particular, the effects of HRM on the attitudes and behaviors of private enterprises’ (PE) workers and state-owned enterprises (SOEs) in China was examined by Wang, Yi, Lawler and Zhang (2011). Their primary aim was to determine differences on the HRM practices efficacy between the two organization types and their influence on the performance of employees.

In the present paper, the way HRM affects the performance of IGOs are determined primarily to highlight the role of HRM in enhancing performance of such a distinctive context of organization. In the remaining parts of the paper, the following contents are presented: the operational model and the proposed hypotheses are enumerated then the study methodology adopted for achieving the objectives is explained. This is followed by the presentation of key results and their discussion, and the study implication. The study concludes by stating the major contributions of the study, its limitations and future avenues for further studies.

With regards to the indirect relationships, the model proposes that HRM practices have indirect relationships with organizational performance on the basis of the reviewed literature. The indirect effects of HRM practices on organizational effectiveness go via its positive effects on the morale of employees (Delmott et al., 2012, p. 1484). For example, in the case of selective hiring, direct outcomes can lead to skilled workforce and indirectly, this may provide several benefits (e.g., the creation of a talented pool of workforce). These were evidenced to be insignificant due to the fact that the research only focused on a single organization. The model further determined that age, gender, education level and national as personal characteristics – characteristics that are often overlooked in their significance (Paauwe, 2004, p.62).

Accordingly, this study examines the HRM effects on four major attitudinal measures following hypotheses to be tested:

Hypothesis 1: HRM practices have a positive effect on employee commitment.
Hypothesis 2: HRM practices have a positive effect on employee job satisfaction.

Hypothesis 3: HRM practices have a positive effect on employee motivation.
Hypothesis 4: HRM practices have a negative effect on employee intention to quit.

The hypotheses are tested in their measurement of employee attitudes on the basis of the study model and the reviewed prior studies. Prior authors proposed that the development of HRM attitudinal outcomes mediate the contribution of HRM to organizational performance practices (e.g., Korff, Biermann & Voelpel, 2016; Katou & Budhwar, 2010; Lengnick-Hall et al., 2009; Armstrong et al., 2010). HRM practices is assumed to result in improved attitudinal outcomes like motivation, commitment, quit intention and satisfaction of employees, which in turn, could lead to higher performance of the organization (the strategic aim of management practice). The causal link explanation and its operations are not under the purview of this study as the psychological contract between employee-organization falls under the field of behavioral as mentioned by Ramsay et al. (2000) and Guest (2002).

5. The study framework and research hypotheses

This work is based on the HRM activities, outcomes and performance model proposed by Boselie et al. (2005), which he adopted from the pioneering studies (1997) and Paauwe (2004), who addressed the relationship between HRM and performance. In other words while Paauwe and Richardson originally developed the model, it was by Boselie et al. (2005) in their research concerning HRM and performance. They presented the relationship between HRM with performance within well-known journals for the years 1994 until 2003 (Boselie et al., 2005, p.67) and they conducted an analysis to examine the dominant theoretical frameworks from the articles as to the way HRM and performance are operationalized and developed. They also analyzed the methodologies and the research designs adopted by the studies. Based on the model, the current study attempts to examine the attitudinal outcomes of employees, proposing that the used HRM practices will motivate employees, while making them committed and satisfied.

Aligned with the theory of HRM key the HRM determinant effects include individual work attitudes, satisfaction, motivation, commitment and quit intention. In the previous sections, studies evidenced that HRM outcomes stem from HRM practices (e.g., Tangthong, Trimetsoontorn & Rojniruttikul, 2015; Stavrou et al., 2010 and Armstrong et al., 2010). Figure 1 shows the HRM attitudinal outcomes (key mediators) and the intermediate variable that relates the practices of HRM with performance as illustrated in Guest’s (2002, p.340) study. As for the HRM practices, they refer to the organizational activities.

Figure 1. HRM activities in relation to HRM outcomes and organizational performance

Source: Paauwe and Richardson (1997)
6. Research methodology and data collection

The study focused on inter-governmental organization, which plays a governmental role by providing public services for more than 1.2 million recipients, recruiting more than 29,000 workers in the eleven branches in nine nations. The organization fits the objective of this study as it initiated an extensive reform program to boost its management capacity and facilitate services that are effective and efficient.

6.1. Data Collection

Data collection was conducted with the help of survey questionnaires distributed in a cross-section manner to the workers in the agency. A letter of invitation to the survey accompanied the questionnaire requesting the participation of the respondents and assuring them that their feedback will be kept private and confidential. Five hundred and five (505) questionnaires were distributed in a span of six weeks to seven service departments, from which 234 questionnaires were retrieved and deemed usable. The author also carried out interviews with the administrators and directors from various HRM departments. The interviews were meant to examine the influence of new HRM practices adoption in every department and determine the presence of clarify the questionnaire obtained data and clarified the perceptions of the HRM practices effectiveness.

6.2. Study Sample Characteristics

The characteristics of the 234 employees are as follows; majority (57.5%) was male respondents. As for the distribution of respondents based on ages from the highest to the lowest, they are as follows; 45% were between 46 and 60 years of age, 39.3% were between 31 and 45 years of age, 25.6% were between the ages of 18 and 30 years of age, and 0.6% was more than 60 years of age. Moving on to the years serving the agency and their qualifications, the average service year was 12.08 years, where standard deviation was 8.92. A few of the respondents (11.5%) had no formal qualifications, 25.5% were diploma holders, 37.2% had university degrees, and the remaining 22.8% had master degrees. With regards to their job positions, majority of the respondents (71.4%) were frontline workers, followed by supervisors (15.7%), middle managers (15.4%), and lastly, program managers (0.8%). As for the departments they were in, majority was in education department (39%), followed by Engineering, Infrastructure and Camp Development Department (31%), Microfinance department (18.0%), Procurement department (9%), Human Resources and Administration department (9%), Financial Services department (5%), Job Creation Program department (4%), Logistics Support Services department (4%), Community Services and Mental Health department (3%), and lastly, Health department (2%).

7. Analysis and results

7.1. Practices measures of HRM

According to the obtained findings, showed organization largely depended, utilized fixed and explicit job description, and for new hires they used an extensive process of socialization. Nevertheless, limitations exist for the advancement opportunities in the entity, limited to certain practice area or unit. In the case of performance appraisals, it was found that the process concentrates mainly on results. This may be exemplified by the fact that little attention is placed on the development of employees. According to prior literature, the process of appraisal has to encapsulate employee development areas on the basis of the interaction and group performance of the employee (Payne, Horner, Boswell, Schroeder & Sline-Cheyne, 2009). Lastly, with the performance appraisal time frame, the respondents had a neutral stance and mixed perceptions as to whether it is long or short-term condition.

The results from the survey indicated that HRM practices in this area are seldom used by the agency. Moreover, the results from the interview sessions indicated that the organization had rewards and incentives level. Moving on to the survey of job satisfaction, the two primary measures of employee satisfaction measures as manifested from the low remuneration and the few perks provided. Lastly, with regards to the training and employee development practices, the obtained results indicated that the training was provided in low degrees and are more specific to tasks. The initiatives and programs for training were focused more on long-term, with high participation from employees. Nevertheless, the training and development programs lacked system and are not oriented towards group performance. Little uptake was noted of many practices, particularly in compensation and rewards, with staffing and recruitment the sole area that the entity adopted HRM practices for.

8. Employee attitudes measures

The results obtained for the attitudes measure indicated the high commitment of the employees of organization, where the mean score was 4.76, followed by less satisfied mean of 4.36. The respondents also showed low possibility of leaving the entity, where mean score was 2.68. The employees were motivated, as evidenced by the mean score of 2.21 (gauged on a 3-point scale) and thus, by and large, the relationships results were expected. Commitment with satisfaction had the highest relationship with HRM practices. Lastly, the aggregate HRM effects was highly correlated with each dependent variable, indicating that the practices reinforced each other and were overlapping, and they had a synergistic influence on the attitudes of the employees.

8.1. The relationship between HRM and employee outcomes

The highest relationship based on the bivariate analysis results was with training, development and job satisfaction \((rs = 0.600 \text{ significant at } p < 0.01)\). A strong relationship was also noted for job satisfaction and performance appraisal \((rs = 0.569 \text{ significant at } p < 0.01)\). As for the relationship with job satisfaction, selection and recruitment practices, it was moderate found to be moderate \((rs = 0.361 \text{ significant at } p < 0.01)\). For employee commitment, it had the strongest relationship with training and development \((rs = 0.469 \text{ significant at } p < 0.01)\). In contrast, employee commitment had the lowest relationship with selection and recruitment practices \((rs = 0.361 \text{ significant at } p < 0.01)\) compared to other practices. Based on the obtained results, performance appraisal and employee motivation had the only insignificant relationship \((p < 0.05)\). For motivation and other HRM practices bundles, significant correlations were also evidenced; positive correlation with training, development and motivation \((rs = 0.197 \text{ significant at } p < 0.01)\).

9. OLS regression analysis

Multiple regression analysis was employed to test the four proposed hypotheses to determine the net effect of every independent variable (HRM practice bundle) on the dependent one (employee attitude).

9.1. Organizational commitment (Model 1)

The model shows two HRM bundles are significant predictors of employee commitment (performance appraisal and training and development) as both were found to positively affect employee commitment. With adjusted \(R^2 = 0.385\), the model is
deemed to account for 38.5% of the variance in employee commitment at (p < 0.001) level of significance. In other words, performance appraisal (β = 0.318, p < .001) and training and development (β = .309, ρ < .001) statistically predicted employee commitment. This result is aligned with prior results reported by Al Emadi and Marquardt (2007), who argued that the provision of training can lead to enhanced organizational commitment as posited by the social exchange theory. Specifically, the theory claims that employees become the organization’s workers in order to leverage the benefits received (Blau, 1964). According to Newman, Thanacoody and Hui (2011), the provision of training to employees is a part and parcel of an expected psychological contract that takes place between the employee and the organization. In relation to this, employees consider training and development opportunities as a reciprocal exchange for their commitment to the organization (Bartlett, 2001). Along a similar line of finding, performance appraisal was evidenced by prior studies as a process that is characterized by the participation of employees in terms of goals and standards setting for performance and this in turn, heightens the commitment among employees (Vasset, Marnburg & Furunes, 2011). Added to the above, performance appraisal clarifies the roles of employees and this could also contribute to their commitment to the organization (Pettijohn, Pettijohn & Taylor, 2001). As for the relationships directions, it was expected for two of the total four HRM practices bundles. Nevertheless, HRM scholars are of the consensus that staffing and recruitment selection processes positively impact the commitment of employees (e.g., Bowen & Ostroff, 2004; Dyer & Reda, 2010).

The above result indicative of the experience of respondents of having limited opportunities for promotion and development, with the interviewees clarifying that promotion opportunities are quite limited within the organization. Regardless of this fact, senior management perceptions of recruitment system were more flexible, allowing for external hiring and selection of best potential candidates.

This demonstrates the requirement for workers to comprehend the motives behind management’s recruitment and staffing procedures otherwise, it may undermine the expected effects of a selection process.

**9.2. Job satisfaction (Model 2)**

There are three HRM practices bundles that were found to have a statistic significant relationship with job satisfaction of employee and they are performance appraisal, compensation and rewards, and training and development, with each bundle positively influencing job satisfaction. In particular, 46.9% of the variance in job satisfaction significant at (p < 0.001), with adjusted R2 = 0.469 was accounted for by the second model. Specifically, the three HRM practices statistically and significantly predicted job satisfaction with the following values; performance appraisal (β = .344, p < .001), compensation and rewards (β = .207, p < .01) and training and development (β = .342, p < .001). This result is supported by prior studies dedicated to examining the effects of performance appraisal on the job satisfaction of employees, where majority of the authors reported positive significant job satisfaction-compensation relationship (e.g., Beutell & Wittig-Berman, 1999) and job satisfaction-performance appraisal relationship (e.g., Pettijohn et al., 2001). Studies of this caliber argued that the process of performance appraisal sets up the feedback system between the employee and managers, allowing the latter to provide the former’s clearly defined workplace role, minimizing role ambiguity, which is adversely related to job satisfaction.

**9.3. Motivation (Model 3)**

Also, the results showed an adjusted R2 = 0.030, indicating very little effect on employee motivation by the HRM bundles. From the result, the effects only constituted 3.0% of the variance in employee motivation, at a significant level of (ρ < 0.01). Compensation and rewards had the only statistical significant relationship with employee motivation (β = .105, ρ < .01), making it a significant predictor of it. This result may be attributed to Public Service Motivation (PSM) by Perry and Wise (1982) in their research, according to them, PMS is the predisposition of an individual to react to motives based distinctly on public institutions and organizations (Perry & Weise, 1990, p.368).

**9.4. Intention to quit (Model 4)**

The last model is for employee quit intention and the obtained adjusted R2 = 0.032, indicating that the model accounted for 3.2% of the variance in employee quit intention, but it was significant at (ρ < 0.01). Quite a low effect degree was noted from training and development (β = -.103, ρ < .01) on the quit intention of employees. This shows that training and development is the sole predictor of employee quit intention in an inverse relationship. Research dedicated to this relationship indicates that stress brought on by workloads and the supervisor-subordinate relationships are top reasons behind the quit intention of the latter (Firth, Mellor, Moore & Loquet, 2004). Also, prior studies indicate that training involving the building up of employee’s job skills make employees think twice about quitting as workers often realize that the benefits that can be reaped from training will be lost if they quit (Sieben, 2007).

**10. Conclusion**

The results were obtained from analyzed data collected with the help of a survey and interviews, in cross-sectional study. The study sample comprised of employees of an intergovernmental organizational headquarters. The findings of the study had partial support for the proposed four hypotheses. The study evidenced the relationship between some HRM practices bundles, which contributed towards the enhancement of work. Specifically, the results indicated multiple HRM practices bundles relationships. First, training and development had significant effects on three employee attitudes measures. Lastly, no relationship was found between staffing and recruitment and any of the four employee attitudes measures.

In addition, the findings illustrated that individual workers perceived HRM practices differently, which may be the reason behind some of the findings. This extends and literature to the new context, through the provision of empirical findings – including that some practices (training and development) were perceived to be more significant compared to others (staffing
The findings of the present study are aligned with those of prior authors in the context (e.g., Fey et al., 2009; Paauwe & Farndale, 2007). Some studies of this caliber even conducted a comparison of the HRM effects in different industries (e.g., Rodwell & Teo, 2004; Beaupre & Cloutier, 2007). Also, employees of humanitarian and development programs, are often in the least-developed nations, where the educational system is in dire need of training and development, explaining the significant factor effects on outcomes of employee. This is in contrast to the premise of the HRM model that posits the universal applicability of the practices for regardless of the context. More importantly, prior literature has been confined to organizational strategy, culture and industry, whereas the present study contributes by examining the organizational context type. The study recommends that administrators investigate the efficacy of using a universal approach. The study findings highlight the effects of organizational context when it comes to transferring distinct management practices to the public organizations domain. In other words, management should not simply consider the universal applicability of management practices and principles and expect the same or similar outcomes. Lastly, the study findings have paved the way for future work to investigate and extend the study and explore other questions that have remained untouched in literature. They can undertake an examination of the causal logic to provide a deeper insight into the different outcomes of HRM practices implementation. This caliber of studies can assist in the decision-making of public administrations when it comes to importing private sector strategies and tools to the public sector. This study also recommends that future work be dedicated to conducting a longitudinal study involving all the organization offices in various geographical locations to determine if differences exist among them. To conclude, the study assists in isolating national context as the main factor that significantly predicts HRM outcomes based on the differences among countries.

References
Strategic Partnership: How Important for Reputation of Small and Medium Enterprise?

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Abstract
The cooperative relationship with stakeholders has potential to increase the knowledge of business managers. It is hoped that it will affect the company's good reputation. However, so far, the empirical research on reputation and partnerships has been primarily seen from the customer side and carried out in large organizations. Organizational agility is still rarely studied in both large organizations and Small and Medium Enterprises (SMEs). Therefore, this study aims to examine the role of strategic partnership, professional knowledge, and organizational agility in improving the reputation of SMEs. The data of 135 managers obtained was analyzed by using structural equation modeling with AMOS software. The results showed that strategic partnership has a significant effect on professional knowledge, but not on organizational agility. Professional knowledge has a significant effect on organizational agility, not on organizational reputation. Then, the organizational agility has a significant effect on the organizational reputation. Therefore, it is important to support the transfer knowledge from the individual to the organizational level. Besides, it is also necessary to improve social capital to support the reputation of SMEs.

Keywords: strategic partnerships; professional knowledge; organizational agility; reputation; SME.

1. Introduction
Talking about organizational reputation, it is always associated with large-scale enterprises. Small and medium enterprises (SMEs) are seen to be more important in managing their internal companies for the sake of efficiency and sustainability of the company. However, it cannot be ignored that one of the important problems of the SMEs is the difficulty in obtaining potential resources, including the quality of their management. To get talented employees, SMEs must compete with large companies that promise more attractive career paths and compensation. This is where the role of SME leaders in creating a positive reputation for the company to help attract and maintain valuable human capital for the company (Friedman, 2009). However, research on the company's reputation tends to be seen from the customer side (Bartikowski & Walsh, 2011; Caruana & Ewing, 2010; Eisenberger et al., 2010; Carmeli & Tishler, 2005), but empirical studies are rarely available from employee perspective (Fu et. al., 2014). How employees perceive the reputation of the company where they work has a direct impact on their attitudes and behavior (Helm, 2011). As a result, Fombrun and van Riel (2004) showed that the emotional appeal of employees determines the company's reputation. Even financial performance is not a major factor influencing employee perception if compared to emotional attractiveness. Moreover, positive attitudes and behaviors of employees eventually impact customer satisfaction and loyalty (Hurley & Estelami, 2007). Employees and owners can create corporate value through the quality of their relationships with customers (Hoque, et al., 2014) especially, for small and medium enterprises where the interaction between employees and customers is relatively high. Employees as company representatives will determine how customers perceive the company's orientation towards its customers. That is why an in-depth study of the organizational reputation is needed from the perspective of internal company.

The phenomenon of collaboration that is currently rife among large companies not only strengthens the capabilities of collaborating companies, but also has an impact on the company's reputation. Partnership practices can also be applied in SMEs despite limited capabilities and resources. The study of partnerships in small and medium enterprises in Indonesia is still limited, even though each SME has a unique competency that is potential to strengthen each other. This research is intended to fill this gap, which is to examine the role of strategic partnerships, professional knowledge, and organizational agility in enhancing the reputation of the Batik SMEs.

2. Literature review
In the era of increasingly fierce business competition, collaboration discourses are even more prominent. This collaboration mainly occurs in industries where companies need to coordinate their business functions with other companies in order to be able to compete effectively as in the telecommunications, transportation, tourism and automotive industries (Williams, 1999). Small-scale companies with limited capabilities and resources can also build partnerships with other business actors with the hope that such company is more capable of capturing external opportunities and internal challenges in creating and maintaining core competence.
There are 3 stages of the strategic partnership process. First, establishing a strategic partnership. The company identifies its own strengths and weaknesses, and then determines which company will become its partner. Of course, the chosen company is one that has competencies that will add value to the company. Second, developing a competitive strategy. The company identifies its core competencies, develops a value chain approach, and creates strategies to achieve partnership goals. Third, maintenance management. It includes ongoing actions to build trust, consensus of shared responsibilities, loyalty, shared risks, role adjustments, and mutual respect (Dunning, 1997; Lewis, 1990). Furthermore, sharing information through an organizational learning process will strengthen the core competencies of each company involved in collaboration (Hamel, 1991).

Today, it is increasingly believed that knowledge is an important asset of an organization. How valuable the knowledge possessed by all members will determine how much support for the achievement of company performance. Similarly, small and medium enterprises (SMEs) are increasingly critical of the need for knowledge workers. Resource limitations and managerial capabilities are some of the conditions in SMEs that limit discussion of knowledge ownership in small and medium enterprises which include the knowledge of employees and managers as well as business owners (Doris & Boštjan, 2008). Moreover, professional knowledge is an important resource in modern learning organizations today. SME leaders as value creators and key contributors to the company are required to have the ability to apply the knowledge and information they possess to support the completion of strategic tasks and decision making that determine the sustainability of the company (McFarlane, 2008).

Organizational agility is a relatively new concept, but there are some interesting definitions explained by a number of researchers. Some define it as the ability to recognize market changes and allocate resources to benefit from these changes (Najrani, 2016). Appelbaum (2017) describes organizational agility as the ability to respond proactively to unexpected environmental changes. Agile companies will enjoy improved performance over time, where current and future performance is always better than before (Routroy, 2015).

Najrani (2016) also suggests three strategies to become an agile organization, i.e., reactive agility, proactive agility, and innovative agility. The company is stated to have reactive agility if it can implement a change program, and if successful it will achieve an increase in profit. If companies do not respond to these changes, the company's profit may decrease. An agile organization will take the first option, which quickly recognizes and responds market changes. Proactive agility is defined as the company ability to proactively identify new market trends and quickly develop strategies in order to maximize profits. If the new trend is long term, then proactive action with strategy adjustments is the best choice. This means that companies are able to swiftly capture new opportunities earlier than competitors. Then, innovative agility occurs when the company strategy is focused on developing new products and markets where consumers are not aware of what they want.

There are number of definitions of organizational reputation. One of them is defined by Fombrun et al. (2000), who stated that an organizational reputation is a collective assessment of the company's ability to provide valuable outcomes for stakeholders. The resource-based view of the firm considers that an organizational reputation is an intangible resource which is very valuable and strategic for the company's competitive advantage in a sustainable manner (Deephouse, 2000; Fu, 2014). Organizational reputation also has a positive impact on financial performance (Surroca et al., 2010), business success (Lipina et al., 2017) and investment attractiveness (Pfarrer et al., 2010). Even a number of research results have found their impact on customer attitudes and behavior (Caruana & Ewing, 2010; Bartkowski & Walsh, 2011; Eisenberger et al., 2010). For employees as internal stakeholders, the organizational reputation has a positive impact on loyalty, creativity, commitment, job satisfaction, and self-esteem (Helm, 2011; Fu, 2014). This shows that the study of organizational reputation studies more about the impact on the organization. In the setting of small and medium enterprises that have limited resources, more research is needed on the role of owners and managers as those who have professional knowledge.

2.1. Strategic partnership and professional knowledge

The partnership built by the company has potential to trigger collaborative knowledge. Hopwood (2016) argues that such relationships have implications for the professional expertise of employees who interact directly with partners. The result by Williams (1999) showed that strategic partnerships support the sharing of information in the fields of products, markets, marketing, technology, industry, government, and so on. Certainly, all of them will support the improvement of the knowledge of company managers. Knowledge, information, and experience from these relationships are intellectual resources that can be used to create value (Nicholson & Kiel, 2004). Similarly, Nathan & Ribiere (2007) emphasized that corporate leaders capture knowledge through personal relationships and interactions with the external environment. The hypothesis can be formulated as: H1: Strategic partnership has a positive effect on professional knowledge.

2.2. Strategic partnership and organizational agility

By collaborating and sharing activities and values, companies can create more innovative and more efficient production processes; and other creative capacities that are difficult to achieve if working alone (Oliver, 1990). This shows that strategic partnerships have the potential to increase the company's ability to respond to market opportunities. Collaborative cooperation between companies also improves quality and speed in decision making, as well as increasing corporate resources (Borzso ny & Hunter, 1996). The results of this study can be interpreted as a strategic partnership which can enhance the company's ability to behave reactively and innovatively. Both are dimensions of organizational agility. Therefore, the hypothesis can be formulated as: H2: Strategic partnership has a positive effect on organizational agility.

2.3. Professional knowledge and organizational agility

As we all know, the involvement of young people in the field of entrepreneurship encourages the dynamics of competition that relies on creativity. No wonder the need to recruit and retain knowledgeable employees in SMEs is increasing. What is needed is a creative idea and the ability to execute it. This requires the support of SME owners as entrepreneurs (Doris, 2008). SME owners must have professional knowledge that distinguishes them from competitors. Entrepreneurs must be knowledgeable to support better business organization (Hunter, 1996). This is in line with the statement of Bruderl et al. (1992) that the higher the level of education of SME owners, the higher the productivity of their businesses. However, the results of Doris & Boštjan (2008) research show that professional knowledge of owners and managers (top management) of SMEs are not primarily determined by the level of education but the experience of business management. Omerzel (2008) also asserts that entrepreneurial professional knowledge will reduce the risk of uncertainty, improve learning skills, and examine market changes more quickly. It can be interpreted that professional knowledge of SME owners supports the company's ability to capture market opportunities and face competition.
dynamics. The agility of this organization requires the support of strong and sustainable commitment from its employees. The commitment of SME owners as the party with the most interest in the sustainability of the company, of course, need not be questioned. But at the level of the entrepreneur/owner of the SMEs, the determinant of organizational agility is his professional knowledge. This will determine the ability to formulate and adapt strategies that ultimately affect the competitiveness of companies in the industry (Klein et al., 2017; Alpkan, 2010). The hypothesis that can be formulated is:

H3: Professional knowledge has a positive effect on organizational agility.

2.4. Professional knowledge and organizational reputation

External parties with an interest in the company form perceptions about the company based on several things (Men & Stacks, 2012). First is a direct experience with the owner and manager. Second is the quality of communication that is built between stakeholders and the company. This is supported by the statements of Gotsi and Wilson (2001) which emphasize the role of communication in creating corporate reputation. In small and medium enterprises, effective communication between companies and external parties is carried out by managers. How the quality of communication that is built reflects his professional knowledge. Stakeholder’s direct experience through its interaction with the management of SMEs determines their perception of the company. The ability of SME managers to build relationships and collaboration with internal employees and external stakeholders affects the company’s reputation. As confirmed by Dowling (2004), that management competencies and quality affect the reputation of the organization perceived by stakeholders. The hypothesis that can be formulated is:

H4: Professional knowledge has a positive effect on organizational reputation.

2.5. Organizational agility and organizational reputation

One indicator of organizational agility is innovation. Organizations that have innovative agility will introduce new products to the market earlier (Najrani, 2016). Even consumers have not yet realized the need for these products. Competitors have also not offered to the market. The introduction of new, creative and fast products to the market has the potential to shape a positive corporate reputation. The company's ability to observe new trends in the market and immediately adjust its product design strategy provides an opportunity to be more proactive in the industry. This also has the opportunity to improve the company's reputation. The hypothesis that can be formulated is:

H5: Organizational agility has a positive effect on organizational reputation.

3. Methods

3.1. Population and sample

The population of this study is the manager of Batik SMEs. The sample involving 135 SME managers, as following Ghozali (2008) i.e. by using the estimation model of Maximum Likelihood Estimation (MLE).

3.2. Variable measurement

Strategic Partnership refers to respondents’ perceptions of the relationship of their cooperation and other batik SMEs. It used 5 modified indicators based on the instruments developed by Williams (1999), namely, information networks, product and marketing synergies, partnerships, market access efficiency and funding access.

Professional Knowledge refers to the respondents’ perception of how much knowledge they have is valuable and supports the company’s ability to compete in the midst of industry dynamics. It used 4 modified indicators based on the instruments developed by Lekap and Snell (1999) i.e. the ability to implement strategies, competitiveness, operational knowledge, and the ability to respond to changes.

Organizational agility refers to the respondents’ perceptions of how much the company is capable of facing competition proactively, reactively and innovatively. It used 3 modified indicators based on the instruments developed by Najrani (2016), i.e. speed of recognizing market changes, reactive agility, and innovative agility.

Organizational Reputation refers to respondents' perceptions of how much corporate responsibility to internal and external stakeholders. It used 4 modified indicators based on the instrument developed by Fu, et al. (2014), i.e. social, environmental and community responsibility.

Each indicator was measured by 1 question item, 1-10 scale from "strongly disagree" to "strongly agree".

4. Results

The validity test was conducted using Confirmatory Factor Analysis (CFA). All question items used in this study were declared valid, because the loading factor is greater than 0.4 which shows the level of compatibility between the variables and the factors. The reliability test was done using the Cronbach's Alpha method. In this study, the research instruments used were categorized as reliable because they have an alpha value of more than 0.6.

This research employed Structural Equation Model (SEM) test. Data analysis was conducted through AMOS software version 22. Table 1 shows that the standardized estimate value generated in each indicator is > 0.5, so it can be concluded that each indicator can be used as a measuring tool for the four variables in this study. The results of the model feasibility test showed the fit value where TLI is 0.981 or more than 0.90 and RMSEA is 0.066 or less than 0.08, whereas the values of GFI (0.891) and AGFI (0.847) showed marginal results. The RMSEA value is less than 0.08 indicating satisfactory fit (Noruzi et al., 2013), so that it can be concluded that the structural equation model is fit and can proceed to the hypothesis testing.

Table 1 shows that strategic partnership only has a significant effect on professional knowledge (β=0.845***), and has no significant effect on organizational agility (β=0.079). Similarly, professional knowledge only has a significant effect on organizational agility (β=0.867***), but it has no significant effect on organizational reputation (β=0.035). The organizational agility in this study shows a significant effect on organizational reputation (0.873***).

The hypothesis 1 test showed that strategic partnership has a positive and significant effect on professional knowledge. The
partner this case is interpreted as a collaboration that has been carried out by batik entrepreneurs with their stakeholders. These stakeholders include fellow batik entrepreneurs, local governments (industry offices), raw material suppliers, batik traders, educational institutions, and other business communities. The forms of cooperation include joint exhibitions, sharing of information, capital assistance, training in product and market development, guarantee of raw material supply, business consultation, relief of payment requirements, mutual benefit sharing, expansion of sales reach, and so on. The collaboration was carried out systematically, comprehensively, and synergically, sharing, expansion of sales reach, and so on. The collaboration was carried out systematically, comprehensively, and synergistically. Professional knowledge supports the agility to implement strategies to take advantage of opportunities and face competition. Besides, it also improves the ability to run business operations efficiently and effectively. As Scoot-ladd and Noonan's (2012) statement, that relationship is very important for the business community. Even Chittoor and Das (2007) assert that business failure lies in the company's ability to build partnerships with its stakeholders. One example, as acknowledged by respondents, that the limited ability of human resources and capital hampers the fulfillment of high export opportunities. With the production collaboration between batik entrepreneurs, orders from export markets can be fulfilled. This is able to increase the confidence of foreign customers and encourage the sustainability of re-orders. Then, the facts in the field also showed that batik entrepreneurs realize the importance of the role of Internet-based information technology. But again, the constraints of human resources capable of managing IT professionally are still very limited. Collaboration in electronic community systems is a solution that batik entrepreneurs cannot avoid to expand their marketing reach. This shows that strategic partnership has the opportunity to improve professional abilities of batik entrepreneurs. Based on the results of hypothesis testing, it was not proven that there is a significant effect of strategic partnership on organizational agility. Strategic partnership measured by the extent of systematic collaboration, information sharing, and synergy with partners do not have a significant effect on the agility of the company in terms of speed of recognizing market changes, early identification of new opportunities, and the speed of introducing new products. Agility here is interpreted as a quick and agile act of reading changes and responding immediately by offering new products that are in line with market trends. This finding shows that the cooperation made by batik companies with their stakeholders does not necessarily increase their speed of responding to these opportunities and challenges. This can be understood because of two things. First, respondents perceive that the cooperation which has been built so far has been followed up with joint action, not the speed of entering the market by the company individually. Second, cooperation with partners is carried out by the owner / manager who is the key person in SMEs. This causes partnership relationships that occur tend to improve the individual capabilities of those key HRs, and not directly improve organizational skills. Professional knowledge has a positive and significant effect on organizational agility. As it is known that SMEs depend on potential human resources whose numbers are very limited. Knowledge of SMEs is also located in these potential individuals. Usually an owner who at the same time acts as the leader / manager, having an interest in the sustainability of the business as well as the adequate basic experience and capabilities of the batik industry. So that the greater the ability to operate the business effectively and efficiently and implement strategies, the greater the agility of the company in introducing new products compared to its competitors. The finding showed that professional knowledge does not significantly affect the reputation of the organization. This finding is an indication that the reputation of small and medium enterprises is influenced by many factors, not only by the professional knowledge of the business manager. Professional knowledge is interpreted by the respondents as the ability of the owner / manager to apply knowledge in decision making and strategy implementation for business continuity, while SMEs are companies that are "close" to the surrounding community, both as customers, suppliers and sources of labor. Therefore, the ability to build social interaction with various external parties is an important factor. In the interaction process has the potential to build "trust" which is one of the factors in building the company's reputation as Wikaningrum's statement (2011) that "trust" is an intangible resource that is important for the organization and develops through a process of social exchange. Organizational agility has a positive and significant effect on the reputation of the organization. The results of this study are in line with previous studies that tested these two variables. A company that is proactive, reactive, and innovative is a characteristic of an agile organization. The company's rapid response to market and environmental changes affects the perception of external parties (partners, surrounding communities, customers) of the company concerned. For example, the problem that often occurs in the batik industry is the waste of chemical dyes that pollute the river and the environment around the production site. The company's willingness and ability to innovate to address these issues both proactively and reactively, reinforces its reputation for social and environmental responsibility. The use of natural materials that are environmentally friendly and of higher quality also has the potential to increase the company's reputation in the minds of the target market. The results of this study also show that a positive reputation is more effectively built through strengthening social capital. This is in line with the orientation of SMEs that are not only on the economic welfare of the company but also socio-economic justice. So that a balance is reached between the material and spiritual needs of both the internal company and the surrounding community. Indeed, Burt (1992) states that one of social capital is the reputation. This reputation comes from the relationship of interaction and cooperation in certain network memberships. It appears that it is very closely related to reputation and partnership, especially partnerships with credible stakeholders and has an impact on increasing the trust of other stakeholders. Therefore, SMEs that are as the subject of this research should actively join the network built by the Cooperative and SME Office. Various activities, such as training, coaching, and mentoring by government agencies are expected to increase the knowledge of SMEs and facilitate access to information that supports the development of their businesses. The membership of SMEs as fostered partners of the Cooperative Office and SME Office is expected to strengthen the company's positive reputation in the external stakeholder view. As for employees (internal stakeholders), the partnership can increase trust in the existence and development of the company they work for.

5. Conclusion

Small and medium business rely on "key person" who is generally the owner and or manager who becomes "top management". So that the partnership that occurs in SMEs has more impact on the professional knowledge of certain individuals. Knowledge at the individual level does not have a direct impact on the company's reputation. However, professional knowledge affects the agility of the organization in answering the dynamics of competition and opportunities, which in turn will have an impact on reputation. As with the findings of this study in which organizational agility significantly mediates the effect of professional knowledge on reputation. This has several implications. First, the importance of learning practices to support the transfer of knowledge from the individual level to the organizational level. Second, it needs to increase social capital to support the reputation of small and medium enterprises. Third, business actors must build partnerships with
credible stakeholders to create a multiplier effect. That is the effect of strengthening reputation and collaboration with other stakeholders, both external and internal. The authors also view the importance of further research that tests which one the partnerships with stakeholders which is most significantly improves the reputation of SMEs. Therefore, further research needs to involve several other concepts, such as organizational learning, knowledge management, and social capital.

References


Redefining the Conceptual Framework for Quality of Care

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Abstract

The purpose of this work is to provide a case study on quality care. More specifically, the study wants to confirm the following hypotheses: HP1, the attribution of quality features provided by the main actors involved in the multidisciplinary auditing process in healthcare; HP2, confirm the process characteristics related to quality auditing conducted at a multidisciplinary level in healthcare.

The study saw how the control tool is useful and necessary to carry out this evaluation continuous process, the survey of the most relevant variables, identifying the critical areas and the related corrective actions.

Keywords: quality care; healthcare; audit; multidisciplinary approach.

1. Introduction

The interest in measuring and improving the quality of health care in many countries of the world is growing due to the increase in health care demand, rising costs, limited resources and evidence of changes in clinical practice have increased (S. M. Campbell, Braspenning, Hutchinson, & Marshall, 2002; S. M. Campbell, Roland, & Buetow, 2000; Nottingham, Johnson, & Russell, 2018; Schuster, McGlynn, & Brook, 1998; Seddon, Marshall, Campbell, & Roland, 2001).

Quality has become an increasingly predominant part of our lives (Hall, 2004; Saad Andaleeb, 1998). People are continually looking for quality products and services. Quality healthcare is a human right (World Health Organization (WHO), 2017). Higher healthcare quality results in satisfaction for the clients (patients and the community in general), employees, suppliers and better performance for the organisation (E. Hart, 1999; O. Hart, 2003). If the quality of healthcare services improves, costs decrease, productivity increases and better service would be available for clients, which in turn enhances organisational performance and provides long-term working relationships for employees and suppliers (P.-M. Lee, Khong, & Ghista, 2006; Snoj & Mummel, 2002).

Some studies identify quality as an essential element for the administration of care, such as for the treatment of cancer. These requests led to a higher evaluation of services and clinical verification (Higginson, 1993; Higginson et al., 2003; McPherson & Addington-Hall, 2003; Payne, Large, Jarrett, & Turner, 2000).

The collection of information is essential, therefore, gathering information indirectly from the proxies later introduces potential problems regarding the validity of the relations the validity, in this context, refers to the degree to which the proxy accounts accurately reflect the experiences of the representing person. Now, little is known about the accuracy of proxy responses, even though inaccuracy can compromise validity and lead to incorrect conclusions. Because proxies are a significant source of information and are often the only source available for a large percentage of dying patients, it is crucial to understand how and why their accounts may differ from those of the patient (Higginson, Priest, & McCarthy, 1994; Hinton, 1996; McPherson & Addington-Hall, 2003).

The following work increases and confirms what has already been defined by the Mosadegh Grad studies (2012) concerning the characteristics related to the quality of health care, carried out at eight hospitals in the health system in Iran, involving 700 stakeholders interviewed. It also verifies the process defined in the study of Biancone, Tradori, Brescia, Migliavacca (2017).

This document aims to provide a case study on quality assistance. More specifically, the study wants to confirm the following hypotheses:

- HP1, the attribution of quality features provided by the main actors involved in the multidisciplinary auditing process in healthcare;
- HP2, confirm the process characteristics (Biancone et al. 2017) related to quality auditing conducted at a multidisciplinary level in healthcare.

The case study facilitates the deductive path linked to quality in health care; the contribution is aimed at the academic and professional communities.

On a scientific level, the research summarizes what is known and suggests some lines for further research to complete the study of the gaps. The document is structured as follows: the second section illustrates the research methodology, section three provides the discussion, while section four results, finally, section five concludes.

2. Methodology

The objective of the analysis is to propose a possible quality care approach and assessment path through the Piedmont Region case study. The study group has analyzed the existing literature, the Quality Care Plan of the Piedmont Region and subsequently a questionnaire was given to health personnel to gather the characteristics and application of quality care tools.
The study group for the definition of the questionnaire (Brescia, 2017) started from the review of the literature related to the processes of quality control in health and the audit processes within the health structures (Biancone et al., 2017). The construction of the questionnaire took place through a first review process based on the questions of the professionals followed by a second review that involved the involvement of health professionals in defining the contents through interviews according to the criteria established by the Delphi method (Hasson, Keeney, & McKenna, 2000; Hsu & Sandford, 2007). The preference of risk allocation identified from the survey was based on understanding and perceptions of respondents. The Delphi technique was thus adopted to minimize the biases or personal subjectivity of the operational station, Texas, USA, 2013. The questionnaire takes a second section dispersed with information feedback in the form of written summaries (Chan, Yung, Lam, Tam, & Cheung, 2001; Ke, Wang, & Chan, 2013). The questionnaire to be submitted to professional figures potentially involved in the quality care processes (doctors, administrative directors, health and complex structures, nurses, technicians and auditors) contains a first section aimed at investigating the salient characteristics of the interviewee and the company to which he/she belongs, and a second section aimed at evaluating the hospital risk management. The study group reviewing the questionnaire through interviews with experts in the field followed the indications proposed by Powell (2003). In order not to affect the collection of the obtained and available results (Alexander & Kroposki, 1999; Fiander & Burns, 1998; Hasson et al., 2000; Powell, 2003). The questionnaire definition process is present in the proceedings of the 2017 National AIDEA conference "Tendenze nuove negli studi economico-aziendali l’evoluzione dei rapporti azienda-società" held in Rome from 14 to 15 September (Tradori et al., 2017) and is based on the approach presented at the GIKA 2017 Conference – Global Innovation and Knowledge conference which was then published (Biancone et al., 2017). The questionnaire and interviews were carried out between October 2017 and December 2017 in the Piedmont Region (Italy).

The project has mainly collaborated with the local health care company (Azienda Sanitaria Locale – ASL) of Alessandria, Verbano-Cusio-Ossola-Vercelli. The local health care company (ASL) is a public body of the Italian public administration, charge to the provision of health services. It performs the tasks of the National Health Service in each area. The analysis is qualitative through questionnaire and interviews, but some statistical results are interesting and provide important food for thought. All statistical analyses were performed using STATA V.13 (Stata Corp, College Station, Texas, USA, 2013) and p-value < 0.05 was considered significant for all analyses (Palmore, 1988).

Data in the case study method are collected by multiple means and consist of qualitative research techniques such as interviews, document analysis, various modes of observation anthropological strategies as well as the use of quantitative data satisfying four criteria of research: construct validity, internal validity, external validity, and reliability (Behling, 1980; D. T. Campbell, 1975; D. T. Campbell & Stanley, 1963; Cock & Campbell, 1979; Denzin & Lincoln, 1994; Eisenhardt, 1989; Kitchener & Judd, 1986; Kirk, Miller, & Miller, 1986; Silverman, 2013; Stake, 1995; Yin, 1994).

The strategy adopted to guarantee the validity of the case study construct is the triangulation of the various data sources found thanks to the research, with the data of the interviews retrieved from the selected sample and the filing sources and direct participative observations and analysis of the guidelines and protocols of the Piedmont Region (Denzin & Lincoln, 1994; Silverman, 2013; Yin, 1994). Features linked to the guidelines and procedures adopted by the Piedmont Region’s risk management system were analyzed thanks to the interview of Dr. Giulio Fornero, regional manager.

The analysis presents the requirement of internal validity as there is the presence of causal relationships between variables and results because the degree of awareness of the change was not a standard value (Cock & Campbell, 1979; Glaser & Strauss, 1967; Silverman, 2013; Yin, 1994).

The analysis path has not affected the variables since the method starting from the construction of the questionnaire with the criteria established by the Delphi method and therefore leaving open and unconditional responses, working together with specialists and having access to internal documentation this has led not to affect the results. External validity is present in that there is an intuitive conviction that the theories adopted are generable as well as replicable and reliable (Cock & Campbell, 1979; Denzin & Lincoln, 1994; K. L. Lee, 2009; Numagami, 1998; Silverman, 2013; Yin, 1994).

The applied method involved the analysis of the legislation, protocols and, verification through interviews. The route can be replicated according to the approach presented Case Study.

Many events and circumstances have affected the region and despite the fact that Piedmont (Italy) has been used as a case study for other research subjects or other types of quality, it has been demonstrated by a response from the local government and institutions to address the hazard scenario and mitigate the quality to people, property and the environment by providing technical support to the emergency management (Aratano et al., 2010; Blengini, Brizio, Cibrario, & Genon, 2011; Pelosini, Bovo, & Cordola, 2011).

About our research the final assessment concerning the year 2015 (last available data), the Piedmont Region confirms its position in the first places in Italy for the quality of health services, also gaining a position compared to the previous ranking (Agnoletti, Bocci, Iommi, Lattarulo, & Marinari, 2015; Bacci, 2015; Ivaldi & Burlando, 2017).

The first step is the realization of the verification tool, which is a questionnaire consisting of six open questions, whose purpose is to demonstrate the presence of the nine characteristics of the control that make up the theoretical model. The questionnaire is to be submitted to professional figures potentially involved in the audit processes, which therefore represent the group of “experts” referred to in the explanation of the Delphi technique. The questions closely related to the verification topic are preceded by another six questions of a cognitive nature necessary for the purposes of the sample description (professional role, years of experience in this role, gender, type and name of the structure to which the structure is the primary source of financing).

The first phase was that of administering the instrument to a panel as described below (Table 3). A mixed sample was considered for each type of structure and funding, in addition to this sample, some statistics were selected for the review of the questionnaire through interviews.

The next phase saw the administration of this tool to other health professionals working in different ASLs of the Piedmont Region; the choice lies in the desire to start from a homogeneous health system by structure, organization and type of funding, in order to facilitate the analysis some data. The analysis of this further phase will be discussed in the next chapter.

3. Discussion

The control activity is a tool for quality assurance and is divided into various cases, in order to be able to monitor all aspects of the health service, ranging from economic-financial objectives to ethical and social objectives. Consequently, in the health sector "the audit activity should focus on a holistic approach, where the whole activity is verified and kept under control, able to meet the organization's management needs", thus favoring the maximization the outcome of health and the results both organizational and financial. From the analysis of the literature it emerges that the control activity consists of nine characterizing elements:
1. Periodicity
2. Relevance
3. Accountability
4. Cyclicality
5. Thoroughness
6. Task separation
7. Independence
8. Competence
9. Structure

The innovative contribution of this work: explore the topic, analyzed first theoretically (Biancone et al., 2017), through a case study in the desire to confirm the model.

It is a theoretical model, which asserts that the presence of the nine elements mentioned above is essential to guarantee the quality of services. Therefore, the objective of this study is to analyze the outlook that had the administration of the verification to the officials of different ASL of the Piedmont region, in order to demonstrate if the realized theoretical model has a summary in local reality analyzed and if the elements it is composed must be confirmed, expanded and/or redefined.

The theoretical framework used in order to achieve the meeting of quality healthcare requirements can be individuated as the "P.R.A.C.T.I.C.S." approach, whose name is derived from the acronym of the assumptions of the framework. In Table 1 it is possible to see the summary.

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Description</th>
<th>Autors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Periodicity</td>
<td>Audit is planned, must be recurrent and continuous, performed step by step, and this leads to the necessity of conducting periodic audits, whatever the typology of the audit is under consideration, in order to achieve the best result with limited (time) resources.</td>
<td>(Arter, 2003; Johnson, 1997; Moeller, 2009; Russell, 2012; Van Steen, 1996)</td>
</tr>
<tr>
<td>Relevance</td>
<td>Auditors cannot consider all the aspects of the organizations’ activities and must perform risk management practice to cover the uncertainties and potential events.</td>
<td>(Arena, Amaboldi, &amp; Azzone, 2010; Biancone, Marra, Secinaro, &amp; Iannaci, 2018; Hopkin, 2018; Power, 2004, 2007)</td>
</tr>
<tr>
<td>Accountability</td>
<td>The individualization of the accountable subject in each step of every audit activity, both for the auditor and the auditee, must be conducted thoroughly, in order to keep all the components of the organizations aware of their risks and responsibilities and consenting a better overall performance.</td>
<td>(Gendron &amp; Béland, 2001; Gendron, Cooper, &amp; Townley, 2001; Kurland, 2017; Mutcher, 2003)</td>
</tr>
<tr>
<td>Cyclicality</td>
<td>The audit process is divided into three separate phases of activity: programming, executing, controlling that are recurring and continuous.</td>
<td>(Bristol, 1993; Chou, Du, &amp; Lai, 2007; Khuri et al., 1996; Pudder, 2011)</td>
</tr>
<tr>
<td>Thoroughness</td>
<td>Audit must cover: management of organizations, being them related to law, financial aspects, clinical or medical occurrences, process necessities under the relevance assumption.</td>
<td>(Boekeloo et al., 1991; Cunnington, Neville, &amp; Norman, 1996; Fertle &amp; Shortell, 2001; Paine, 1994)</td>
</tr>
<tr>
<td>Task separation</td>
<td>Each control task and the related responsibilities must be cross check and separation amongst relevant areas of accountability in order to improve the quality of the audit activity, and reduce risks related to errors, manipulation or frauds.</td>
<td>(Beasley, 1996; Bedard &amp; Johnstone, 2004; Norman, Rose, &amp; Rose, 2010)</td>
</tr>
<tr>
<td>Independence</td>
<td>An effective independent audit Committee is seen as one of the determinants of audit service effectiveness.</td>
<td>(Al-Aym, 2009; Cohen &amp; Sayag, 2010; DeZoort, Hermanson, Archambeault, &amp; Reed, 2002; Dhillon, Naiker, &amp; Navissi, 2006)</td>
</tr>
<tr>
<td>Competence</td>
<td>The expertise of the auditors in the area of analysis and the observance of high-quality standards is the main driver of service quality is driven audit.</td>
<td>(Buttersworth &amp; Houghton, 1995; Eichenseher &amp; Shields, 1983; Holz, Jabb, &amp; Houghton, 2007; Shockley &amp; Holt, 1983)</td>
</tr>
<tr>
<td>Structure</td>
<td>Due to the complexity of the healthcare organization, and its diffused professional ties, the different typologies of the audit must be well structured, and must communicate between each other, in order to achieve a better understanding of all the areas audited.</td>
<td>(Fertle &amp; Shortell, 2001; Hannan &amp; Freeman, 1984; Palmrose, 1988)</td>
</tr>
</tbody>
</table>

Table 1. The quality healthcare requirements, "P.R.A.C.T.I.C.S." approach Source: Our production

In the previous research (Mosadeghrad, 2012) the 181 attributes that a health service should have in defining quality were illustrated and it was said that these refer to five categories of reference: Environment, Empathy, Efficiency, Achievement of objectives, Effectiveness (Biancone et al., 2017). These same macro classes were used to categorize the responses of the employees of the Piedmontese ASL. Each interviewee had to indicate all the criteria that he considered useful for achieving quality in the managed service, for this reason, unlike the previous questions, the numerical results and percentages do not refer to single responders, but to the number of times each attribute in the respective macro class it has been mentioned. In this regard, it is useful, for the purposes of our work, to report the categorization of attributes in the respective macro areas (Table 2). The attributes related to the environment are those most perceived as guarantors of quality in service provided, followed by Empathy, achievement of objectives and effectiveness, however, the less stated criteria are those related to efficiency.

4. Results
4.1. Sample description

Identifying the subjects in such a way as to represent a homogeneous sample was the first step. The study has not verified the effects of any future changes in personnel during the period in which the research has investigated but it has coded the entire sample, and the result is the following mapping (Table 3, 4).

Each role has been reviewed as well as years of experience, kind and Membership.

Subdivision by role: one third doctors, one third administrative, one fourth professional and, as expected, a smaller number of directors of complex structure (which are also less represented within companies).

Years of experience: better represented those who have more years of experience is a result understandable as knowing the company this part of responders tend to be more likely to respond, have more years of experience and stress behind but above all there were more competitions and entries in the ASL compared to what has occurred in the last 10 years (certainly for the administrative but also for the doctors). In Table 4 it is possible to see the description of the sample stratified by gender.

The percentages are to be read in the column: among the males, almost half of the responders are medical and the remaining 60% divided evenly among the other 3 categories. Among the females, there is instead a prevalence of administrative and are less represented the Guidelines of S.C. Any differences are not significant.

Similarly, the other two variables can be read.

4.2. Statistical results of the research

The results were obtained using descriptive statistics and quantitative analysis carried out through univariate and multivariate analyzes. The statistical processing of the answers
collected led to obtaining the following results. In table 5 it is possible to see the evaluation of clinical risk and elements of risk management.

The analysis of the clinical risk assessment and the risk management elements was submitted to the sample that presented a variable that the study did not initially put in the mapping: awareness.

In the sample 1 subject in 3 reports a high frequency of adverse events in his company. Few have answered questions related to the existence of a corporate reporting system and company procedures. Among these, all of them declare their existence. It is possible that many did not answer the question because, regardless of the existence or not, they declare of not aware of it, this is an important aspect to stress.

Less than half of responders stated that the division of tasks is correct; a third believe that the relationship between one's job and the level of responsibility and autonomy is not adequate. 60% consider the request to perform tasks that go beyond their strict competences acceptable.

Criteria related to the quality of service: the environment is the criterion most associated with the guarantee of quality of service, followed by empathy and the achievement of objectives. The least reported criterion was efficiency: this is an aspect that could probably be improved by empowering staff through trai-

Table 2. Characteristics of the quality of the health service divided by macro category

<table>
<thead>
<tr>
<th>Role</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor</td>
<td>30</td>
<td>31.91</td>
</tr>
<tr>
<td>Complex structure Manager</td>
<td>12</td>
<td>12.77</td>
</tr>
<tr>
<td>Administrative</td>
<td>30</td>
<td>31.91</td>
</tr>
<tr>
<td>Professional</td>
<td>22</td>
<td>23.40</td>
</tr>
<tr>
<td>Years of experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 5 years</td>
<td>15</td>
<td>15.96</td>
</tr>
<tr>
<td>5-9 years</td>
<td>4</td>
<td>4.26</td>
</tr>
<tr>
<td>10-19 years</td>
<td>27</td>
<td>28.72</td>
</tr>
<tr>
<td>≥20 years</td>
<td>48</td>
<td>51.06</td>
</tr>
<tr>
<td>Kind</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>32</td>
<td>34.04</td>
</tr>
<tr>
<td>Female</td>
<td>62</td>
<td>65.96</td>
</tr>
<tr>
<td>ASL Membership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alessandria</td>
<td>29</td>
<td>31.52</td>
</tr>
<tr>
<td>Verbano-Cusio-Ossola</td>
<td>54</td>
<td>58.70</td>
</tr>
<tr>
<td>Vercelli</td>
<td>6</td>
<td>6.52</td>
</tr>
<tr>
<td>Others</td>
<td>3</td>
<td>3.26</td>
</tr>
</tbody>
</table>

Table 3. Sample Description

<table>
<thead>
<tr>
<th>Gender</th>
<th>Male N (%)</th>
<th>Female N (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctor</td>
<td>15 (46.89)</td>
<td>15 (24.19)</td>
<td>0.090</td>
</tr>
<tr>
<td>Complex structure Manager</td>
<td>5 (15.63)</td>
<td>7 (11.29)</td>
<td></td>
</tr>
<tr>
<td>Administrative</td>
<td>7 (21.88)</td>
<td>23 (37.10)</td>
<td></td>
</tr>
<tr>
<td>Professional</td>
<td>5 (15.63)</td>
<td>17 (27.42)</td>
<td></td>
</tr>
<tr>
<td>Years of experience</td>
<td></td>
<td></td>
<td>0.141</td>
</tr>
<tr>
<td>&lt; 5 years</td>
<td>7 (21.88)</td>
<td>8 (12.90)</td>
<td></td>
</tr>
<tr>
<td>5-9 years</td>
<td>0 (0.00)</td>
<td>4 (6.45)</td>
<td></td>
</tr>
<tr>
<td>10-19 years</td>
<td>12 (37.50)</td>
<td>15 (24.19)</td>
<td></td>
</tr>
<tr>
<td>≥20 years</td>
<td>13 (40.63)</td>
<td>35 (56.45)</td>
<td></td>
</tr>
<tr>
<td>ASL Membership</td>
<td></td>
<td></td>
<td>0.206</td>
</tr>
<tr>
<td>Alessandria</td>
<td>10 (32.62)</td>
<td>19 (31.15)</td>
<td></td>
</tr>
<tr>
<td>Verbano-Cusio-Ossola</td>
<td>19 (61.29)</td>
<td>35 (57.38)</td>
<td></td>
</tr>
<tr>
<td>Vercelli</td>
<td>0 (0.00)</td>
<td>6 (9.84)</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>2 (6.45)</td>
<td>1 (1.64)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Description of the sample stratified by gender

Source: Our production
Quality management courses to improve quality and transparency thanks to the provision of adequate tools to understand the information.

Characteristics of the institution: the institution and the professional figures involved in evaluation should, according to the responders, first know the activities being assessed (60%), be objective and impartial (about 27%) and competent (25.4%). The third party of the institution appears to be less important than the assessment to be carried out (9.52%).

Most people (92.41%) believe that there is no pre-eminent activity compared to others, in carrying out the activity of a health facility that provides quality services, however, only 27.91% of respondents think that this synergy is present in the company to which it belongs.

In mapping the questions and conditions to be submitted to the selected sample (table 6), the researchers decided to move towards a significant direction: the univariate analysis of the variables that influence the perception of a high frequency of adverse events within the company to which they belong.

The univariate analysis evaluates individually the correlation between each of the variables inserted in the first column on the left and the perception of a high frequency of adverse events in the company. The variable "perception of the high frequency of adverse events" has been chosen because it is the one that, for sample size and distribution, is more likely to give results.

No variable was significant for univariate analysis. The study would underline it, remembering the low sample size, but it would use some interesting data to make hypotheses. In this, it reported in the table the percentages of the row less influenced by the number of the various categories.

Role: a high frequency perception of adverse events has been reported more by complex structure directors (perhaps because they have greater responsibilities) and by professional staff (perhaps because they are subjected to greater workload and work stress).

Years of experience: the perception of a high frequency of adverse events is evenly distributed, with a slightly higher prevalence in those with a greater number of years of experience (> 20 years: 40%)

Local health authorities: the professionals of Vercelli who responded are few but seem more likely to perceive a high frequency of adverse events compared to what happens in other ASL.

Strangely, those who believe that within their own company there is synergy between the various components that contribute to quality is more likely to perceive as high the frequency of adverse events within the same company (56.67%).

---

**Table 5.** Evaluation of clinical risk and elements of risk management  
*Source: our production*

<table>
<thead>
<tr>
<th>Perception of high frequency of adverse events</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>26</td>
<td>32.10</td>
</tr>
<tr>
<td>No</td>
<td>55</td>
<td>67.90</td>
</tr>
</tbody>
</table>

**Company reporting system presence**

| Yes | 33  | 94.29 |
| No  | 2   | 5.71  |

**Presence of company procedures**

| Yes | 28  | 96.55 |
| No  | 1   | 3.45  |

**Correct and consistent division of tasks**

| Yes | 39  | 44.83 |
| No  | 48  | 55.17 |

**Adequacy of the relationship between job and responsibility**

| Yes | 25  | 65.79 |
| No  | 13  | 34.21 |

**Acceptability of carrying out extra tasks**

| Yes | 26  | 60.47 |
| No  | 17  | 39.53 |

**Criteria related to the quality of the service**

| Environment | 45  | 51.14 |
| Empathy     | 35  | 39.77 |
| Efficiency  | 13  | 14.77 |
| Achieving goals | 30  | 34.09 |
| Effectiveness | 24  | 27.27 |

**Company characteristics**

| Knowledge of activities | 39  | 61.90 |
| Competence             | 17  | 26.98 |
| Experience under the subject of the evaluation | 9   | 14.29 |
| Third company          | 6   | 9.52  |

**Need for synergy between the components to ensure quality**

| Yes | 73  | 92.41 |
| No, there is a pre-eminent activity | 6   | 7.59  |

**Presence of synergy in your company**

| Yes | 12  | 27.91 |
| No  | 31  | 72.09 |

---

**Table 6.** Univariate analysis of the variables influencing the perception of a high frequency of adverse events within the company to which they belong  
*Source: our production*

<table>
<thead>
<tr>
<th>High frequency adverse events</th>
<th>N (%)</th>
<th>N (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Role</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Doctor</td>
<td>6</td>
<td>21</td>
<td>0.103</td>
</tr>
<tr>
<td>Complex structure Manager</td>
<td>5</td>
<td>6</td>
<td>0.55</td>
</tr>
<tr>
<td>Administrative</td>
<td>5</td>
<td>18</td>
<td>0.26</td>
</tr>
<tr>
<td>Professional</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Years of experience</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 5 years</td>
<td>1</td>
<td>12</td>
<td>0.35</td>
</tr>
<tr>
<td>5-9 years</td>
<td>1</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>10-19 years</td>
<td>7</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>≥20 years</td>
<td>16</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>ASL Membership</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alessandria</td>
<td>7</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Verbania-Cusio-Ossola</td>
<td>13</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Vercelli</td>
<td>4</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>0</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>Correct and coherent division of tasks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>10</td>
<td>36</td>
<td>0.075</td>
</tr>
<tr>
<td>No</td>
<td>14</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Adequacy of the relationship between duties and responsibilities</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4</td>
<td>9</td>
<td>0.481</td>
</tr>
<tr>
<td>No</td>
<td>4</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Acceptability of extra tasks</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6</td>
<td>9</td>
<td>0.344</td>
</tr>
<tr>
<td>No</td>
<td>5</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Need for synergy to ensure quality</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>20</td>
<td>36</td>
<td>0.482</td>
</tr>
<tr>
<td>No</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Presence of Synergy in his company</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>17</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>3</td>
<td>75</td>
<td></td>
</tr>
</tbody>
</table>

**Table 7.** Multivariate analysis: potential predictors of the perception of a high frequency of adverse events within the company to which they belong  
*Source: our production*
In conclusion, the study subjected the sample to multivariate analysis (table 7) in which potential predictors of the perception of a high frequency of adverse events within the company to which they belong are evaluated. The results are very interesting as the multivariate analysis evaluates the association between the variables of the left column (role, gender, years of experience and ASL) and the probability of perceiving the frequency of adverse events as high. Concerning the univariate analysis seen above, what changes? In this case, each variable is not evaluated individually but inserted into a logistic regression model that corrects the results due to the possible influence of the other variables contained in the model.

It emerges that:

1) the Directors of S.C. have a probability of perceiving as high the frequency of adverse events within the Company which is 6.74 times that of physicians (reference category). This data is adjusted for the possible influence of the other variables present in the model could have (years of experience, gender, ASL) and is a data at the limits of statistical significance (p = 0.052);

2) Vercelli professionals have a probability of perceiving as high the frequency of adverse events within the Company which is 8.87 times that of the Alexandrians (reference category). This data is adjusted for the possible influence that the other variables present in the model could have (years of experience, gender, role) and is a statistically significant data (p = 0.049).

4.3. Analysis of results

The next step, for this study (purpose: to demonstrate the validity of the theoretical model, testing it on a larger sample), is to analyze the questions from a qualitative-descriptive point of view, keeping in mind what emerged from the statistical results. To examine the individual open questions the research, need to start from the characteristics identified by the theoretical model, essential in the control process to guarantee the quality in healthcare, to confirm, implement or modify them. As seen, each application submitted investigates one or more of the nine characteristics of the control. In table 8 it is possible to view the results of the answers.

<table>
<thead>
<tr>
<th>Question</th>
<th>Aspects</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>Periodicity and Cyclicality</td>
<td>Adverse elements: therapeutic errors and drug delivery; diagnostic difficulties, infections; events included in taxonomy CTAE and ADR (Common Terminology); Adverse Events and Adverse Drug Reaction; operating seat suspension. Other adverse organizational and procedural events concern: delays in providing the service; lack of communication between the various departments; events of aggression by users at the expense of the providers.</td>
</tr>
<tr>
<td>2a</td>
<td>Relevance and Thoroughness</td>
<td>Not countless requirements are listed, but the study can identify some main ones such as: centrality of the patient/user; evaluation of available resources (be they human, instrumental, financial); analysis of the context in which it operates (useful for identifying risk areas); adherence to the guidelines.</td>
</tr>
<tr>
<td>3a</td>
<td>Accountability and Task separation</td>
<td>A small majority of respondents declare that, within the health structure at which it serves, the division of activities is correct but, from a more in-depth qualitative examination of the answers, it emerges that despite their affirmation, sometimes (with a far more casual character) compared to those who say otherwise) are placed in situations to perform tasks not strictly competent, therefore, effectively the separation of tasks is not so clear.</td>
</tr>
<tr>
<td>4a</td>
<td>Competence</td>
<td>Professionals in the healthcare sector have favored attributes falling within the “Environment” category, such as: professionalism; training; flexibility; accessibility; appreciably; etc. In the second place in terms of frequency, the sample listed attributes related to the sphere of “Empathy”, such as: humanity, I listen; courtesy; respect; communication; involvement, etc. Important, even if reported with a slightly lower frequency, are the attributes of “Goal achievement” and “Effectiveness”.</td>
</tr>
<tr>
<td>5a</td>
<td>Independence</td>
<td>The knowledge of the activity has been the most reported but, within it, the study could also include experience in the area covered by the assessment and emerge the characteristics of objectivity and impartiality.</td>
</tr>
<tr>
<td>6*</td>
<td>Structure</td>
<td>The perception is that there must be synergy between the various components and activities of the organization to increase the level of quality. Not surprisingly, in response to the question of how to cope with the occurrence of adverse events respondents among the various responses report the need for coordination between the various tasks.</td>
</tr>
</tbody>
</table>

The first question in the questionnaire focuses on the aspects of the “Periodicity and Cyclicality” of the control activity.

The largest number of respondents answered this question and, as illustrated in Table 7, 67.90% declared that errors/damage/inconvenience in their structure were not frequent. As seen, the answers concerning the existence of reporting systems and procedures are small compared to the first question, however, among those who provided a response, the majority affirms its presence (94.29% for the reporting systems and 96.55% for the procedures) identifying them in some cases with the name “System/Service Clinical Risk”.

The absence of adverse events should not mislead events are not perceived as frequent not because there are not, but rather, because employees are not adequately sensitized to their recognition and they are not aware of the related identification and reporting tools, even if they exist. This makes us understand that precisely the periodicity and cyclicality of the control are essential to identify errors and/or damage in the process of delivery of the health good.

The requirements of “Relevance and Thoroughness” are monitored, therefore, those activities that have above all an impact on customer satisfaction and is also what is expected given the nature of the service, not neglecting, however, the professional quality (in this regard the mention to the lines guide) and organizational quality. These two attributes are found in the questionnaire reality and represent useful elements for maintaining and increasing quality.

As far as “Accountability and Task separation “ of the activity is concerned, thanks to the univariate analysis the study have noticed (remembering that the data provided by it did not produce results with statistical significance, but that allowed us to make interesting reflections) which do not declare the division of duties to be correct to show a greater perception of frequency of adverse events.

Given what emerged, it is believed that these requirements would be needed to clearly define the tasks, so that everyone operates according to their skills and, at the same time, the control is structured and allows to identify areas where the quality of service is lacking.

Therefore, once again, thanks to the examination of the local reality, the two attributes are confirmed.

Question 4A investigates the requirement of "Competence", being competent, but in this context, it is not only carried out with technical skills but also with the possession of interpersonal skills and comprehension skills.

The attributes of "Efficiency" are the least reported. The explanation may lie in the fact that, perhaps, these elements are perceived as important by those who have organizational-managerial roles within the structure or managerial roles. But given that competence must be a concept that encompasses more and different perspectives, solutions should be put in place to make all the figures working in health care more efficient, especially in a context of progressive containment of sector spending.

Nevertheless, the results allow us to say that Professional competence is a multidimensional concept like quality, and
thanks to its multidimensionality it is a valid instrument to guarantee quality in health care. Finally, examining the local reality, nine characteristics have emerged further compared to the 181 reported by the literature, they are: sharing; information; updated data; simplification; meritocracy; organization; planning; specialization; resources.

The aspect of “Independence” emerges through question 5A. The professional figures involved in the evaluation process must be autonomous in the process. Given that the research could consider these three requirements, as basic requirements of the evaluation activity, since only those who are aware of the dynamics investigated can make consistent and conscious assessments, the characteristics of objectivity, impartiality and third entity are the least obvious. These three characteristics are the expression of a requirement that the model has listed under the name of “Independence”.

Only effective communication between departments and organizational levels can make it possible not to fall into this mechanism (Cilliers & Greyvenstein, 2012; Drummond & Jönsson, 2003; Garrison & Tows, 2003), operating instead according to interaction and communion of interests, with the consequence that the service operates guaranteeing high levels of quality (Fenwick, Seville, & Brunsdon, 2009; Pieter van Donk, Drupsteen, & van der Vaart, 2013; Vatapur, Khorrarnnia, & Forutan, 2013).

4.4. Effects on a theoretical model and verification tool

Thanks to the administration of the questionnaire to the employees of the Piedmont ASL the theoretical model was tested on a larger sample. The analysis of the results presented shows that the nine characteristics are present during the audit and are verified in the health structures examined. At the same time in the multidimensional quality view, the results obtained show that the characteristics identified by the model embrace all the qualitative aspects highlighted in the literature, for example, periodicity and cyclicity allow constant monitoring of the entire work, the protection protects both users that the providers, the competence makes a valid contribution to the professional and managerial quality, the structure allows the improvement of the organizational quality. These features present at the audit stage allow the achievement of quality requirements and at the same time their improvement. It can be said that the control activity is a valid instrument to guarantee total quality in the health sector. The theoretical model is valid and confirmed.

5. Conclusion

This document aims to provide a case study on quality care. More specifically, the study wants to confirm the following hypotheses.

HP1, compared to the study of Mosadegh (2012) there is a variation in the number of characteristics in the case study, from 181 to 166 in our case, with a variation of some characteristics detected. The study also allows the grouping of the characteristics according to the five groupings: Environment, Empathy, Efficiency, Achievement of objectives, Effectiveness. This allows us to state that the reference context plays an important role in defining the characteristics and the concept of quality defined by each profession based on the reference state.

HP2 confirms the approach the characteristics described by (Biancone et al., 2017) defined in the “P.R.A.C.T.I.C.S.” approach.

The study has seen how the tool of control is useful and necessary in carrying out this evaluation, allowing, through a continuous process, the investigation of the most relevant variables, identifying the critical areas and the related corrective actions. Through its evaluation and correction action, the audit distinguishes itself from other processes for its function of quality assurance in health care, representing, at the same time, an instrument of integration between the various activities that populate the health sector. In the context of the process of corporatization of the health sector, the audit is therefore the means by which to satisfy the primary purpose of the system, the provision of health, linking it, however, to compliance with economic constraints and financial balances, and to the stimulus towards process innovations and towards collaboration and sharing among the various lenders.

“Good control” must present a series of observable characteristics in such a way as to examine that the quality of the service is guaranteed. These characteristics have composed the theoretical model, which has been tested in the Piedmontese sample, allowing to demonstrate that it is a valid tool through its verification tool (given to the same reality) its validity and allowing to confirm its characteristics. Therefore, when the controller operates according to the nine characteristics indicated, this should be able to guarantee and improve the various dimensions of quality in health care.

Possible lines of future development foresee the administration of the verification tool beyond the regional boundaries, in order to adapt the model nationally and subsequently internationally, making the necessary corrections if necessary or confirming what has emerged at the local level. Moreover, given that the analysis carried out highlights some characteristics and some elements that must be considered during the audit, the prospects envisage that the methodological approach must be tested to verify the effective positive fallout on the risk management and control system. The venture analysis could focus on the quantitative analysis of the results in the light of integration and verification of the elements highlighted in the treatment and on the continuous improvement of the healthcare companies.

The study must be confirmed in further contexts and different health systems. The present study provides a useful approach that can be confirmed through multidisciplinary audits to verify, through a system of continuous improvement, the effective increase in quality in healthcare.

References


Service Quality Management at Lithuanian Healthcare Institutions

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Abstract

The principal purpose of the present paper is to examine the impact of service quality (SERVQUAL) dimensions on the satisfaction of service users’ (patients’ parents) with healthcare services and to develop a model of service quality management at healthcare institution. Measuring service quality dimensions is essential for achieving patient satisfaction with healthcare and for identification of weaknesses at healthcare institution. Research by authors at the largest Lithuanian Children’s Hospital in Vilnius showed that strongest correlation relationships with satisfaction of patients' parents emerges with responsiveness and assurance dimensions, the weakest – empathy. Two dimensions of service quality (tangibles and responsiveness) generally explain the dispersion of satisfaction with healthcare services by 51.5%. Based on literature and research results, developed by authors model of service quality management at healthcare institution shows the essential four steps from planning to improvement, ensuring systematic improvement of service quality.

Keywords: healthcare service quality; satisfaction with service quality; SERVQUAL service quality dimensions; model of healthcare service quality management.

1. Introduction

The quality and management of the services provided by healthcare institutions is one of the priority goals in the improvement of healthcare both in Lithuania and other European and world countries. Public health is the greatest society value in the economic and social context. The needs and expectations of the people and society, especially in relation to high quality healthcare, are growing at great steps (Public audit..., 2007).

EuroHealth Consumer Index 2018 survey showed that Lithuanian residents are not satisfied with the quality of healthcare services (Lithuania ranked 28th out of 35 European countries, at 2017 year – 31st out of 34 countries). The scientific problem is that there is lack of indicators for measuring the quality of healthcare in Lithuania, accordingly it is impossible for consumers to objectively evaluate and choose healthcare services, which best meet their needs and help to better care for their health (Lithuanian law of 2017 No. XIII-903). Service providers must measure the quality of the services they provide in order to identify weaknesses and focus on improving the quality of service. Thus, the identification and measurement of service quality dimensions is essential for achieving patients satisfaction with health services and for the continued improvement of service (D’Cunha & Suresh, 2015).

The purpose of the present study is to assess the impact of service quality dimensions on the satisfaction of service users (patients’ parents) with healthcare services and to develop a model of service quality management at healthcare institution.

Tasks of the study:
1. Measure expression of indicators of service quality dimensions and satisfaction with healthcare quality;
2. Examine the link between tangibles service quality dimension and satisfaction with healthcare quality;
3. Examine the link between reliability service quality dimension and satisfaction with healthcare quality;
4. Examine the link between responsiveness service quality dimension and satisfaction with healthcare quality;
5. Examine the link between assurance service quality dimension and satisfaction with healthcare quality;
6. Examine the link between empathy service quality dimension and satisfaction with healthcare quality;
7. Determine which of the five dimensions of the SERVQUAL method (tangibles, reliability, responsiveness, assurance or empathy) predicts service users satisfaction with healthcare services;
8. Based on the literature and study results, develop a model of service quality management at healthcare institution;
9. Formulate the key conclusions and provide insights into further research.

2. Literature review

Application of quality concept in healthcare. Allen–Duck et al. (2017) after reviewing numerous articles in the context of the quality concept for healthcare, formulated a definition of quality in healthcare, which describes quality in healthcare as – providing effective and safe healthcare based on a culture of excellence, which results in optimal desirable health condition. American Medical Association (1994) defined quality as ‘a degree that indicates the likelihood that healthcare services will have an impact on optimal patient outcomes’ (quotations from Allen–Duck et al., 2017). USA National Academy of Medicine has provided this definition of quality in healthcare: the ‘degree
by which health care for individuals and society increases the likelihood of obtaining the desired health condition using current professional knowledge’ (Crossing the..., 2013). A little different perception of quality in healthcare is provided by World Health Organization (WHO), where quality is strategic decision making in health systems (Quality of..., 2006). Crosby (1984) described quality in health care as conformance to the requirements. Quality standard EN ISO 9000:2015 the term ‘quality’ describes as ‘the degree to which a set of features of an object conform to the requirements’. WHO suggests focusing on improving the six dimensions (conditions) of the health system that characterize the quality of healthcare service: effective, efficient, accessible, acceptable/patient-centred, equitable, safe (Quality of..., 2006). Balancing can be achieved the experience of healthcare institutions that are considered to provide good quality health care. EN ISO 9001:2015 standard for healthcare set eleven quality requirements for healthcare institutions: appropriate and correct care, availability, continuity of care, effectiveness, efficiency, equity, evidence/knowledge based care, patient centered care, patient involvement, patient safety, timeliness/accessibility (Quality Management..., 2017).

Specifics of healthcare services at children’s hospital. Healthcare at children’s hospital requires a different strategy to improve the quality of services as children’s physiology, sociology, and psychology differs from adults; therefore, specific health care processes cannot normally be applied in a pediatric hospital based on practice with adults (Park, 2018). Communicating with a child is becoming an increasingly important aspect of the quality of service in child healthcare, which is often a challenge for the doctor (Damm et al., 2015). Effective communication between parents, child, and the healthcare professional can increase the accuracy of the diagnosis, improve patient understanding and compliance with the treatment process, and improve the quality and outcome of health services (Damm et al., 2015).

Quality management methods and tools to improve the quality of healthcare services. Applying a variety of quality management tools – systems, models, and techniques in the public sector, such as healthcare, allows to ensure healthcare service quality (Kosinskiene & Ruzevicius, 2010). Doctor Avedis Donabedian (1988) was the first who developed a model for improving quality in healthcare, that shows a close direct relationship between good structure and processes, also between good processes and good results gained during their interactions (Donabedian, 1988).

One of the organizational improvement measures and integral elements of the quality system is quality policy. Quality policy can be used to improve the performance of a healthcare institution, provided that it is in line with the strategy and vision of senior management regarding the future of the organization, formulated in a clear and comprehensible manner, including continuous improvement of identifying the needs and expectations of patients and other interested parties (Ruževičius, 2012).

There are key methods of evaluating the performance of a healthcare institution to determine whether an organization achieves its planned goals (Ruževičius, 2012):

- financial evaluation of activities;
- external measurements (e.g. benchmarking or third-party evaluation of the organization);
- process measurement in an organization;
- an assessment of the satisfaction of the users, employees and other interested parties with the quality of the organization work;
- assessment of other success factors defined by management.

Another method of external measurement activities for improving and evaluating quality involves audits of management systems, which are of three types: internal (first party) audits of the health care institution, customers (patients) quality management system (second party) audits and (third party) audits of an independent Quality Management System (OMS) certification institution on purpose to obtain a certificate of compliance (Serafinas, 2011).

Implementing a Quality Management System is a strategic decision of a healthcare institution that can improve the overall efficiency of an institution and lay a solid foundation for sustainable development initiatives (Quality Management..., 2017). An organization that has implemented a quality management model becomes managed as an integrated system with efficient processes leading to quality service delivery in healthcare (Ruževičius, 2012). Standard EN ISO 9001:2015 for healthcare is based on the following seven principles of quality: customer focus, leadership, engagement of people, process approach, improvement, evidence-based decision making and relationship management. A. Kosinskiene and J. Ruzevicius (2011) noted that the implementation of OMS in countries, where quality management and QMS development at hospitals is financially promoted and defined by law, is more successful than in countries, where such principles are voluntary and advisory. One of the most popular methods of quality improvement and evaluation in Lithuania is self-evaluation according to the recognized international model – EFQM excellence model (Serafinas, 2011). The EFQM excellence model is based on eight key concepts of excellence that essentially describe characteristics of a perfect organizational culture: adding value for customers, creating a sustainable future, developing organisational capability, harnessing creativity and innovation, leading with vision, inspiration and integrity, managing with agility, succeeding through the talent of people, sustaining outstanding results (Domittner et al., 2013). Favaretti et al. (2015) noted that the application of the EFQM excellence model in the Italian healthcare system resulted in a significant increase in self-evaluation and improved performance, especially in terms of customer satisfaction, staff and service delivery.

On the basis of the EFQM excellence model for improving the performance of public sector organizations, including hospitals, there was developed and adapted method of total quality management — Common Assessment Framework (CAF) (Kosinskienė & Ruževičius, 2011). CAF is based on the assumption that proper management of the organisation’s operational processes and available organizational resources determines organizational performance results oriented to the public needs. This model provides an opportunity to evaluate the organization’s performance simultaneously and on a variety of criteria (Common Assessment..., 2013).

Servqual model is a tool for evaluating the quality of services through various service characteristics, including both service perception and expectations. In order to help managers define goals and priorities for improvement and get the best results, the Servqual model can clear the gap between expectations and perception. One of measures of service quality is the level at which the services meet the needs or expectations of their customers (European consumer..., 2010).

3. Study methodology

For the study accomplishment satisfaction with healthcare services was selected by analysing service users’ (patients’ parents) evaluations in accordance with the dimensions of SERVQUAL model. Based on the scientific literature examined, the authors have developed a graphical model of the research concept (Fig.1).

Based on the developed graphic model of the research concept, the following hypotheses were raised:

- First hypothesis (H 1): Tangibles quality dimension has a positive impact on service users’ satisfaction with healthcare services.
- Second hypothesis (H 2): Reliability quality dimension
has a positive impact on service users' satisfaction with healthcare services.

- **Third hypothesis (H3):** Responsiveness quality dimension has a positive impact on service users' satisfaction with healthcare services.

- **Fourth hypothesis (H4):** Assurance quality dimension has a positive impact on service users' satisfaction with healthcare services.

- **Fifth hypothesis (H5):** Empathy quality dimension has a positive impact on service users' satisfaction with healthcare services.

**Sample.** The object of the study was Children's Hospital service users' (patients' parents) satisfaction with the quality of healthcare services. According to the 2017 Children's Hospital performance report, the number of hospitalized patients (21,000) in 2017 at the Children's Hospital, on the basis of the sample size formula with 95 percent probability and the 8 percent probability of error, the resulting sample required for the study consisted of 149 service users (patients' parents). The minimal sample size consisting of the 149 respondents was surveyed. Surveyed respondents' sample represent the opinion of Children's Hospital service users in this regard.

**Study methods.** The data needed for the study were collected by publishing the questionnaire in the online program. Link to questionnaire was sent via social networks to Facebook friends, acquaintances, Facebook parents and kindergarten groups. Others were also asked to share a link with acquaintances who had visited Vilnius Children's Hospital of Santaros Clinics (hereafter – Children's Hospital) with children under 18 years. Filling time of the questionnaire was unlimited. The sampling was based on both a spontaneous and random sampling strategy. The questionnaire consists of 4 parts: service quality construct: tangibles (4 statements); reliability (4 statements); responsiveness (4 statements); assurance (7 statements) and empathy (6 statements); satisfaction with healthcare services construct and service quality dimensions constructs was assessed with Cronbach's α indicators. The averages of the construct indicators were calculated, the correlation of the study variables was evaluated by the Pearson correlation coefficient, estimating correlation strength on the scale from 0 to 1 and from 0 to -1, i.e. if r = 0 – there is no dependency between the variables, the closer the value is -1 or 1, the dependency between the variables is stronger. Statistical differences between evaluations for the two independent samples analyzed (by gender, age of child) were assessed by Student's t test, for comparing three and more independent samples (by education) was used ANOVA test, according to the coefficients of significance: if p ≤ 0.05, the differences between the indicators are considered statistically significant. The suitability of the data for the factor analysis was calculated by Kaizer-Meyer-Olkin (KMO). Factor analysis was used to validate the constructs used, indicating that the five quality dimension scales (statements) fall into the same factors. Predictive factors for dependent variable – satisfaction with healthcare services – were assessed by applying multidimensional linear regression. In regression analysis the regression equation relates one variable Y, called a dependent variable, with independent variables X1, X2 ...., Xk. In this study dependent variable Y – Satisfaction with healthcare services, independent variables: X1 – Tangibles, X2 – Reliability, X3 – Responsiveness, X4 – Assurance, X5 – Empathy.

**Demographic indicators.** Respondents were asked about gender, their education and the age of their children. The questionnaire included possible answers.

- **Satisfaction with healthcare services construct consisted of the 4 following statements:** 'I respond positively about Children's Hospital for other people', 'I would recommend Children's Hospital to my acquaintances and relatives', 'I intend to use the Children's Hospital healthcare services in the future as well', 'I give the Children's Hospital a preference under the necessity of healthcare services for my child'.

The Cronbach alfa score of the internal consistency of satisfaction construct is 0.86. The results of the factor analysis of the key components with a varimax rotation (KMO = 0.78, Sig. <0.05) showed that the data were suitable for the analysis, and one factor was identified explaining 72.6 percent of the dispersion.

The Cronbach alfa score of the internal consistency of service quality 'Tangibles' dimension is 0.65. The results of the factor analysis of the key components with a varimax rotation (KMO = 0.68, Sig. <0.05) showed that the data were suitable for the analysis, and one factor was identified explaining 50.67 percent of the dispersion.

The Cronbach alfa score of the internal consistency of service quality 'Reliability' dimension is 0.81. The results of the factor analysis of the key components with a varimax rotation (KMO = 0.79, Sig. <0.05) showed that the data were suitable for the analysis, and one factor was identified explaining 65 percent of the dispersion.

The Cronbach alfa score of the internal consistency of service quality 'Responsiveness' dimension is 0.86. The results of the factor analysis of the key components with a varimax rotation (KMO = 0.78, Sig. <0.05) showed that the data were suitable for the analysis, and one factor was identified explaining 70.44 percent of the dispersion.

The Cronbach alfa score of the internal consistency of service quality 'Assurance' dimension is 0.89. The results of the factor analysis of the key components with a varimax rotation (KMO = 0.83, Sig. <0.05) showed that the data were suitable for the analysis, and one factor was identified explaining 61.37 percent of the dispersion.

The Cronbach alfa score of the internal consistency of service quality 'Empathy' dimension is 0.7. The results of the factor analysis of the key components with a varimax rotation (KMO = 0.73, Sig. <0.05) showed that the data were suitable for the analysis, and one factor was identified explaining 40.16 percent of the dispersion.
4. Results

Majority of 149 surveyed patients' parents are female (88.6%). Most of respondents (73.8%) have an university degree, 17.4% have post-secondary education, 4.7% secondary education, and 4% vocational education. Most patients' parents replied that they have children under 4 years old (42.7%), 4-7 year old children have 36.8% of respondents, 8-11 year old children – 12.7% of respondents, 12-15 year old children – 4.9% and 16-18 year old children – 2.9% of respondents.

The first task of the study was to measure the expression of indicators of five service quality dimensions and satisfaction with healthcare services. Research data showed that almost all criteria of five service quality dimensions ratings exceed the average point out of 5 possible, with the exception of the empathy’s dimension two criteria of less than 3 points out of 5 (‘Parking at the hospital is convenient’ – 2.30 point out of 5, ‘Registration by telephone is convenient’ – 2.93 point out of 5). Best rated (over 4 points out of 5) are two statements of tangibles dimension: ‘Doctors' clothing is neat’ (4.34 point out of 5) and ‘The hospital premises are clean’ (4.07 out of 5), also statement of assurance dimension: ‘The hospital has qualified doctors’ – 4.11 point out of 5. There is a statistically significant difference between respondents' responses to the empathy dimension statement by gender: ‘Doctors give individual attention to the patient’, which female rated better than male. Overall value of satisfaction with healthcare services – 3.97 point out of 5. The majority of respondents best agreed with the statement: ‘I intend to use the Children's Hospital healthcare services in the future as well’ – 4.12 point out of 5, and the least respondents agreed with statement ‘I give the Children’s Hospital a preference under the necessity of healthcare services for my child’ – 3.77 point out of 5.

According to the data presented in Table 1, it is stated that averages of all five service quality dimensions are similar and exceed the average of 3 points.

<table>
<thead>
<tr>
<th>Service quality dimension</th>
<th>Average</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tangibles</td>
<td>3.87</td>
<td>0.57</td>
</tr>
<tr>
<td>Reliability</td>
<td>3.57</td>
<td>0.73</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>3.67</td>
<td>0.74</td>
</tr>
<tr>
<td>Assurance</td>
<td>3.83</td>
<td>0.66</td>
</tr>
<tr>
<td>Empathy</td>
<td>3.38</td>
<td>0.64</td>
</tr>
</tbody>
</table>

Table 1. Averages and standard deviations of service quality dimensions

(compiled by the authors on the basis of the study results)

Best averages scored dimensions of tangibles (3.87 out of 5) and assurance (3.83 out of 5). Empathy dimension scored the lowest average – 3.38 out of 5. Statistically, there is a difference in the assessment of the tangibles dimension depending on the age of children (16-18 aged children’s parents rate it worse than other children’s parents).

Link between service quality dimensions and satisfaction with healthcare

Pearson’s correlation coefficients obtained between the service quality dimensions and satisfaction with health services (Table 2) have shown that there is a positive link between all dimensions of service quality and satisfaction. Strong link (r>0.7) exists between reliability and responsiveness (r=0.797, p≤0.01), reliability and assurance (r=0.815, p≤0.01): the better aspects of reliability are rated, i.e. doctor’s work (does not make mistakes, solves problems, provides services professionally and on time), the better will aspects of responsiveness be ranked (quick response to problems, willingness to help the patient, information about the treatment and its course, and quick service delivery) and aspects of assurance (staff helpfulness, respect, trust, sufficiency of the consultation time, doctors qualification, safe performance of service and intelligible explanation of treatment). The strongest link is between responsiveness and assurance (r=0.819, p≤0.01).

<table>
<thead>
<tr>
<th>Service quality dimension</th>
<th>Tangibles</th>
<th>Reliability</th>
<th>Responsiveness</th>
<th>Assurance</th>
<th>Empathy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfaction</td>
<td>0.602**</td>
<td>0.570**</td>
<td>0.670**</td>
<td>0.641**</td>
<td>0.483**</td>
</tr>
<tr>
<td>Tangibles</td>
<td>1</td>
<td>0.563**</td>
<td>0.592**</td>
<td>0.602**</td>
<td>0.481**</td>
</tr>
<tr>
<td>Reliability</td>
<td>1</td>
<td>0.797**</td>
<td>0.815**</td>
<td>0.515**</td>
<td>1</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>1</td>
<td>0.819**</td>
<td>0.500**</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Assurance</td>
<td>1</td>
<td>0.510**</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Empathy</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**p≤0.01

Table 2. Correlation coefficients of service quality dimensions and satisfaction with healthcare services (compiled by the authors on the basis of the study results)

There is medium strength link between satisfaction with healthcare services and almost all service quality dimensions (0.5<r≤0.7), except for the empathy dimension, which correlates weakly with satisfaction (r<0.5).

Link between tangibles dimension and satisfaction with healthcare services

For the purpose of verifying the five hypotheses were calculated links between service quality dimensions and satisfaction with healthcare. According to data presented in Table 3, it is stated that while overall satisfaction with the dimension of tangibles correlates with average strength (r=0.603, p≤0.01), however, with the separate tangibles criteria relationship of satisfaction is weak (0.2<r<0.5), except for statement about cleanliness of hospital premises, which correlates moderately with satisfaction (r=0.505, p≤0.01).

Table 3. Correlation relationships between tangibles dimension’s criteria and satisfaction with healthcare services (compiled by the authors on the basis of the study results)

<table>
<thead>
<tr>
<th>Tangibles dimension’s criteria</th>
<th>Satisfaction with healthcare services</th>
</tr>
</thead>
<tbody>
<tr>
<td>The hospital uses modern equipment.</td>
<td>0.438**</td>
</tr>
<tr>
<td>Doctors' clothing is neat.</td>
<td>0.443**</td>
</tr>
<tr>
<td>The hospital premises are clean.</td>
<td>0.505**</td>
</tr>
<tr>
<td>The hospital premises are in clear position.</td>
<td>0.349**</td>
</tr>
<tr>
<td><strong>p≤0.01</strong></td>
<td></td>
</tr>
</tbody>
</table>

The first hypothesis (H1) was confirmed: Tangibles quality dimension has a positive impact on service users’ satisfaction with healthcare services.

Link between reliability dimension and satisfaction with healthcare services

According to Table 4 statistical values, it is emphasized that although reliability dimension generally moderately correlates with satisfaction (r=0.570, p≤0.01), however, almost all reliability dimension criteria correlate weakly with satisfaction (0.2<r<0.5), except for statement that ‘Hospital staff are willing to solve the problems’, which is related to the satisfaction of the moderate

<table>
<thead>
<tr>
<th>Reliability dimension’s criteria</th>
<th>Satisfaction with healthcare services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors do not make mistakes while providing the service</td>
<td>0.421**</td>
</tr>
<tr>
<td>Hospital staff are willing to solve the problems</td>
<td>0.519**</td>
</tr>
<tr>
<td>Services are provided on time.</td>
<td>0.419**</td>
</tr>
<tr>
<td>Services are done professionally.</td>
<td>0.498**</td>
</tr>
<tr>
<td><strong>p≤0.01</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Correlation relationships between reliability dimension’s criteria and satisfaction with healthcare services (compiled by the authors on the basis of the study results)
correlation strength \( (r=0.519, p\leq 0.01) \). The second hypothesis (H2) was confirmed: Reliability quality dimension has a positive impact on service users’ satisfaction with healthcare services.

**Link between responsiveness dimension and satisfaction with healthcare services**

With reference to Table 5 correlation coefficients, it is stated that with all the responsiveness dimension criteria the relationship with satisfaction is moderate \((0.5<r\leq 0.7)\). Most correlated with satisfaction is statement about doctors ability to quickly provide the treatment \((r=0.598, p\leq 0.01)\) and doctor’s providing of information about the treatment and its course \((r=0.588, p\leq 0.01)\).

**Table 5. Correlation relationships between responsiveness dimension’s criteria and satisfaction with healthcare services (compiled by the authors on the basis of the study results)**

<table>
<thead>
<tr>
<th>Responsiveness dimension’s criteria</th>
<th>Satisfaction with healthcare services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors are able to respond quickly to emerging problems</td>
<td>0.551**</td>
</tr>
<tr>
<td>Doctors are willing to help patients when they need help</td>
<td>0.515**</td>
</tr>
<tr>
<td>Doctors inform about the treatment and its course</td>
<td>0.588**</td>
</tr>
<tr>
<td>Doctors are able to quickly provide the treatment</td>
<td>0.595**</td>
</tr>
</tbody>
</table>

**p<0.01**

The third hypothesis (H3) was confirmed: Responsiveness quality dimension has a positive impact on service users’ satisfaction with healthcare services.

**Link between assurance dimension and satisfaction with healthcare services**

Data in Table 6 show that although in general assurance dimension correlates with satisfaction by coefficient of moderate strength \((r=0.641, p\leq 0.01)\), nevertheless, most of the criteria of assurance dimension correlate with satisfaction weakly \((0.2<r\leq 0.5)\).

**Table 6. Correlation relationships between assurance dimension’s criteria and satisfaction with healthcare services (compiled by the authors on the basis of the study results)**

<table>
<thead>
<tr>
<th>Assurance dimension’s criteria</th>
<th>Satisfaction with healthcare services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital staff behave pleasantly and helpfully</td>
<td>0.551**</td>
</tr>
<tr>
<td>Hospital staff behave with respect</td>
<td>0.567**</td>
</tr>
<tr>
<td>I can trust in hospital doctors</td>
<td>0.560**</td>
</tr>
<tr>
<td>Time spent with the doctor is sufficient</td>
<td>0.434**</td>
</tr>
<tr>
<td>Doctors are able to explain intelligibly about treatment procedures</td>
<td>0.475**</td>
</tr>
<tr>
<td>The hospital has qualified doctors</td>
<td>0.436**</td>
</tr>
<tr>
<td>Doctors are able to perform services safely</td>
<td>0.472**</td>
</tr>
<tr>
<td>Assurance dimension in general</td>
<td>0.641**</td>
</tr>
</tbody>
</table>

**p<0.01**

The first three criteria of assurance dimension that describe the personal traits of the hospital staff are related to the satisfaction of the moderate strength relationship; ‘Hospital staff behave with respect’ \((r=0.567, p\leq 0.01)\), ‘I can trust in hospital doctors’ \((r=0.560, p\leq 0.01)\), ‘Hospital staff behave pleasantly and helpfully’ \((r=0.551, p\leq 0.01)\). According to correlation coefficients obtained can be inferred that the personal characteristics of hospital staff and doctors are more important for patients satisfaction (helpfulness, kindness, respect, trust) than time spent with the doctor, ability to explain intelligibly about the treatment, doctors qualification or safe service performance. The fourth hypothesis (H4) was confirmed: Assurance quality dimension has a positive impact on service users’ satisfaction with healthcare services.

**Link between empathy dimension and satisfaction with healthcare services**

According to data presented in Table 7 it can be concluded that empathy dimension is generally weakly correlated with satisfaction \((r=0.483, p\leq 0.01)\) and almost all of the empathy criteria have little effect on patient satisfaction with healthcare services \((0.2<r\leq 0.5)\).

**Table 7. Correlation relationships between empathy dimension’s criteria and satisfaction with healthcare services (compiled by the authors on the basis of the study results)**

<table>
<thead>
<tr>
<th>Empathy dimension’s criteria</th>
<th>Satisfaction with healthcare services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors give individual attention to the patient</td>
<td>0.464**</td>
</tr>
<tr>
<td>Registration by telephone is convenient</td>
<td>0.276**</td>
</tr>
<tr>
<td>Registration by internet <a href="http://www.sergu.lt">www.sergu.lt</a> It is convenient</td>
<td>0.196*</td>
</tr>
<tr>
<td>Reaching the hospital is convenient via public transport</td>
<td>0.224**</td>
</tr>
<tr>
<td>Parking at the hospital is convenient</td>
<td>0.307**</td>
</tr>
<tr>
<td>Hospital working hours are convenient</td>
<td>0.411**</td>
</tr>
<tr>
<td>Empathy dimension in general</td>
<td>0.483**</td>
</tr>
</tbody>
</table>

**p<0.01; *p<0.05**

It should be noted that registration by internet www.sergu.lt correlates very weakly \((r=0.196, p\leq 0.05)\). Despite the weak correlation coefficient values between these table variables, the fifth hypothesis (H5) was confirmed: Empathy quality dimension has a positive impact on service users’ satisfaction with healthcare services.

**Predicting factors of healthcare satisfaction**

Multidimensional linear regression was used to check how separate dimensions of service quality predict satisfaction with healthcare. At linear regression analysis dependent variable – satisfaction with healthcare services, independent variables – tangibles, reliability, responsiveness, assurance and empathy. Determination coefficient \(R^2\) value indicates how much the dependent variable – satisfaction with healthcare services, explains model that connects independent variables. The initial regression model was not suitable for analysis, whereas three variables (reliability, assurance and empathy dimensions) \(t\) test did not meet the requirements (their \(p\) value was higher than 0.05 significance level), therefore these three variables were discarded from the analysis and regression analysis has been repeated with two independent variables – tangibles and responsiveness. Multicolinearity VIF indicators obtained for the remaining two independent variables (tangibles and responsiveness) are less than 4, the statistical significance of the model is shown by \(p=0.000\) and \(F=77.519\) values, therefore the model is suitable for regression analysis. The results of regression analysis are presented in Table 8.

**Table 8. Results of regressive analysis (compiled by the authors on the basis of the study results)**

<table>
<thead>
<tr>
<th>Independent variables</th>
<th>Dependent variable Satisfaction with healthcare services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standardised (\beta) (Beta) coefficients of predicted variables</td>
<td>VIF</td>
</tr>
<tr>
<td>Tangibles</td>
<td>0.318**</td>
</tr>
<tr>
<td>Responsiveness</td>
<td>0.462**</td>
</tr>
<tr>
<td>Determination coefficient (R^2)</td>
<td>0.515</td>
</tr>
<tr>
<td>F</td>
<td>77.519</td>
</tr>
</tbody>
</table>

**p<0.01**

Based on regression analysis data, it is stated that both dimensions (tangibles and responsiveness) commonly explain 51.5% dispersion of satisfaction with healthcare services \((R^2=0.515)\).

According to standardised \(\beta\) (Beta) coefficients values, it is
stated that variable responsiveness explains more of dependent variable satisfaction with healthcare services dispersion ($\beta=0.482$) than tangibles ($\beta=0.318$).

5. Model of service quality management at healthcare institution

Based on scientific literature analysis and authors’ research results, using E. Deming continuous improvement cycle template consisting of four steps: Planning – Performance – Evaluation – Improvement, authors created a model of service quality management at healthcare institution (Fig. 2).

Since the standard EN ISO 9001:2015 for healthcare applies process approach, created model involves Plan – Do – Check – Act (PDCA) cycle. One of the organizational improvement measures is quality policy, corresponding the strategy and vision of senior management regarding the future of the organization, including continuous improvement in meeting the needs and expectations of patients and other interested parties, it is therefore important to plan implementing measures for quality policy (at planning stage). The process approach to healthcare determines the planning of the organization’s clinical and other processes’ interactions (planning stage), helps to analyze clinical processes, achieve effectiveness of clinical processes, improve processes based on data and evaluation of information.

At Performance stage consequential is implementation of quality policy and basic process at healthcare institution – interaction of healthcare staff with the patient during clinical processes, which requires internal healthcare resources: relevant infrastructure (SERVQUAL tangibles dimension) and hospital staff (professional knowledge and culture of excellence). Culture of excellence (SERVQUAL assurance dimension) including collaboration, communication, competence, respect, responsibility and trust, in conclusion of the research has proved to be one of the most correlated ($r=0.641$, $p\leq 0.01$) with healthcare service satisfaction after responsiveness dimension ($r=0.670$, $p\leq 0.01$). Effective communication between parents, child and the healthcare professional can increase the accuracy of the diagnosis, improve patient understanding and compliance with the treatment process, and improve the quality and outcome of health services. On the other hand, it is highlighted the focus of healthcare on the healthcare needs and expectations of the patient, influenced by external factors (healthcare initiatives): promotion of healthy lifestyles, health protection, prevention of illnesses, improved access to medicines and ensuring of effective medicines (Input). The result (Output) achieves the optimal desirable health condition and satisfaction with healthcare services. During hospital staff interaction with patient (at performance stage) it is essential thing is ensuring of healthcare conditions: effectiveness, continuity of care, patient involvement in the treatment process and timeliness (SERVQUAL responsiveness dimension); efficiency, evidence/knowledge based care (SERVQUAL reliability dimension); availability, patient centered care (SERVQUAL empathy dimension); equity and security (SERVQUAL assurance dimension).

![Figure 2. Model of service quality management at healthcare institution](compiled by authors based on the information from the research literature and the study results)
At the evaluation stage, it is important to analyze the quality of the actions taken during the performance stage, i.e. the quality of the hospital staff interaction with the patient process searching of the gaps and opportunities for development and moving to the fourth stage of improvement. At improvement stage all opportunities for improvement and corrective and preventive measures are being implemented, as well as promotion of improvement and active learning. There are possible voluntary quality initiatives at healthcare institution: implementation of quality management system, EFQM excellence model or CAF. Application of Quality Management System EN ISO 9001:2015 standard for healthcare contributes to efficiency of processes, quality of services and satisfaction of all interested parties.

6. Conclusions

After examining the theoretical aspects of applying the concept of quality in health care, it emerged that quality health care services, as defined by the quality standard, WHO and other organizations and scientific articles, are described as: accessible, safe, effective, efficient, patient-centered (needs and expectations), equitable, appropriate, evidence-based, timely and involving patient to the treatment process and decision making, accordingly can be grouped into five SERVQUAL quality dimensions.

Based on the calculated correlation coefficients between all variables, a strong relationship has been established between responsiveness and assurance, reliability and assurance, reliability and responsiveness dimensions.

After examining the links between five service quality dimensions and the satisfaction of patient’s parents with the healthcare services, all five hypotheses have been confirmed. Responsiveness and assurance demonstrate the strongest correlation link with satisfaction, whereas the weakest − empathy.

Data of multidimensional regression analysis showed that two dimensions (tangibles and responsiveness) commonly explain 51.5% dispersion of satisfaction with healthcare services. Accordingly responsiveness (quick response to problems, willingness to help the patient, information about the treatment and its course and quick service performance) and tangibles (modern equipment, neat doctors clothing, clean hospital premises and their clear position) mostly predict patients’ parents satisfaction with healthcare services.

Based on E. Deming continuous improvement cycle, developed by authors model of service quality management at healthcare institution shows the essential four steps from planning to improvement, ensuring systematic improvement of service quality. The model is applicable to all healthcare institutions: hospitals, sanatoriums, outpatient centers, rehabilitation centers, family doctor’s offices, health care centers, etc.

Further possible insights for development of the problem: forasmuch authors explored attitude of healthcare service users towards service quality and satisfaction with service quality, it would be useful to examine attitude of service providers (healthcare specialists’) towards service quality they provide and to identify problematic quality management points at healthcare institution. It would be also important to investigate an application of seven quality principles of EN ISO 9001:2015 quality standard (customer focus, leadership, engagement of people, process approach, improvement, evidence-based decision making and relationship management) at healthcare institution through a medical staff survey.

References

1. Introduction

General methods for assessing the quality of services are fairly common (Alemán, Gutiérrez-Sánchez and Liébana-Cabanillas, 2018; Mardani, Jusoh, Zavadskas, Khalifah and Nor, 2015); however, the question of developing a systematic, multiple-criteria assessment of the quality of housing and utilities services remains open. The level of the quality of housing and services is different in the services market, but it is extremely difficult for a consumer (buyer) due to the lack of time and experience to determine this level at the time of purchase. A significant role is played by the subjectivity of customer expectations (Prashar, 2016, p. 479). In addition, he or she does not know the background of the housing and utilities service, which is offered to him or her, and he or she has less information about the quality of services than the seller.

Therefore, the process of elaborating an effective strategy of services market development for a service organization of the housing and utilities sector becomes important for regulating the quality of utilities services from the sides of the customer—the consumer and the state, which requires determining a combination of all factors affecting the quality. The researchers offer different ranges of scales for the quality of services for different or several services spheres—water supply, heat, gas and electricity (Çelen and Yalçın, 2012; Prevos, 2016; Kansal, Ndimbo and Chandanha, 2017; Strand, 2012; Szabó and Ujhelyi, 2015; Lannier and Porcher, 2014). Modern integrated reports combine financial and non-financial material information so that the interested parties can express their opinion on the organization’s activities and the cost of services (Pozzoli and Gesuele, 2016, p. 121). For society, the assessment of quality can be a source of reliable information (Nepal and Jamasb, 2015), and for the state, it can be a way to substantiate the budget and increase the transparency of operations (Ensslin, Ensslin, Matos, Dutra and Ripoll-Felli, 2015, p. 995).

Investigating this issue, the authors came to the conclusion that the researchers, trying to find the reasons for the changes in the state of the services market of a service organization of the housing and utilities sector, examine various dependencies of the influencing factors. For example, as a rule, “satisfaction with the quality of the housing and utilities services is higher in areas of new housing development and lower in areas of old housing development” (Starikov, 2012; Satapathy, 2014, p. 964). Fenomenov presents the factors of quality management effectiveness of the housing and utilities services. In particular, among the scientific and technical factors, there are “the age of buildings, utility networks, elevators, and other equipment; the degree of wear, among the organizational and economic factors—employment period of staff, number of employees and other indicators; net profit” (Fenomenov, 2012). Akifeva systematized the factors of the internal and external environment that affect the quality of the provision of the housing and utilities services in modern conditions. Among the internal financial factors, she highlights the ratio of accounts receivable and accounts payable, financial results of activities (profits, losses), among external economic factors—the incomes of the population and the solvency (Akifeva, 2013; Pickering and Davis, 2012; Leipnik and Kryuchenko, 2013). It is important to note that housing and utilities services are different types of activities, the work of the housing and utilities sector, in the process of conducting which a new, previously non-existent product is not created, but the quality of an existing, already
created product changes. Therefore, for private companies, it is necessary to monitor the satisfaction of their customers and take timely measures to improve the quality of services (Safronova, 2013; Prevos, 2016, p. 367).

The purpose of this article is to offer a fairly universal method for assessing the quality of various types of utility services.

2. Methods

The authors identified the indicators, evaluating the quality of services. Each of the indicators of the quality of services is formed under the influence of socio-economic factors. To identify the relationship between them, mathematical calculations and statistical analysis were conducted, which allowed determining the closeness of the relationship of the factors, affecting the quality of services, and its direction (direct/inverse). For the calculations, the authors used the performance indicators of the service organization OOO Santekhnika-servis, the managing organization OOO Vash partner+, which will make it possible to consider the results, obtained in the process of the calculations, to be scientifically justified.

Summarizing the results, obtained in the process of the calculations, the authors identified the inter-factorial relations that have an impact on the services market of the service organization of the housing and utilities sector. Using the data on correlation coefficients, presented in the study, it is possible to assess the existence of a relationship between the variables, but it is not feasible to make judgments regarding the strength of their influence, which does not allow to choose the factors that have a forming effect, since the correlation analysis is one of the methods of statistical analysis of the interdependence of several characteristics. To achieve the goals of the study, the determination coefficient was calculated, which enabled to solve this issue.

Thus, using statistical methods of analysis, a group of forming factors was identified, which should be accounted for in the process of elaborating a strategy for developing a services market for a service organization of the housing and utilities sector, the purpose of which is to increase the level of provision of the Russian population with qualitative services of a service organization of the housing and utilities sector.

The method of integrated assessment of the impact of socio-economic factors (Sorokina, 2014) on the quality of services provided by the service organization of the housing and utilities sector was approbated by the authors by the example of the service organization OOO Santekhnika-servis.

3. Results

The authors identified the following indicators that assess the quality of the housing services:

- net profit indicator, thousand rubles;
- indicator of the actual payment by the population for the housing and utilities services (collectability), %;
- indicator of the average monthly salary of employees of the housing and utilities sector, rubles;
- indicator of the level of deterioration of municipal infrastructure, %.

Each of the above-listed indicators of the quality of the housing services is formed under the influence of the following socio-economic factors. When choosing factors, the authors were guided by the works of Russian scientists-economists (Savina, 2006; Bezrukikh and Levshina, 2011; Savin, 2006; Kobilev, 2013), who attempted to determine the dependence of the factors of the quality of the housing services (Table 1).

<table>
<thead>
<tr>
<th>Indicator of housing services</th>
<th>Factor affecting the quality of housing services (indicator)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indicator of net profit, thousand rubles</td>
<td>Accounts receivable, thousand rub.</td>
</tr>
<tr>
<td>Indicator of the actual payment by the population for the housing and utilities services (collectability), %</td>
<td>Ratio of the tariff for the housing and utilities services to the actual integral accident rate (for 100 km of networks)</td>
</tr>
<tr>
<td>Indicator of the average monthly salary of employees of the housing and utilities sector, rub.</td>
<td>Cash income of the population per capita, rub.</td>
</tr>
<tr>
<td>Indicator of the level of deterioration of municipal infrastructure, %</td>
<td>Number of cases of absence from work, days</td>
</tr>
</tbody>
</table>

To identify the relationship between the indicators of the housing services and the factors of their quality listed in Table 1, mathematical calculations and statistical analysis were conducted, which allows determining the closeness of the relationship of the factors affecting the quality of the housing services and its direction (direct/inverse). While assessing it, the authors proceeded from the standard conditions for estimating the correlation coefficient (Formula 1):

\[
 r = \frac{n \sum_{i=1}^{n} ((x_i - \bar{x}) \cdot (y_i - \bar{y}))}{\sqrt{[\sum_{i=1}^{n} (x_i - \bar{x})^2] \cdot [\sum_{i=1}^{n} (y_i - \bar{y})^2]}}
\]

if \(|r|<0.15\) – there is no connection; \(|r|=0.3–0.4\) – moderate connection; \(|r|=0.4–0.6\) – average connection; \(|r|=0.7–0.8\) – good connection; \(|r|=0.8\) – the connection is very good, the dependence is close to a linear one. The sign “+” indicates the presence of a direct connection, “−” indicates an inverse connection. For the calculations, the authors used the performance indicators of the service organization OOO Santekhnika-servis, the managing organization OOO Vash partner+, which makes it possible to consider the results, obtained in the process of calculations, to be scientifically justified.

It is suggested to estimate the correlation coefficient. For example, it was determined that there is no connection between net income and accounts receivable (Table 2).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>r (cor. coef)</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>0.14 (no connection)</td>
</tr>
</tbody>
</table>

The analysis of the results showed the presence of an extremely weak connection between the examined variables, which makes it possible to form the opinion that the accounts receivable do not have a noticeable effect on the net profit volumes. It is suggested to estimate the relationship between net income and accounts payable (Table 3).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>r (cor. coef)</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>0.66 (connection is good, direct)</td>
</tr>
<tr>
<td>y</td>
<td></td>
</tr>
</tbody>
</table>
The calculation showed that the relationship between the variables is present and is characterized as "good", which makes it possible to form the opinion that with the growth of volumes of accounts payable, there is a noticeable increase in the volumes of net profit in the region.

The next indicator that assesses the services market of the service organization of the housing and utilities sector is "the actual payment by the population for the housing and utilities services (collectability)". The authors determined that one of the factors affecting the value of this indicator is the ratio of the tariff for utility services for the population to the actual costs. It is suggested to assess the relationship between the indicator and this factor (Table 4).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>r (cor. coef.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>r = 0.99 (connection is very good, direct)</td>
</tr>
<tr>
<td>y</td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Assessment of the relationship between the actual payment by the population for the housing and utilities services (collectability) (x) and the ratio of the tariff for utility services for the population to the actual costs (y)

It is suggested to assess the relationship between the actual payment by the population for the housing and utilities services (collectability) and the integral accident rate (Table 5).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>r (cor. coef.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>r = 0.92 (connection is very good, direct)</td>
</tr>
<tr>
<td>y</td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Assessment of the relationship between the actual payment by the population for the housing and utilities services (collectability) (x) and the ratio of the tariff of the integral accident rate (y)

The calculations showed the presence of direct and very good connections between the variables, which makes it possible to take into account these factors as important when developing mechanisms that stimulate the development of the services market of the service organization of the housing and utilities sector in the region. As it is shown in Table 6, there is a direct average connection between the indicators; therefore, it can be stated that with an increase in the average cash income of the population per capita, the amount of actual payment by the population for the housing and utilities services (collectability) is growing.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>r (cor. coef.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>r = 0.57 (connection is average, direct)</td>
</tr>
<tr>
<td>y</td>
<td></td>
</tr>
</tbody>
</table>

Table 6. Assessment of the relationship between the actual payment by the population for the housing and utilities services (collectability) (x) and average cash income of the population per capita (y)

The analysis of the results showed the presence of an extremely weak connection between the examined variables, which allows stating that the above-presented factors do not have a noticeable effect on the size of the average monthly salary of employees in the housing and utilities sector.

The last indicator in the study is the "level of deterioration of the municipal infrastructure", which is formed under the influence of a number of driving market forces. For example, it is suggested to calculate the dependence of the level of deterioration of the municipal infrastructure on the integral accident rate. The integral accident rate is the number of accidents in the region per 100 km of networks (Table 10).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>r (cor. coef.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>r = 0.36 (connection is moderate, direct)</td>
</tr>
<tr>
<td>y</td>
<td></td>
</tr>
</tbody>
</table>

Table 10. Assessment of the connection the level of deterioration of the municipal infrastructure (x) and the integral accident rate (y)

The calculation showed the presence of a direct and moderate connection, which makes it possible to state that with a slight increase in the integral accident rate, an increase in the level of deterioration of the municipal infrastructure will be observed (Table 11).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>r (cor. coef.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>r = 0.82 (connection is very good, direct)</td>
</tr>
<tr>
<td>y</td>
<td></td>
</tr>
</tbody>
</table>

Table 11. Assessment of the connection the level of deterioration of the municipal infrastructure (x) and the age of buildings (y)

The analysis of the obtained data suggests that there is a very good relationship between the variables, which makes it possible to consider this factor important in the development of mechanisms that stimulate the development of the services market of the service organization of the housing and utilities sector in the region.

Summarizing the results obtained in the process of calculations, the inter-factorial relations were identified affecting the services market of the service organization of the housing and utilities sector in the region.

Using the correlation coefficients, presented in Table 12, one can assess the existence of a relationship between variables, but there is no way to judge the strength of their influence, which does not allow one to choose the factors that have a forming effect, since the correlation analysis is one of the methods of statistical analysis of the interdependence of several characteristics. To achieve the goals of the study, it is suggested to calculate the determination coefficient (R2), which will solve this problem. The square of the correlation coefficient is called the
determination coefficient, which shows the fraction of variation of the resulting characteristic, explained by the variation of the factorial characteristic. When applying the determination coefficient, one deals only with two outcomes: if there is dependence, the determination coefficient is higher than 0.5, and if there is no dependence, the determination coefficient is less than 0.5. To calculate the determination coefficient, the authors took into account only factors with an indicator of the services market of a service organization of the housing and utilities sector more than 0.5 ($r > 0.5$), that is, the effect on the scale of correlation is estimated as average and above.

To assess the impact of each of the factors, it is suggested to make a table of the impact of the indicators of the socio-economic development of the region on the services market of the service organization of the housing and utilities sector (Table 13).

### Table 12. Assessment of the connection between the factors of socio-economic development of the region and the indicators of the services market of the service organization of the housing and utilities sector

<table>
<thead>
<tr>
<th>Indicators of market development</th>
<th>The services market of service organization of the housing and utilities sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net profit, thousand rubles</td>
<td>Actual payment by the population for the housing and utilities services (collectability), %</td>
</tr>
<tr>
<td>Cash income of the population per capita, rub.</td>
<td>Connection is good $R^2 = 0.32$</td>
</tr>
<tr>
<td>Age of buildings, years</td>
<td>Connection is very good $R^2 = 0.67$</td>
</tr>
<tr>
<td>Accounts receivable, thousand rubles</td>
<td>Connection is invisible</td>
</tr>
<tr>
<td>Accounts payable, thousand rubles</td>
<td>Connection is good $R^2 = 0.44$</td>
</tr>
<tr>
<td>The ratio of the tariff for housing and utility services for the population to the actual costs, %</td>
<td>Connection is very good $R^2 = 0.98$</td>
</tr>
<tr>
<td>Integral accident rate (for 100 km of networks)</td>
<td>Connection is very good $R^2 = 0.85$</td>
</tr>
<tr>
<td>Number of cases of absence from work, days</td>
<td>Connection is invisible</td>
</tr>
<tr>
<td>Number of people employed</td>
<td>Connection is invisible</td>
</tr>
<tr>
<td>Number of people dismissed</td>
<td>Connection is invisible</td>
</tr>
</tbody>
</table>

### Table 13. The influence of factors of socio-economic development of the region on the services market of the service organization of the housing and utilities sector

4. Discussion

According to the recently conducted studies, the interpretation of the quality of services is more difficult than the assessment of the quality of production (Prashar, 2016, p. 479) and at the same time is a prerequisite for the eradication of poverty (Strand, 2012, p. 163; Pickering and Davis, 2012). The practical value of developing the authors’ interpretation of the quality of these services is dictated by the fact that this is a prerequisite for eradicating poverty and raising the standard of living, as well as reducing nonpayment and decreasing the accident rate, to which the recently conducted studies were devoted (Szabó and Ujhelyi, 2015; Nepal and Jamasb, 2015).

Analyzing the data of the matrix of the inter-factorial influence, it is suggested by the authors to highlight, according to the results of calculations, the factors that have the greatest influence on the level of development of the services market of a service organization of the housing and utilities sector: age of buildings, years; the ratio of the tariff for the housing and utility services for the population to the actual costs, %; integral accident rate (per 100 km of networks). The above-listed factors have the greatest impact, because for calculating the determination coefficient, only factors with an indicator of the services market of a service organization of the housing and utilities sector more than 0.5 ($r > 0.5$) were accounted for, that is, the effect on the scale of correlation is estimated as average and above.

5. Conclusion

Thus, using statistical methods of analysis, the authors identified a group of forming factors, which should be accounted for in the process of elaborating a strategy for developing a services market for a service organization of the housing and utilities sector, the purpose of which is to increase the level of provision of the Russian population with quality services of a service organization of the housing and utilities sector.

In the prospects for further research, a hypothesis will be formulated by means of the Quality Function Deployment (QFD), which is a methodology for systematical and structured transformation of consumer wishes (already at the early (first)
stages of the quality loop) into quality requirements for products, services and/or a process. In the examined example of ensuring the quality of services, provided by the service organization of the housing and utilities sector, the main focus will be mostly on improving the above-listed characteristics; this approach was implemented by Jahanzaib et al. (2016). In accordance with this, the tools for ensuring the quality of the housing and utilities services were improved.

References


Minimization of Risks of the Enterprise Foreign Economic Activity through Improving the Interaction Management Quality with Potential Partners

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Abstract

Foreign economic activity is one of the global opportunities for the development of industrial enterprises in most countries of the world. At the same time, enterprise management faces the problem of improving the quality of management processes in this particular area as a result of the growing number of threats and risks that are difficult to predict and which significantly affect the economic security of such entities. Improving the quality of managing interactions with potential foreign partners provides for their weighted selection based on minimizing risks, which necessitates the use of high-quality management tools. The study developed and tested an economic mathematical model for optimizing the interaction of industrial enterprises with potential partners based on risk minimization. This model allows to make high-quality strategic decisions in the field of foreign economic activity while ensuring the development of the enterprise by establishing mutually beneficial relations with foreign partners with a minimum risk level.

Keywords: quality; management; foreign economic activity; risk.

1. Introduction

Globalization processes and the development of international relations necessitate the intensification of foreign economic activity of enterprises and the improvement of the quality of management of such processes. The entry into new markets and the establishment of partnerships, as a rule, cause the emergence of specific risks and threats for the company. All this actualizes the need to minimize risks in the process of foreign economic activity of the enterprise by improving the quality of interaction with potential partners.

Explanation of the nature of markets, and especially, the relationship of the main players (participants) in the markets is investigated within the framework of the theory of agency relations, which is extremely important because it focuses not only on direct connections and interactions of market participants, but also on hidden and indirect connections. In their work “The Modern Corporation and Private Property” A. Berle and G. Means considered the theory of “principal-agent”. According to their approach, the principal (guarantor) is the owner, the agent is the trustee (manager) (Berle, Means, 1932).

An agency relationship occurs when one or more individuals, called principals, hire one or more individuals, called agents, to provide certain services and then empower the agents to make decisions (Jensen, Meckling, 1976). R. H. Coase studied the specifics of the relationship between market participants and the occurrence of additional transactions and costs associated with installing and maintaining such relationships in the framework of the theory of transaction costs. The foundations of this theory were outlined by him in the work “The nature of the firm” (Coase, 1937). The theory of transaction costs has been further developed within the framework of the theory of internalization, according to which enterprises seek to minimize transaction costs by entering the foreign market (Hennart, 1982).

After analyzing the theoretical achievements of scientists involved in issues of the functioning of markets and individual subjects in such markets, it is advisable to note the existence of quite different approaches to explaining the causal relationships of individual businesses entering foreign markets. In addition, today there is a fairly wide field for researching problematic issues, in particular, the need to protect the interests of the enterprise in the interaction processes in foreign markets.
necessitates the formation of effective tools for making informed management decisions to minimize risks. It should be noted that it is almost impossible to get rid of all risks in the process of enterprise foreign economic activity, so the question of determining the optimal interaction strategy arises, as a result of which risks will be minimized.

1. Methods

Interaction with potential partners is a rather complex multifactorial process. The main aspect of this process, on the one hand, is profitability (profitability) indicators. On the other hand, even with the positive dynamics of profitability, there are always economic risks, which can provoke situations of sudden loss of this dynamics. Therefore, profitability monitoring and profitability dynamics should be carried out according to the following interaction model. If \( r \) – risk that negatively affects profitability and economic security in general, when \( r(A) = r(A^*) \) – risk formed under the action (influence) of group of parameters \( A \), then \( r \) formed under the action (influence) of group of parameters \( A^* \), with \( \min_{A \subseteq B} r(A) = r(A^*) \) (1)

where \( B \) is a set of all possible (admissible) configurations of group of parameters \( A \). Solving the problem (1) is a platform not only for improving economic security, but also for optimizing interaction with potential partners in the process of enterprise foreign economic activity.

An obvious question arises: what parameters should be included in group \( A \), of which the set of all groups \( B \) will be preliminarily formed? First of all, each group \( A \) should include a list of all potential partners (counterparties). It's about real interaction in the short term. Regarding the prospects for foreign economic activity and interaction at a greater distance, such a list would be unreliable, despite the difficult predictability of the international economic situation, which makes any prediction of risks for relatively distant dates insignificant and unimportant (Di Bella, Grigoli 2019; Gholphour 2019; Rudnichenko Ye. et al., 2019).

Of course, the essential parameter is the type of risk. Different types of risk carry different potential threats. Therefore, each type of risk must be accompanied by an appropriate weight or significance (Das et al., 2019; De Santis, 2018). However, if the equivalence (the same significance) of all types of risk is preliminarily justified or coordinated, their weight can be ignored.

For the convenience of further presentation, potential partners of the process of foreign economic activity can be numbered from 1 to \( K \), where \( K \) – total (maximum) number of all partners. The number of type of risk in the process of foreign economic activity with a \( k \)-th counterparty is equal to \( n_k \), where

\[ k = 1, K \]

That is, interaction with the first counterparty is characterized by \( n_1 \) risks, with the second – \( n_2 \) risks, ..., with the last but one – \( n_{K-1} \) risk, with the last, \( K \)-th – \( n_K \) risk. Quantities \( n_1, n_2, ..., n_K \), \( n_K \) are, generally speaking, are different primarily through certain features and differences of foreign legal systems, the market conjuncture, the currency dynamics, etc (Kannadasan, Bhattacharyya, 2019; Wang et al., 2018). Even climatic differences have a serious impact (for example, the risks of foreign trade and interaction with the Baltic or Scandinavian enterprises will be very different from the risks for African countries).

If the \( i \)-th type of risk in interaction with \( k \)-th counterparty is marked by \( r_{ik} \), then, at first glance, we would have to solve the problem only by minimizing the sum of all risks:

\[ \min_{k=1, K} \sum_{i=1}^{n_k} r_{ik} \] (2)

where we would find such \( k \), from the list 1, 2, 3, ..., \( K-1 \) K, when

\[ \min_{k=1, K} \sum_{i=1}^{n_k} r_{ik} = \sum_{i=1}^{n_k} r_{ik} \]

that is, the problem (1) would be solved. However, a simple transition to problem (2) is impossible for two reasons. First, the risk \( r_{ik} \) is an abstract category, so you can only operate with its estimate (for example, point or interval – in the form of an interval), which is not constant in time (Yu, 2015; Romanuke, 2018). Secondly, almost always there are at least two types of risks, the significance of which can not be equal. For example, transport risks and corruption risks will be of different significance for enterprises from Poland. For far foreign countries, transportation to or from which is more expensive, the difference between the weights of transport and corruption risks will be much more tangible. That is why each type of risk "within" each counterparty must be assigned an appropriate weight.

Consequently, the risk \( r_{ik} \) (without its real appreciation yet) has weight \( \lambda_{ik} \). For the weights \( \{ \lambda_{ik} \}^{n_k} \) which are to be found for the risks "within" the \( k \)-th counterparty, let’s put the following properties:

\[ \sum_{ik}^{n_k} \lambda_{ik} = 1, \lambda_{ik} > 0 \text{ for all } i = 1, n_k \text{ and for each } k = 1, K \] (3)

Actually, properties (3) is a condition of \((0,1)\)-standardization (weighting to a single interval). These properties are very useful for comparing both the weights inside ("within") of the risks of one counterparty and the "external" comparison (risks from different counterparties). These properties are very useful for comparing both the weights "within" the risks of one counterparty and the "external" comparison (risks from different counterparties).

Thus, instead of the direct \( i \)-th type of risk \( r_{ik} \) when interacting with the \( k \)-th counterparty, we must consider a weighted risk \( r_{ik} \lambda_{ik} \). Risk assessment \( r_{ik} \), hereinafter will be noted as \( \tilde{s}_{ik} \). Unlike risk \( r_{ik} \) as an abstract category, value \( \tilde{s}_{ik} \) is the usual estimate (real integral number) of this category. Therefore, the weighted risk estimate is \( \lambda_{ik} \tilde{s}_{ik} \). And, as a result, the task (1) is the following: to determine such \( k \), from the list 1, 2, 3, ..., \( K-1 \), \( K \), when

\[ \min_{k=1, K} \sum_{i=1}^{n_k} \lambda_{ik} \tilde{s}_{ik} = \sum_{i=1}^{n_k} \lambda_{ik} \tilde{s}_{ik} \] (4)

In the framework of minimizing risk and increasing economic security, task (4) is the model of optimal interaction with potential partners in the process of enterprise foreign economic activity. It is quite clear that in order to solve this problem we need to obtain risk estimations \( \{ \tilde{s}_{ik} \}^{n_k} \) along with their weights \( \{ \lambda_{ik} \}^{n_k} \).

While the weights can be taken as equivalent, risk assessment is a non-trivial process, requiring the strengthening of two components: determining the list of relevant risks for each counterparty and introducing a composition of qualified experts (Romanuke, 2016).

3. Results

In the course of foreign economic activity, enterprises can both develop (generally speaking, unevenly in time), and disappear, transforming various groups of risks. Mainly, these risk groups can be classified into the following seven groups:

1. risks associated with logistics processes;
2. fiscal risks (including customs and tax risks);
3. the risk of non-compliance of products with the standards and norms of the partner countries;
4. the risk of increased transaction costs;
5. the risk of currency fluctuations in the partner country.
6. corruption risks;
7. risk of non-fulfillment (disruption) of contracts (including in case of force majeure).

So, formally, the maximum number of risks is equal to 7. However, for the partner countries some risks from this list become irrelevant. For example, the risk of non-compliance of products with standards and norms is almost zero if we consider countries with which stable cooperation has been conducted for
In assessing the relevant types of risk \( j \)-th the expert will submit his version of the risk \( n_{ik} \) as \( s_{ij} \in [1, S_{ik}] \), where \( j = 1, Q \).

In general, weights \( w_{ij} \) are taken into account of experts’ qualification, and an evaluation of \( i \)-th type of risk when interacting with \( k \)-th counterparty is the weighted sum of all expert estimates:

\[
\delta_{i} = \frac{1}{Q} \sum_{j=1}^{Q} s_{ij} , \quad \text{for each } i = 1, n_{i} \text{ and } k = 1, K
\]  

(8)

In the case of experts having the same qualification, the estimate (8) is replaced by the arithmetic mean (since then the weight of each expert’s qualification is equal to \( 1/Q \)):

\[
\delta_{i} = \frac{1}{Q} \sum_{j=1}^{Q} s_{ij} , \quad \text{for each } i = 1, n_{i} \text{ and } k = 1, K
\]  

(9)

Now, despite the estimates of the risks weights (6) and (7) and estimates of the risks themselves (8) or (9), before proceeding to the solution of problem (4) we must find out how relevant these estimates are in aggregate. Here we are talking about so-called consistency of expert estimations. In case of inconsistency (which we will not exclude yet), we will contact the experts with the requirement to perform the expert procedure again. This is quite possible, since the total number of estimates that one expert must make is equal to \( 2 \cdot \sum_{k=1}^{K} n_{k} \) and, as it has already been clarified above \( \max_{k=1}^{K} n_{k} = 7 \). So, in extreme cases, one expert will be forced to perform 14 \( K \) point reevaluations. For three counterparties, for example, it will be an acceptable amount (42 estimates) for reevaluation.

To form a criterion for the consistency of expert estimations, we use the well-known approach, according to which expert estimations should be relatively compact. When assessing the weight of the \( i \)-th type of risk when interacting with the \( k \)-th counterparty, the relative error of the \( j \)-th expert is calculated as follows:

\[
\varepsilon_{ij} = \frac{|w_{ij} - \hat{w}_{ij}|}{\hat{w}_{ij}} , \quad (i = 1, n_{i} \text{ and } k = 1, K)
\]  

(10)

Its relative error in assessing the risk itself is equal to:

\[
\varepsilon_{ik} = \frac{|s_{ij} - \hat{s}_{ik}|}{\hat{s}_{ik}} , \quad (i = 1, n_{i} \text{ and } k = 1, K)
\]  

(11)

In the case of experts have the same qualification the calculating of the relative errors (10), is following:

\[
\delta_{ij} = \frac{1}{Q} \sum_{j=1}^{Q} \frac{\sum_{i=1}^{n_{i}} w_{ij} - \sum_{i=1}^{n_{i}} \hat{w}_{ij}}{\sum_{i=1}^{n_{i}} \hat{w}_{ij}} , \quad (i = 1, n_{i} \text{ and } k = 1, K)
\]  

(12)

Now choose the consistency threshold \( h > 0 \). This is done on the basis of rational considerations and hypothetical opportunities of experts (Romanuke, 2016). Typically, this threshold is (in percentages) from 5% to 25%. The consistency threshold is the same for all counterparties. Next, if the condition

\[
\sum_{j=1}^{Q} \xi_{j} \delta_{ij} < h
\]  

(13)

is performed simultaneously for all \( (i = 1, n_{i} \text{ and } k = 1, K) \) expert estimations of risk weights are consistent. For those indices \( i \) and \( k \), for which the condition (13) is not fulfilled, it is necessary to do a revaluation. For experts of the same qualification, respectively, it is checked whether condition

\[
\sum_{j=1}^{Q} \delta_{ij} < h \cdot Q
\]  

(14)
We will use the same consistency threshold to verify the risks themselves for the compactness. However, the transition to such an audit will only be carried out if for \( k \)-th contractor all risk weightings \( \left\{ w_{ij} \right\}_{j=1}^{n_k} \) are consistent, that is, the condition (13) or (14) for all \( i = \frac{1}{n} \) is performed. Then the condition for consistency of expert risk estimations is the fulfillment of inequality

\[
\sum_{i=1}^{n_k} \left( \sum_{j=1}^{Q} z_{ij} w_{ij} \right) \leq h \sum_{j=1}^{Q} z_{ij} w_{ij} < h
\]

for all \( k = 1, K \), which for convenience will be presented as inequality

\[
\sum_{i=1}^{n_k} \left( \sum_{j=1}^{Q} z_{ij} w_{ij} \right) \leq h \sum_{j=1}^{Q} \sum_{i=1}^{n_k} z_{ij} w_{ij} < h \sum_{j=1}^{Q} \sum_{i=1}^{n_k} z_{ij} w_{ij}
\]

which must be performed for all (counterparties) \( k = 1, K \). For experts of the same qualification, instead of (15), it is checked whether the condition

\[
\sum_{i=1}^{n_k} \left( \sum_{j=1}^{Q} w_{ij} \right) \leq h \cdot Q \sum_{j=1}^{Q} z_{ij} w_{ij}
\]

is performed simultaneously for all (counterparties) \( k = 1, K \). We should add that the choice of the value of the consistency threshold \( h \) depends on the number of experts. Obviously, for small groups of experts the value \( h = 0.25 \) will be acceptable. Lower values of the consistency threshold mean more stringent requirements for the compactness of expert estimations (Romanuke, 2016), which can be presented only to powerful expert groups (with the number of experts from several dozen or more).

The proposed approach will be used to make strategic decisions on the further business development of Ukrainian enterprises based on the estimation of the generalized risk of interaction with counterparties from different countries. So, state enterprise “Novator” plans foreign economic activity and interaction with one of three enterprises: “NOSTON” – Stockholm, Sweden, “Intelligent Lectern System BV” – Assen, Netherlands, “Kil-A” – Astana, Kazakhstan. For “NOSTON” each of seven types of risk is relevant, while the sixth and seventh types of risk for “Intelligent Lectern System BV” are not relevant. For “Kil-A” the seventh type of risk is not relevant.

To estimation the SE “Novator” attracted 17 experts. Experts have taken into account that this enterprise does not have state support. Also, the experts were reminded that at the moment SE “Novator” is in a state of unfair competition from domestic enterprises. Before the expert procedure, the maximum levels of all types of risk and all counterparties were set equal: \( S_{ij} = 6 \) (the index \( i \) varies from 1 to 7, \( j = 5, 6, k = 1, 3 \)). Based on the fact that a relatively small number of experts were involved in the examination, a higher consistency threshold was set: \( h = 0.25 \). In addition, it has been agreed and accepted that all experts have roughly the same qualifications.

Experts’ estimation of risk weights and risks degrees are presented in Fig. 1–6. All of them are consistent (see Fig. 7 and 8). The distribution of risk weights and resulting risk assessments are shown in Fig. 9 and 10 respectively.

The result of the problem solution (4) is shown in Fig. 11, which suggests that interaction with “Intelligent Lectern System BV” is optimal.

4. Conclusions

Improving the quality of management decisions is the key to the effective development of a modern enterprise. Since competition in the globalized world is extremely high, business entities use more and more medium-term forecasting tools in practice, most of which are based on the use of economic mathematical models. When carrying out foreign economic activity is a component of the development of large industrial enterprises due to the limited domestic demand, the problem of choosing potential foreign partners for cooperation and beneficial interaction is of particular importance. Accordingly, a model of optimization of interaction with potential partners based on risk minimization was developed in the study, which allows enterprises to significantly improve the quality of management decisions and increase their overall economic security. At the same time, further deeper research is needed on the problems of the influence of the institutional environment on the activity of subjects of foreign economic activity and the selection of potential markets for business expansion.
Figure 2. Experts’ estimation of risk weights \( \{w_{ij}\}_{j=1}^{17} \) (\( i = 1..7, 1..5, 1..6, k = 1, 3 \)) for “Intelligent Lectern System BV”

Figure 3. Experts’ estimation of risk weights \( \{w_{ij}\}_{j=1}^{17} \) (\( i = 1..7, 1..5, 1..6, k = 1, 3 \)) for “Kil-A”

Figure 4. Experts’ estimation of risk rates \( \{s_{ij}\}_{j=1}^{17} \) (\( i = 1..7, 1..5, 1..6, k = 1, 3 \)) for “NOSTON”
Figure 5. Experts’ estimation of risk rates $\left\{ \xi_{ij} \right\}_{j=1}^{17}$ ($i = 1..7, 1..5, 1..6, k = 1, 3$) for “Intelligent Lectern System BV”

Figure 6. Experts’ estimation of risk rates $\left\{ \xi_{ij} \right\}_{j=1}^{17}$ ($i = 1..7, 1..5, 1..6, k = 1, 3$) for “Kil-A”

Figure 7. Consistency of experts’ weight estimation (all – below the threshold)

Figure 8. Consistency of experts’ risk estimation (all – below the threshold)
References

1. Introduction

Communication plays significant role in almost all aspects of business and management. Even more, ‘communication is certainly the essence of civilization’ (Project Management Institute, 1987). The importance of communication in management has been pinpointed by numerous authors (Rouse, 2002; Argenti, 2003; Blundel, 2004). Especially significant for the business operations are the communications with customers, consumers and clients (Wood, 2000). Project management is not an exception and in this field the communications with customers are generally perceived as one of the key factors of the overall project success (Dow and Taylor, 2010). ISO 9001 standards emphasize the impact of the communications with clients on the quality (Cochran, 2015) though there is the lack of empirical quantitative studies investigating potential links between customer communications and the quality perceived by customers. This research is intended to fill the gap in the research on the interconnection between client communication and the quality satisfaction and to report the results of empirical analysis revealing the relations between the intensity of client communications and two quality management measures (customer quality satisfaction and non-quality costs) in a project-based company.

2. Literature overview

Communication can be understood as a two-way process between the sender and the receiver whereby information is transferred through a channel (Van Staden et al., 2002). Communications can be seen as interactions between the receiver and the sender, hence the customer communications can be interpreted as the interactions between the customer (buyer) and the provider of services or the vendor (seller) (Sheth, 1975). The communications with customers are traditionally depicted as dyadic interactions (Williams and Spiro, 1985). Although in project management customer communications usually occur within the more complicated communication network (Plokhov et al., 2016), the main information flows connecting the customer and the project are the dyads ‘customer – project/ account manager/ coordinator’ and ‘customer – project team’. Some researchers pay attention to the fact that many companies prefer to interact with customers through one contact person (project or account manager) willingly limiting the links between customers and project teams (Moller, 2003). On the other hand, the actively used concept of early customer/supplier/ project team involvement implies the desirability of direct connections between project teams and customers at the early stages of projects (Kurokawa, 2017). Early customer involvement concept is based on the presumption that the customer communication notably influences the key parameters of the project (schedule, cost, quality) though the empirical research on the impact of the customer communication on the project performance (especially, on quality (Korkala et al., 2006)) is limited (Henderson, 2008). The abundant literature on quality management pays little attention to the interconnection between communication and quality of goods and services, although isolated statements about the importance of communication for quality management are ubiquitous. Johnston (1995) defined the communications with customers as one of the importance determinants of service quality. ISO 9001 underlines the importance of internal and external communications for quality management (Cochran, 2015). Zeithaml et al. (1988) identified the communication as...
one of the important factors influencing the perceived quality of services in their well-known SERVQUAL model. Despite all these generalizations about the importance of client communication for quality, there is the deficit of studies analyzing the possible direct connections between communications and quality.

As the response to the discovered scarcity of the empirical studies on the interrelations between the customer communication and quality we pose the following research question:

**Is it possible to identify the connections between the customer communications and the quality of the project products and services?**

This question will be addressed with the help of the analysis of the data concerning the frequency of customer communications at different stages of the turnkey interior and furniture projects, customer satisfaction with quality of the project deliverables and the non-quality costs.

### 3. Research methodology

To approach the research question posed above the authors reached the company executing service projects and asked for the data about the communications with the project clients, quality satisfaction, costs associated with quality management.

Upon receiving agreement from the company, its project management and communication system were analyzed and the researchers decided which information about client communications and quality management costs can be appropriately used for the purposes of the research. The data collected from the firm went through the preliminary analysis to ensure its relevance for the research and the appropriateness for the correlation analysis. To identify the connections mentioned in the research question the correlation analysis was performed. Pearson correlation coefficients for each pair of investigated variables were calculated. P-value equal to 0.05 was used to recognize the identified correlations as strong or not. The findings from the correlation analysis were critically estimated and interpreted. In conclusion the authors formulated the implications for quality management in project-based service companies and suggestions concerning further research in this area.

### 4. Company, its projects and communication system

The primary data was received from a company engaged in the project-based turnkey interior and furniture solution services. The products of these projects are the completed, fully installed and assembled according to the design solutions, ready to use interiors including: (1) furniture purchased according to the client’s specifications, (2) lighting systems, (3) and quite often doors, curtains, floor coverings and decorative elements.

The typical project of the company consists of the six major stages:

- **Pre-contractual stage (PC)** includes the analysis of the customer needs and requirements, negotiations on quality, price, terms of delivery and payment, formulation of the terms and conditions of the contract, and eventual signing the contract;
- **Design stage (DE)** starts after the contract is signed and aims to the elaboration of the complete design documentation that describes all the details of the interior to be built for the customer;
- **Planning stage (PL)** implies the activities connected with searching for producers and subcontractors that are needed to implement the design, contracting, planning storage, targets and time of delivery, planning the internal production operations if needed; budgeting and so on;
- **Executing stage (EX)** includes delivery of the furniture and other components from the external vendors, production of untypical elements of the furniture and refinement of the furniture in order to get it prepared for installation, all necessary checks and preliminary assembly of some components on the company’s production sites;
- **Assembly and acceptance stage (AA)** means the installation of the interiors on the clients’ sites, acceptance of the interiors by the clients, closing the contracts;
- **Post-delivery stage (PD)** implies the correction of the minor or more serious errors and omissions and solution of the some documentary, informational or financial issues.

Within the project communication system the company's account managers serves as a contact person for customer and as a product manager and project coordinator for the internal project team. The account manager is a key figure and a center of all project communications. All interactions with clients are intentionally organized through the account manager which translates the voice of a customer to the project team. Though the direct communications between project team and the client inevitably occur, they are not stimulated and considered as working interactions with the limited scope and content. Project teams are usually include 4-15 specialists from the design, production and technology, delivery and assembly departments. According to the project management system the communications with clients should pass through and be mediated by the account managers, though in different projects the communication system emerge with different structural features due to the various factors.

Formal communications with clients such as emails, video conferences and telephone calls from the corporate numbers are registered in the firm’s CRM which is used as a main platform for organizing all customer-oriented communications, the storage for all client-related information and the source of the data about clients. The CRM system affords to identify the project stage when the interactions happen and the participants of the communications. Hence, it was possible to retrieve the number of interactions with clients within all projects of the company since 2013 when the system was installed.

As a part of the acceptance procedure all clients are asked to provide their feedback regarding the quality of the services based on the extended questionnaire within the CRM system where clients input their assessments directly and the company's employees are not able to edit them. Among various client satisfaction indicators the quality satisfaction index is calculated.

The corporate information system allows the top managers to determine different types of project costs including explicit accounting costs of non-quality (cost of rework, non-conforming furniture components, replacement etc.) which can be considered as the economic measure of the quality management efficiency.

### 5. Data and its preliminary analysis

For the research, 37 projects with the similar budget, duration and scope characteristics were selected. More important fact is that all projects selected for the research had the same level of the technical complexity and the same level of expected quality as they were defined at the start of the design stages of the projects. All selected projects were executed by the company for the business clients during the two years period prior to the research (2016 – 2017). The information about the client communications and costs were available from the corporate information system. In particular, the following data concerning each project under analysis was retrieved from the company’s CRM system:

- **Pre-contractual stage (PC)** includes the analysis of the customer needs and requirements, negotiations on quality, price, terms of delivery and payment, formulation of the terms and conditions of the contract, and eventual signing the contract;
- **Design stage (DE)** starts after the contract is signed and aims to the elaboration of the complete design documentation that describes all the details of the interior to be built for the customer;
- **Planning stage (PL)** implies the activities connected with searching for producers and subcontractors that are needed to implement the design, contracting, planning storage, targets and time of delivery, planning the internal production operations if needed; budgeting and so on;
- **Executing stage (EX)** includes delivery of the furniture and other components from the external vendors, production of untypical elements of the furniture and refinement of the furniture in order to get it prepared for installation, all necessary checks and preliminary assembly of some components on the company’s production sites;
- **Assembly and acceptance stage (AA)** means the installation of the interiors on the clients’ sites, acceptance of the interiors by the clients, closing the contracts;
- **Post-delivery stage (PD)** implies the correction of the minor or more serious errors and omissions and solution of the some documentary, informational or financial issues.
The number of interactions between project account managers and the clients at each project stage (A_PC – the number of ‘account manager – client’ interactions within the pre-contractual state, A_DE – the same number in the design stage of projects; A_PL – the same number at the planning stage; A_EX – the same number at the execution stage; A_AA – ‘account manager – client’ interactions at the assembly and acceptance stage; and A_PD – similar interactions at the post-delivery stage);

- The number of interactions between project teams and the clients at each project stages (these numbers are depicted by the abbreviations started from T; for instance, T_PC – means the number of ‘project team – client’ interactions at the pre-contractual stage and so on);

- Client quality satisfaction level (QS) for each project (from 1 to 5, where 1 is the lowest possible level of satisfaction and 5 is the highest one).

For each project additional communication metrics were calculated: the sum of all interactions with a client regardless the project stage and the participants from the company (C_SU), and the sum of interactions at all stages separately in the dyads ‘account manager – client’ (A_SU) and ‘project team – client’ (T_SU).

Financial modules of the corporate information system provided the data pertaining to the non-quality costs which were expressed in million rubles (Russian national currency), rounded to integers (NQ).

The preliminary simple analysis of the data was intended to identify the expected and necessary variability in the number of interactions with clients. It showed that the client-related communications in various projects have different distribution across the project stages. For instance, in Figure 1 there is the comparison of the profiles of interactions with clients in a project with the lowest quality satisfaction (level 1) and in a high quality satisfaction project (level 4).

It can be noted that the overall number of interactions with clients (both in types ‘account manager – client’ and ‘project team – client’) in the high quality satisfaction project is higher than in the project with the lowest quality satisfaction level. In both projects the highest number of communications occurs in the category A DE that is the interactions between an account manager and a client during the project design stage. The least communication intense project stage is the post-delivery stage.

The comparison provided in Figure 1 can be interpreted as if there is a positive correlation between the numbers of interactions (overall and at some project stages) with clients and the level of quality satisfaction. However, some of the projects seemingly contradict to this presumptive correlation. For example, in Figure 2 there is the graphical comparison of another pair of projects in terms of the client interaction distribution across the project stages.

![Figure 1. Examples of the project communication frequency diagrams](image1)

![Figure 2. Other examples of the project communication frequency diagrams](image2)

It can be seen, in contrary to the situation in Figure 1, that in Figure 2 the project with the lowest quality satisfaction level (1) has notably higher level of communications with a client than the project with the highest level (5). Hence, the simple graphical comparative analysis is not enough to reasonably answer the research questions as they were stated in the earlier sections of the article, and we need to apply more sophisticated statistical tools.

6. Findings and analysis

In order to identify the possible relations between client communications and the quality the correlation analysis was performed. We calculated Pearson correlation coefficients to measure the possible relations between the number of interactions with clients, on one hand, and quality satisfaction level and non-quality costs, on the other hand. The results are
shown in Figure 3. In each cell Pearson coefficients and P-values are provided. The pairs with the P-value less than 0.05 are bolded. These correlations can be considered as statistically significant.

<table>
<thead>
<tr>
<th></th>
<th>A_PC</th>
<th>A_DE</th>
<th>A_PL</th>
<th>A_EX</th>
<th>A_AA</th>
<th>A_PD</th>
</tr>
</thead>
<tbody>
<tr>
<td>QS</td>
<td>0.264</td>
<td>0.374</td>
<td>0.095</td>
<td>-0.028</td>
<td>-0.433</td>
<td>0.063</td>
</tr>
<tr>
<td>NQ</td>
<td>-0.675</td>
<td>-0.533</td>
<td>-0.244</td>
<td>-0.335</td>
<td>-0.282</td>
<td>0.101</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>T_PC</th>
<th>T_DE</th>
<th>T_PL</th>
<th>T_EX</th>
<th>T_AA</th>
<th>T_PD</th>
<th>T_SU</th>
<th>T_SU</th>
<th>C_SU</th>
</tr>
</thead>
<tbody>
<tr>
<td>QS</td>
<td>0.372</td>
<td>0.39</td>
<td>0.023</td>
<td>0.017</td>
<td>0.583</td>
<td>0.675</td>
<td>0.606</td>
<td>0.650</td>
<td>0.271</td>
</tr>
<tr>
<td>NQ</td>
<td>-0.427</td>
<td>-0.567</td>
<td>-0.102</td>
<td>0.028</td>
<td>-0.244</td>
<td>0.037</td>
<td>-0.588</td>
<td>-0.499</td>
<td>-0.605</td>
</tr>
</tbody>
</table>

Hence, it is quite reasonable to think that the more frequent communications in the design stage help to build the basis for better quality satisfaction which is defined by the client later on during the acceptance of the results. The same thing can be said about the positive correlation between the communications between a client and a project team (T_PC), on one hand, and the quality satisfaction level (QS), on the other hand.

### 7. Conclusions

Even considering all limitations of the correlation analysis, we can reasonably state with some caution that more intensive communications with clients in the design stage and early engagement of a project team in the pre-contractual interactions with clients increase the probability of the higher quality satisfaction. This conclusion corresponds with the other research on the early engagement of clients and project participants and complements this research by the statement that early client and project team engagement brings not only cost savings and also quality satisfaction gains. As a practical recommendation for project managers and quality managers we can state that the client communications at the early stages of the projects not only bring about the benefits of the budget and schedule compliance or optimization, but also definitely correlate with the positive impact on customer satisfaction with the quality of the project product and with the non-quality costs. As a direction for further research we can suggest the analysis of the connection between client communication and quality with the help of the more advance statistical tools.

### References


Table 1. Correlation between communication frequencies and quality measures (quality satisfaction and non-quality costs) (Pearson coefficients - above and P-values – below)
Optimization of the Forecasting Neural Network Parameters for Quality of Service Management Tasks

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Abstract

The problem of designing a training sample in the task of forecasting time series in the presence of a delay in the effect of individual factors on the dependent variable associated with the uncertainty of the selection of training pairs was considered in the paper. The authors considered a consistently complicating problem of determining the optimal lag at which the shape of the response surface is most consistent with the form of real dependency.

The method of accounting for time lags based on the approximation and the subsequent nonlinear optimization of the parameters of the neural network was proposed. Used two-layer homogeneous neural network with serial communications, with sigmoid transfer functions with a finite number of neurons. The algorithm using stochastic methods of minimization to solve of nonlinear optimization problems was proposed. The stochastic method allows to overcome the difficulties caused by the local minima encountered by the method of back propagation and other gradient descent methods.

A generalized system model that predicts the time series, which gives optimal time lag, including: the distribution of training and validation sets, approximation for finding weights of a network, optimization, search time delay, shift the original series of observations, predicting values of the dependent variable was proposed by the authors.

Keywords: time series; heuristic optimization; time lags; response surface.

1. Introduction

The many processes available for analysis and forecasting are time series. Thus, the quality of service management tasks are often solved on the basis of time series analysis. The most commonly used statistical and empirical methods. One of the empirical methods is modeling using neural networks.

Usually, the aim of neural network forecasting is to predict the value of a variable based on its previous values. Data on the behavior of an object whose characteristics are associated with the time duration are represented as the results of observations at uniform time periods. For the time moments t = 1, 2, ..., n, the observation data take the form of a time series x(t1), x(t2), ..., x(tn). Information on the values of the time series up to the moment n allows us to give estimates of the parameters x(tn+1), ..., x(tn+m).

To forecast the elements of time series, the "time windows" method is widely used [1, 2]. A learning example is formed by superimposing the initial data of an time "window". The following example is formed by shifting the single time window forward.

In the problems of time series analysis, the interpretation of the training, validation and test sets, as well as unrecordable data [3] is of particular complexity, since in this case each input or output set is made up of data concerning several observations, the number of which is determined by the width of the "time window" and frequency of observations. There appears a situation when the data of one observation is used immediately in three sets, each of which can be training, validation or test.

To separate the training, validation and test sets completely it is necessary to form separate blocks of observations separated from each other by a sufficient number of unrecordable values, which is not realized in practice. The use of neural network analysis of phenomena that have recently arisen, dynamically developing, without an analytical description and a long history of observations, raises the problem of a lack of statistical data for the formation of the above described sets. An example of such a problem is given in [4].

In [5], different approaches to forecasting were analyzed. It was shown that "the main disadvantage of technical analysis is that it is based on the forecasted series only, without explicitly using information on other factors affecting the value being forecasted". Due to this, it is proposed to search for the value of the dependent variable at a future time moment on the basis of known previous values of independent factors.
2. Multi-factor prediction features

In case of taking into account different factors influencing the forecasted value, each training example contains a history of values by factors that significantly affect the value of the forecasted value and the history of the values of the forecasted value itself, as well as the required output of the neural network [6]. The width of the time "window", i.e. the number of previous values on the basis of which the forecast is formed, can be determined by analyzing the graphs of the autocorrelation functions of the input factors.

To adapt the network weights \(w_i\), we use the backpropagation algorithm. It is necessary to minimize the squared error \(E_2\) [4]

\[
E = \sum_{n=1}^{T} \frac{1}{2} e^2(n) = \sum_{n=1}^{T} \frac{1}{2} (d(n) - y(n))^2
\]

where \(d(n)\) is desired network response; \(y(n)\) is actual network response.

Further, in the standard way (changes in the direction of the gradient decrease):

\[
\Delta w_k(n) = -\eta \frac{\partial E}{\partial w_k}
\]

\[
\Delta w_k = -\eta \sum_{n=1}^{T} (d(n) - y(n)) x(n)
\]

where \(\eta\) is training step.

In the papers [5, 6] it was shown that the influence of one event on another one manifests itself after a certain time, the value of which is called the time lag \(\Delta\). The time lag is revealed in determining the connections between phenomena in the social, financial, medical and other spheres.

In the case of an unknown time lag, the problem of neural network modeling of time series is significantly complicated, since there is an uncertainty in the choice of training pairs \((x, y)\). If we suppose that the influence of \(X\) on \(Y\) factors is delayed, then the time series \(Y\) "lags" behind the rows \(X_i\) by some amount of \(\Delta\), and in the general case \(\Delta_{i-1}, \Delta_{i-2}, \ldots, \Delta_{i-n}\).

To obtain a one-step forecast, the forecasting problem can be reduced to an approximation problem of the following form.

3. Setting the task of neural network multidimensional forecasting

There are \(M\) time series \(X_1, X_2, \ldots, X_M\) for \(N\) observations in each one. There is a variable \(Y\) investigated – the same in terms of time series, presumably depending on the series of observations. It is necessary to develop and train a neural network that implements the mapping \(Y = \phi = \phi(X_1, X_2, \ldots, X_M)\) with the given degree of accuracy, on an array of input data containing the observations at time moments \(t_i\) (\(i = 0,1, \ldots, N-1\)). The network trained is used to forecast the value of \(Y(t_0)\) based on the values of \(X(t_0)\).

If there is a time lag, the adequacy of the model cannot be guaranteed because of the uncertainty of the choice of training vectors. There appears the task of determining the optimal lag, in which the influence of the i-factor is maximum and the shape of the surface response corresponds to the form of the real dependence most of all. To formalize the problem, we consider a consistently complicating problem, beginning with the simplest form.

There is a single set of \(X\) with observable values \((x(t_1), x(t_2), \ldots, x(t_0))\). There are series depending on it \(Y(y(t_1), y(t_2), \ldots, y(t_0))\). Here \(t_1 = t_0 + \Delta\), where \(\Delta = -c \cdot \Delta_t\).

Suppose that \(c = 0\), that is \(t_1 = t_0\). Let us first consider the correlation dependence between the series \(x\) and \(y\). Suppose that the conditions for the applicability of linear regression analysis [7] are fulfilled, then the theoretical regression line can be represented by an equation in the form

\[
y = a + bx
\]

where \(y\) is theoretical value of the dependent variable.

The parameters \((a\) and \(b)\) of regression equations are found by the method of least squares [8]. An example illustrating the case under consideration is shown in Fig. 1. Here \(X\) is an independent variable, \(Y\) is a dependent variable, The unbiased series is obtained from the regression equation \(\hat{y} = -0.06 + 1.4x\), the parameters of which were found by the method of least squares from the original values.

As it can be seen from Figure 1 the difference between the graphs is very large and it is impossible to use the model to forecast the value of \(Y\) \((t = 1)\) from the value of \(X\) \((t = 1)\) with satisfactory accuracy.

Suppose now that \(c = 1\), that is, \(t_1 = t_0 + \Delta\). Thus to find the parameters of the regression equation, we use the "shifted" values of the series \(X\), comparing the observed value of \(Y\) to the "past" value of \(X\), spaced by one interval. The regression equation takes the form \(y = 0.4 + x\), the illustration is shown in Figure 2.

The calculation series coincided with the empirical (excluding the starting point), therefore, the model can be used to obtain a more reliable forecast.

However, formally to find the coefficients of the regression equation, we did not use the original series \(X(t_i)\), but the series \(X*(t_i)\), which is not the result of direct observations at the same time points in which the values of \(Y\) were fixed. If the form of the dependence \(X(t_i) = \gamma(t_i)\) is known, then we can find the parameters of the regression equation by introducing an additional variable \(\Delta\), which is the time shift value:

\[
y = a + b \cdot \gamma(t + \Delta)
\]

In the available literature no examples of an analytic solution of such a problem were found. In addition, the use of another function \(\gamma\), the analytic expression of which is unknown and, in general, may be absent, can lead to a sharp increase in the model error.

On the other hand, the time lag can be taken into account when solving the problem of discrete optimization, based on the following considerations.

4. The time lag investigation

In accordance with [12], when using the method of least squares, the parameters of the regression equation are as follows:

\[
b = \frac{n \sum X_i Y_i - \sum Y_i \sum X_i}{\sum X_i^2 - n \bar{X}^2},
\]

\[
a = \frac{\sum Y_i - b \sum X_i}{n}
\]

\[
 \sum X_i^2 - n \bar{X}^2
\]

\[
 \sum Y_i - b \sum X_i
\]

\[
 \sum X_i \sum Y_i - n \bar{X} \bar{Y}
\]
where \( a \) and \( b \) are equation (4) parameters, \( n \) is observations number, \( X_i \) is the result of observations of an independent variable at a time point \( i \), \( Y_i \) is the result of observations of a dependent variable at a time point \( i \).

A general model error can be found as

\[
e_k = y_k - (a + bx_k)
\]

(11)

We will consider the general model error in the form:

\[
\bar{c}_k = \frac{1}{n} \sum_{i=1}^{n} (y_k - (\bar{X} - x_k)) \left( \frac{n \sum X_i Y_i - n \bar{X} \bar{Y}}{\sum X_i^2 - n \bar{X}^2} \right)
\]

(12)

where \( X_i \) are elements of the series obtained from the original series of \( X \) by shifting to some optimal value \( \Delta \).

Thus we formulate the problem of discrete optimization as follows:

\[
\frac{1}{n} \sum_{i=1}^{n} c_i \rightarrow \min,
\]

(13)

\[y_i \in Y, x_i \in X, k = 1, \ldots, n,
\]

\[x_i \in X', x_i = x_i + \Delta \in \{0, \Delta, 2 \Delta, \ldots, n \}
\]

where \( \Delta \) is sample spacing.

Turning to neural network modeling, we use pairs \((x_i, y_i)\) to solve the problem of dependent series approximating. In [10] an example of a neural network with a single input, one output, a linear activation function, capable of solving the problem of finding the coefficients of the regression equation is given. Constants \( a \) and \( b \) in (4) were chosen as custom parameters. Comparability of the results of regression and neural network analysis was demonstrated. However, the use of the linear activation function limits the range of application of the neural network approximation method to cases of linear dependence of \( Y \) on \( X \). Therefore, we use the statement [9] that for any set of pairs \((X^k, Y^k)\), \( k = 1 \ldots N \) there exists a homogeneous two-layer neural network with consequent connections, with sigmoid transfer functions and with a finite number of neurons, which forms the corresponding output vector \( Y^k \) for each input vector \( X^k \).

Functioning of the neural network of the structure described above, but having one output (which is determined by the task) is subject to the following law:

\[
y^* = \tilde{f} \left( \sum_{i=1}^{n} w_{ji}^{(2)} \left( \sum_{j=1}^{m} w_{ij}^{(1)} \cdot x_j \right) \right)
\]

(14)

where \( \tilde{f}(x) = \frac{1}{1 + e^{-x}} \)

(15)

\( w^{(2)} \) is weight of the i-neuron of the output layer,

\( w^{(1)} \) is weight of the i-neuron of the hidden layer,

\( x_j \) is input vector \( X \) element,

\( y^* \) is neural network output.

Provided that the network has one input,

\[
y^* = \tilde{f} \left( \sum_{i=1}^{n} w_{ji}^{(2)} \left( \sum_{j=1}^{m} w_{ij}^{(1)} \cdot x_j \right) \right)
\]

(16)

where index 0 corresponds to the polarization signal and weights [1].

To solve the approximation problem, the neural network must be trained, that is, the weights of all the neurons of the output and hidden layers must be matched so that we could obtain a value \( y^* \) at the output that coincides with the desired accuracy with the expected value of \( y \) for the given \( x \). Therefore, a precise match of the input \( x_i \) and the expected output \( y_i \) in each learning example is necessary for successful learning by any of the known methods. The supposed existence of a time lag makes it impossible to construct a training set correctly and to find the value of a time lag in the course of solving the approximation problem.

It was noted in [11] that if we optimize (minimize the error) by changing the network parameters, then the solution to the approximation problem is obtained. If a certain objective function is minimized and the corresponding values of the variables are searched, then the optimization problem is solved (although formally this is the same mathematical problem and the separation into parameters and variables is determined by the logic of the domain, and from the formal viewpoint the difference is practically absent). Hence the possibility of solving the discrete optimization problem consisting in finding a value of \( \Delta \) that minimizes the forecasting error of a neural network trained on an unbiased set of initial data.

Then we determine the network weights using, for example, the back propagation error algorithm. This network is then used to predict the value of \( y^*(t+1) \) not used in training, without adjusting the network parameters. The approximation quality is estimated by the forecast error value \( E = \left( y - y^* \right)^2 \).

5. Statement and solution of the discrete optimization problem

The problem of discrete optimization for one series can be formalized as follows:

\[
E = \left( y - \tilde{f} \left( \sum_{i=1}^{n} w_{ji}^{(2)} \left( \sum_{j=1}^{m} w_{ij}^{(1)} \cdot x_j \right) \right) \right)^2 \rightarrow \min
\]

(17)

where

\[
y = Y(t+1), x_i^* \in X^*, x_i^* = x_i + \Delta \in \{0, \Delta, 2 \Delta, \ldots, n \}
\]

(18)

The above given reasoning can be generalized for \( M \) time series \( X_1, X_2, \ldots, X_M \) as follows.

The problem of non-linear multidimensional discrete optimization is written in the following form:

\[
y^* = \tilde{f} \left( \sum_{i=1}^{n} w_{ji}^{(2)} \left( \sum_{j=1}^{m} w_{ij}^{(1)} \cdot x_j \right) \right) \rightarrow \min,
\]

\[
y_i = Y_i(t+1), x_i^* \in X_i^*, j = 1,2, \ldots, M,
\]

\[x_i^* = x_i (t + \Delta_j),
\]

\[\Delta_j \in \{0, \Delta, 2 \Delta, \ldots, n \}
\]

(19)

where \( N \) is the quantity of training samples.

A nonlinear optimization problem involves a set of independent variables that are deterministically associated with the value of the objective function. The purpose is to find such a set of values of independent variables that minimizes the objective function.

Such a problem can be solved as follows using stochastic methods of minimization:

1. The system is observed and the data are collected to compose a training set. Each element of the training set consists of measurements during observations and includes the values of all inputs (input vector) and all outputs (output vector).

2. The network is trained on this training set. The training consists of input vector presenting, output vector calculating, comparing of the output vector with the input vector obtained in
the course of observations, and correcting the weights minimizing the difference between them. Each input vector is presented in turn, and the network is partially trained. After a large number of input vectors presentation, the network converges to a solution that minimizes the difference between the desired and measured system outputs. In fact, the network builds an internal model of an unknown system. If the training set is sufficiently large, the network converges to the exact model of the system. If the network is presented with some input vector different from any of the vectors presented during training, a fully trained network will produce the same output vector as the present system.

3. The objective function is minimized. The target function of the outputs must be designed in such a way as to express the degree of "satisfactory" result. Now inputs become variables for the trained network.

In many cases, there may be constraints imposed by the task. For example, it may not be possible to take the values of variables outside a certain range physically. These restrictions can be taken into account by discarding of any change in the input variable in step 3 that violates the constraint.

The stochastic method allows us to overcome the difficulties caused by local minima, which the method of backward propagation and other methods of gradient descent face.

A generalized model of the time series forecasting system taking into account the optimal time lags is shown in Figure 3.

### Figure 3. Generalized model of the forecasting system

Thus, an approximator-optimizer-forecasting system is created. It can take into account the time lags and build updated short-term forecasts.

### 6. Conclusions

The problem of learning set composition in non-stationary time series prediction for same factors action delay is considered. The method of approximation and non-line optimization of predicting neural network parameters to discount the action delay is offered.

An approximator-optimizer-forecasting system is created. It can take into account the time lags and build updated short-term forecasts.

Thus, the tasks of quality of service management, based on the analysis and forecasting of time series, can be solved using neural network forecasting, taking into account time lags.

### References


Methods Toolkit for Estimating the University Ecosystem as an Innovative Form for Upgrading Education Quality

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Abstract

The article deals with the issues related with estimation of the ecosystem of a university. The trends in designing the university ecosystem used to achieve breakthrough results are determined. We consider the conceptual framework of the university ecosystem. The developed algorithm will help in diagnosing the emerging disproportions, monitor the dynamics and trends of the ongoing changes, identify the prioritized areas for the activities aimed at innovative development of a university in the context of integrating academic research into the national innovation system. We propose an integral index to estimate the university ecosystem with the boundary values. The developed classification of factors and results of their cluster analysis influence effectiveness of the university ecosystem. We used a set of indicators for estimating the university ecosystem based on integration of educational and research activities (commitment to innovative activities, ability to commercialize innovations, and effectiveness of innovation activities). The results of estimating the method used to calculate the integral index of the university ecosystem in Saratov region of the Russian Federation are presented. Application of these estimation results will allow the administration of a university identify the weaknesses in the organization of innovation activities, find out the challenges which discourage innovative development, and undertake measures needed to improve the situation.

Keywords: university; university ecosystem; innovative development; algorithm; integral index, factors, cluster analysis, quality of education.

1. Introduction

The outcome of the project of the Ministry of Education and Science of Russia related with creating basic universities should be implementation of three key objectives: universities should become centers for science, staff training, and socio-cultural development of the region. To achieve the breakthrough results, the prioritized trends in university ecosystems should include innovative changes in the management infrastructure, modernization of learning activity, academic development and innovation-driven growth. The improvements will empower development of innovative models for educational programs, conditions for encouraging initiatives and innovation activities, new scientific outlook and research trends, as well as create technologies needed to promote and commercialize the results of fundamental and applied studies conducted within the framework of innovative ecosystems of universities.

The university ecosystem covers a multifunctional infrastructure, managerial and human resources. To resolve the breakthrough objectives related with science and education, the university ecosystem must ensure cooperation with the leading stakeholders representing science, business and government authorities. Meanwhile, under tough economic conditions, there is intense competition not between universities, but between university ecosystems (Chernyshov, S., Aristarchova, M., Poroshin Yu., 2008).

The framework of the concept “university ecosystem” based on the categories “innovation activity of a university” and “innovation-driven growth of a university” is in the focus of substantial scientific studies of many researchers (Gordashnikova, O., 2011; Astafeva, N., 2007; Plotnikov, A., 2001).

Thus, O.A. Latuha and Yu.V. Pushkarev (Latuha, O., 2012) by “university innovation activities" understand multidimensional work aimed at creating innovation products, technologies and services, using innovations for education purposes, and personnel training within innovation development programs.

A.S. Bovkun (Bovkun, A., 2014) interprets innovative activity as a type of activity targeted at the following:

- creation and commercialization of ideas, technologies, services, and types of products in order to improve socio-economic development of a region and the whole country;
- training highly-skilled personnel working effectively under conditions of innovative economy;
- development, incorporation and application of innovative methods, approaches, and learning technologies in education process.

It should be noted that innovation development of a university stems from innovation activity. By innovation development of a university we understand system-based qualitative changes in institutions of higher professional learning emerging as a result of task-oriented development and introduction of innovations into educational, scientific and teaching processes of a university” (Golovcova, I., 2008).
To determine the estimates of a university ecosystem, we need a methods toolkit consisting of indicators that comprehensively characterize integration of educational and research activities (commitment to innovations, ability to commercialize innovations, and effectiveness of innovation activities).

## 2. Materials and Methods

We suggest an algorithm to diagnose the estimate rate of a university ecosystem by calculating the integral index and defining the level of its development. This algorithm will diagnose the emerging disproportions, track the dynamics and trends in the ongoing changes, identify prioritized areas for the activities focused on development of the university ecosystem in the context of integrating academic studies at universities into the national innovation system (Gordashnikova, O., Kekhan, M. 2015) (Figure 1).

![Figure 1. The algorithm diagnosing the estimates of the university ecosystem](image)

The first stage of the algorithm, allows to properly and exactly set up the goals of the diagnosis, which determines the further way for assessment of the university ecosystem.

At the second stage of the algorithm, we define the level for further estimation of the university ecosystem. At the regional level, we conduct a comparative monitoring of universities in the region, and determine the place of the university on the regional market of education services. The national level implies assessment of the university ecosystem and determination of its place among other universities in Russia (Atayan, V., et al., 2007).

At the third stage of the algorithm, we analyze the factors which influence the development of the university ecosystem. The internal factors imply the favorable technical, psychological, organizational, and staffing conditions required for the development of the university ecosystem. The external factors determine the rate of the market impact, innovation climate, economic, social and political conditions.

The fourth stage of the algorithm is used to develop a set of indicators which characterize the possibility, capability and promptness of a university to conduct innovation activities relating each component. The set of indicators covers integration of learning and research activities, including such indicators as commitment of university fellows to innovations, the index of innovative susceptibility of a university (the university’s susceptibility to innovations, and experience in incorporating innovation projects (Atayan, V., 1997).

Technologically, the main requirement to indicators is the possibility of their measurement. The sources for estimating the quantitative characteristics are the data found in the documents which are first rate in terms of their measurability. These indicators provide the actual information relating the universities, the educational services provided by these universities, the major customers, and methods of their promotion on educational market. The effort directed to primarily collect the data referred to these indicators lead to the fact that formal criteria prevail. Estimation of qualitative characteristics (“normal range”, “better”, “worse”, etc.) allow for the comparative analysis across the parameters which do not reflect the physical measurement models, but can be described using the quantitative estimates, such as scores or indices. The qualitative characteristics cover the reputation of the university, qualification standards of the faculty staff, quality of education services, commitment of students to a particular university, the strategy of activities, as well as other non-formalized parameters, which are hard to estimate. Despite the fact that the results are subjective and relative, estimation of these characteristics is absolutely necessary.

The fifth stage of the algorithm deals with collecting data about the universities under study. For this purpose, we need an adequate system for retrieval, acquisition, accumulation and processing the data. At the same time, the information should be maximally full in terms of its content, objectivity, reliability, and specification.

At the sixth stage of the algorithm, we determine the integrated index for estimating the university ecosystem using the formula

$$\text{IEI} = \sum_{i=1}^{m} X_i k_i$$

where $X_i$ is the indicator of the university ecosystem, $k_i$ is the coefficient for the value of the corresponding indicator (determined by the expert assessment method), $i$ is a type a partial index, $m$ is a number of partial indexes, $i = 1, \ldots, m$.

In this case $\sum X_i = 1$ and $\sum X_i k_i \to 1$, i.e. the closer the estimation value to 1, the higher the rate of the university ecosystem.
The integrated index will allow for diagnosing the challenges affecting the effectiveness of the university innovation strategy in relation to the specified requirements. It will also help to compare its own potential in terms of effectiveness, and the value of the components compared with its competitors, and therefore, develop the procedures for its improvement.

The seventh stage is used to determine correspondence of the rate of the university ecosystem to the required level by comparing the values of the integral index with the boundary values. If the value of the integral index is within the range of [0.01; 0.30], then the given rate is estimated as low. If the value of the integral index exceeds the upper boundary value, and refers to the interval [0.31; 0.70], then the rate is estimated as medium. In both cases, there is a need to identify the reserves of the university ecosystem, analyze the sources of funding innovation development of a university, and take measures for upgrading its level. Therefore, it is advisable to recalculate the value of the integral index used to estimate the university ecosystem.

In the case when the integral index corresponds to [0.71; 1], the rate of the university ecosystem is high, and no measures are required to regulate it, whereas it is necessary to undertake the measures supporting the system. The procedure of estimating the university ecosystem is repeated after a given period.

The proposed algorithm of estimation the university ecosystem is targeted to combine the quantitative and qualitative indicators which do not act as antipodes, but, on the contrary, complement each other. Moreover, it is the qualitative indicators, in spite of their subjective character, that allow for understanding the whole spectrum of particular quantitative characteristics of the university as an integral system. The main principle for designing the given algorithm is that it should be based on indicators generalized and interrelated with the public opinion.

3. Results and Discussion

The aim of the diagnosis is to assess the innovation ratio of a university as a regional research and innovation center, which empowers positive changes in the development of the regional environment.

For estimation purposes, we have chosen the classical and technical universities of Saratov region.

In the course of cluster analysis of the factors which influence innovation development of the university ecosystem, we found the degree of their influence (Gordashnikova O., 2017). The provided dendrogram (Figure 2) shows that the biggest effect have such parameters as the degree of teachers and students involvement in academic research, the amount of research funding, the number of teachers who have earned doctoral degrees, and the quality of human capital. It is assumed appropriate to take account of the data obtained when shaping the strategy of innovation development of a university.

**Figure 2.**

Dendrogram to the single link method (the rate of factors affecting innovation development of the university ecosystem)

F1 - relationship between the global scientific community; F2 - trends and rate of institutional changes in the innovation sphere; F3 - regulations and documents relating innovation activities, and the level of legal and regulatory framework for innovation management; F4 - degree of state control of innovation activities (coherence of policy objectives, and coordination rate); F5 - activity of high-tech regional companies; phases of business cycle and economic disturbance; F6 - nature of state participation in innovation activities; F7 - features of competition; innovation and investment climate; F8 - state and development of scientific and technological progress; rate of inventive and research activities of regional organizations; F9 - level of innovation activities of regional companies, trends in the development of technologies; level of the national production and economic systems; F10 - rate of development and application of information technologies; technological R&D; F11 - natural, geographic and climatic conditions; F12 - level of innovation infrastructure; existence of innovation centers, business incubators, science and technology parks, and technology transfer centers; F13 - informing the community and other interested groups about the activities of a university; level of the information system development; F14 - interaction of a university with municipal, regional and federal authorities, and industrial organizations; cooperation with other universities and research organizations; interaction with young people and involving the young into innovation activities; F15 - potential for introducing educational innovations on the organizational level; F16 - availability of distance learning equipment and laboratory equipment for introducing innovations; F17 - incentives for innovative behaviour and innovation culture; F18 - quality of education; effectiveness of the system of human resource management applied in innovation activities of a university; career management; F19 - quality of the human capital (faculty staff and students); F20 - rate of participation of teachers and students in academic research; amount of R&D funding; number of university fellows having earned doctoral degrees.

It would be appropriate to estimate the university ecosystem by grouping components of the system of indicators into blocks, as is shown in the table. The suggested set of indicators presents an integration of learning and research activities (commitment to innovations, commercialization of innovations, and effectiveness of innovation activities). The given set is complemented by such indicators as ability of the university staff to conduct innovations, and innovative susceptibility of the university (Table 1).

The results of the study are summarized (Table 2).
4. Conclusions

The proposed algorithm of estimating the university ecosystem will help to diagnose the emerging disproportions, track the dynamics and trends in the changes, and prioritize the areas of activities aimed at innovation development of a university in the context of integrating academic research into the national innovation system.

Analysis of various indicators of innovation development of a university allowed to make conclusions concerning the requirements referred to academic community:

- improve the quality and scope of research;
- upgrade the provided education services (Yashin, N.S., Popova, L.F., Bocharova, S.V., Bagautdinova, N.G., 2016);
- increase the rate of commercialization in the field of research and development;
- direct scientific research towards the prioritized areas of science and technology;
- upgrade the workforce capacity, train young generation of scientists demanded by society;
- encourage students’ R&D activities, empower their research interests, develop innovation culture among university graduates, encourage students’ innovation activity.

Practical application of the data received as a result of performed diagnostics will allow the university administration solve a set of management tasks:

- receive sufficient information relating certain aspects of innovation activity that will help to make effective and task-oriented decisions;

Table 1. A set of parameters for estimating the university ecosystem

<table>
<thead>
<tr>
<th>Conditional designation</th>
<th>Significance of indicators (determined by the expert method)</th>
<th>SSU Level component</th>
<th>SSU Level component</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1</td>
<td>0.06</td>
<td>0.11</td>
<td>0.10</td>
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<tr>
<td>X2</td>
<td>0.05</td>
<td>0.03</td>
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<tr>
<td>X3</td>
<td>0.05</td>
<td>0.09</td>
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<td>X4</td>
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Table 2. Evaluation of innovative development of universities in Saratov region

2.2. Commercialization of innovations

17. Total number of service centers within the innovation infrastructure (business incubators, technology transfer centers, intellectual property centers)
18. Number of recorded intellectual property goods, per 100 staff members
19. Number of intellectual property goods placed on the university’s balance sheet, per 100 staff members
20. Amount of R&D financing under business contracts with enterprises
23. Share of R&D income in the aggregate income of a university
24. Share of R&D conducted by a single contractor (without co-contractors) within the aggregate R&D income of a university
25. R&D revenue (excluding resources from the budgetary funds of the Russian Federation)
26. Share of financial means of a university, received as a result of managing intellectual property objects, in the aggregate income of a university
27. Rate of intellectual potential efficiency
find out the weaknesses in the organization of innovation activity, the reasons discouraging innovation development, and take measures for improving the situation;

apply the scientific approach and advanced methods in the study of the present-day situation, identify the deficiencies and make forecasts relating the development of higher education system.

Taking account of the identified trends in the development of universities at meso- and macro- levels, it is important to consider the following factors as strategic priorities in their innovative development: integration of learning functions, scientific studies, and entrepreneurship; development of innovation infrastructure as the basis for innovation environment through creation of specialized technology platforms together with enterprises of high-tech sector of economy; ability to create innovations; ability for commercialization of innovations that will ensure effectiveness of innovation activity of universities.

References

Harmonization of Banking Business Models with the Needs of the Economy by Encouraging the Exogenous Social Responsibility

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Abstract

The identification of a prospective economic effect is required to encourage the exogenous social responsibility of a commercial bank. The purpose of this study is to establish a set of economic and administrative factors, determining the feasibility of encouragement of the social responsibility of a commercial bank. Coefficient analysis is used to identify the opportunities for the development of the national economy by encouraging the exogenous social responsibility of a credit institution. The approbation showed a possibility to describe initially the potential for the encouragement of exogenous social responsibility, based on the official data of the subjects of the Central Federal District of Russia. The exogenous social orientation of the price attractiveness of the deposit and loan products differs significantly in the regions of the Central Federal District of Russia. Banking products are less attractive to market participants in depressed regions, and high risk indicators are included in the cost of medium-term and long-term borrowed resources. The results can help to create potential drivers for the growth of the monetary and financial markets and increase the share of financially stable and solvent ones in the structure of economic entities.

Keywords: exogenous social responsibility; commercial bank; national economy; banking business models; client-oriented approach; digitalization of the economy; remote banking services; economic profitability.

1. Introduction

The demand for quality improvement of banking products is determined by market requirements, the changing needs of prospective and actual customers, and the conditions for the prospective development of a commercial bank (Amran et al. 2017). The improvement of the responsibility system in the structural units of a commercial bank should be aimed at the development of its level of client-oriented approach (Palacio and Pérez 2018), which is expressed in strengthening the principles of good faith and openness in the relations with the users of banking products (Ezroh 2014). According to the practice, it is most effective to implement an individualized approach in the formation of competitive banking products if a commercial bank has a matrix structure (Avorbe and Barabanova 2013). It allows creating competent teams, united in separate units on the principle of homogeneous professional characteristics. The quality improvement of a banking product is impossible without giving the functions of a profit center to the branch offices of a commercial bank (Pomorina and Valenteva 2011), which will allow for the intensification of sales volumes based on an awareness of the value of meeting the subjective needs of actual and prospective customers (Goss and Roberts 2011).

A commercial bank, like any organization, has several levels of social responsibility:

- endogenous social responsibility (Sung, Kiyoung, and Ha-Chin 2016), which is aimed at the material, moral and professional development of the internal corporate environment;
- exogenous social responsibility (Atakan-Duman and Ozdora-Aksak 2014), which aims to support and implement the socio-economic goals of the development of the national economy.

The endogenous social responsibility implies:

- labor safety;
- ensuring stable and socially significant wages;
- additional social and medical insurance for employees (Suyu 2012);
- improvement of the level of professional competence of the employees through training programs (Chung-Hua et al. 2016);
- additional support for the employees turned to be in socially vulnerable conditions.

The relevance of the study of the exogenous social responsibility of commercial banks is based on the assumption that the objectives of its prospective development are optimally achievable in terms of the orientation of the banking business not only on the growth of the value of the organization, but also on the main goals of the socio-economic development of the national economy.

In this regard, the purpose of this study is the exogenous social responsibility of a credit institution with a spatially distributed network of external separate and internal structural divisions.
Hypothesis: among other things, consistently efficient activity of a commercial bank itself depends on the financial stability and solvency level of actual and prospective customers, the level of trust and the degree of their business integration with the business model of the credit institution itself. Moreover, one of the possible ways to ensure the continuity of a credit institution in terms of socio-economic stagnation is business participation in the intensification of growth factors of the national economy.

The existence of the branch network of a credit institution enhances the possibilities of its influence on the socio-economic goals of the development of the national economy (Meng-Wen and Chung-Hua 2013), which is, among other things, a combination of regional economic systems. Primarily, this is due to the territorial and market scale of activity.

Maximum consideration of the interests of prospective and actual customers, as well as participation in the resolution of state social problems, not only ensures an increase in the level of confidence in the activities of a commercial bank (Akhatov, Vikulina, and Kutuzova 2018), but also contributes to a positive financial result (Bakhmetyeva 2013). This is due to:

- the sales growth of banking products and services;
- the optimization of consumer properties of banking products and services (Hu and Scholtens 2012);
- the improvement of the image factor, including the recognition of a corporate brand (Cornett, Erhemjants, and Tehranian 2016);
- the improvement and consolidation of business activity and relations;
- the emergence of the possibility of obtaining state support.

The presence of exogenous social responsibility of a commercial bank provides for the compliance of its business model with not only the criteria of efficiency and profitability but also the social and moral development of the national economy.

The encouragement of the social responsibility of a commercial bank is impossible without creation of the conditions for its interaction with the government bodies and the public. This interaction is required for the institutional and information support for the social responsibility of a credit institution (Forcadell and Aracil 2017). The institutional and information support consists in detailing the system of social objectives for the development of the national economy, which provides for the definition of:

- the regulatory and legal identification and the regulation of measures required to solve the national social problems, where cooperation between equal subjects – individual or collective – is required (Lukmanova and Sirazetdinova 2016);
- the sectors of the national economy that need to be encouraged through social development;
- the institutions responsible for the implementation of programs for solving social problems, as the drivers of the development of the national economy;
- the tools and methods for solving social problems of development of the national economy;
- the subjects of the national economy requiring social encouragement.

The encouragement of the social responsibility of a commercial bank can be based on a sustainable resource base, which is represented by a combination of its own and budget funds. The implementation of social responsibility is associated with the priority national projects, for example, in the field of agriculture, housing, health care, and education. In practice, the implementation of social responsibility is based on the role of a credit institution as a financial intermediary (Jun, Zhixin and Guowei 2016). A financial intermediary conducts a qualitative transformation of accumulated available cash assets. Temporarily available cash assets are accumulated for: reconstruction and construction of farm complexes, development of personal subsidiary farming, ensuring of the continuity of agricultural consumer cooperatives, increasing of the land fund of agricultural producers (mortgage), formation of an affordable and comfortable housing stock for young families (mortgage), creation and modernization of the engineering infrastructure projects. In most cases, a mechanism is used to subsidize the interest rates on credit products attracted from a commercial bank, which manifests its social responsibility.

The encouragement of social responsibility through the development of state financial resources may take the form of emergency loans, subventions, subsidies, grants, intergovernmental transfers that are specifically allocated for solving the socially important problems of the national economy. Moreover, the mechanisms for tax discrimination and public recognition by the state of the high social responsibility of a commercial bank may be used.

The encouragement of the social responsibility of a commercial bank in solving important problems of the national economy will act as a deterrent to the inefficient use of public resources, since:

- the possibility of unjustified withdrawal of budget funds through the use of corruption schemes is reduced at the level of executive state bodies;
- the guaranteed delivery of the accumulated resources to targeted sectors and economic entities is ensured;
- the time taken to implement the measures to solve socially significant tasks of the national economy through the use of banking products and services is reduced.

The encouragement of the social responsibility of a commercial bank is impossible without compliance by the state with the principle of break-even operation of a credit institution as a legal entity. The successful combination of social responsibility with the objectives of national economy development is possible when the disbursement of funds from the federal and regional budgets allows a credit organization to carry out a break-even operation or to make a minimal contribution to the value of a positive financial result.

As a rule, credit organizations are interested in expanding the branch network while targeting the banking business at: sales markets expansion, diversification of the activities by offering new banking products and services (Del’Atti and Trotta 2017), replacement of the competitive offers, and improvement of the financial results through scaling up. At the same time, an increase in the number of structural units of a bank may result in the need to: attract additional investment (Farag, Mallin, and Ow-Yong 2014), take into account the territorial risk factors, create competitive advantages in new regional markets, and complicate the organizational structure of a credit institution. It is important to pay attention to the fact that an extensive branch network does not always guarantee the growth of business efficiency (Jaiyeoba, Adewale, and Quadry 2016), as well as the continuity of the social responsibility of a commercial bank. In the domestic banking practice, there are examples of reduction of the branch network by the credit organizations in order to increase the efficiency of their activities. This reduction was often accompanied by a change in the form of legal presence of...
the branch in the regions through its replacement with the operating offices, which had a positive effect on the ability to implement the social responsibility of a credit institution.

2. Materials and Methods

This study will be conducted according to the following plan: first, the authors will present a system of coefficients specially designed to characterize the level and potential of the exogenous social responsibility of commercial banks, followed by a description of interpretation options for the results obtained. To test the totality of coefficients, the data on the subjects of the Central Federal District will be involved. The source of primary data will be statistical materials from the Central Bank of the Russian Federation, the Federal State Statistics Service (Rosstat), the National Agency for Financial Research, regional statistical collections, the Ministry of Economic Development of the Russian Federation, and the Federal Portal for Small and Medium Enterprises (SMEs). Following the results of testing, the authors will present the main conclusions of the research.

The capacity of a credit institution to expand and develop its branch network, among other things, is limited by the territorial scale of the bank’s activities and the degree of saturation of the markets requiring government financial incentives. The scale of the credit institution’s activities is limited by real financial possibilities, the availability of potential sources for the accumulation of additional financial resources, and the existence of the administrative barriers when entering new markets. The degree of market saturation, in the authors’ opinion, can be established by identifying the security of economic entities, including the population, with banking products and branch services, availability of banking products and services in the market segment of a bank branch, quantitative segmentation of targeted social groups, represented as an array of real and potential customer base.

To determine the security of economic entities, including the population, with banking products and services, the authors recommend correlating the number of branches of a credit institution with their number in the region.

\[ k_1 = \frac{\text{NEE (NP)}}{\text{BU}}, (1) \]

where:

- BU – a set of branches;
- NEE (NP) – the number of economic entities (population) in need of state support.

A comparative analysis makes it possible, to some extent, to assess the attractiveness of the competitive advantages of banking products and services of the commercial bank’s branch network, which can be brought in as part of social responsibility implementation programs. The decrease in the value of provisioning of banking services due to the growth of the denominator should be assessed as a positive trend, as it indicates the growth of the client base, the price and quality competitiveness of the products and services of a commercial bank. To detail this indicator, the authors recommend determining the availability of banking products and services in the territorial market segment of a credit institution by determining the magnitude of price deviations from the market average in the region.

\[ k_2 = \frac{\text{BPP}}{\text{AMP}}, \text{where:} (2) \]

- BPP – the price of the banking product (service);
- AMP – average market price, %.

Excessive upwards deviations may indirectly confirm the lack of affordability of the products and services of the branch network of a commercial bank. In this case, the process of social responsibility implementation requires a review of the pricing policy of the credit institution. The situation associated with the excessive downward deviation should not be evaluated solely positively. On the one hand, this may indicate a reasonable pricing policy, a low cost of banking product and service forming, which leads to the establishment of a low final consumer price. This fact, of course, increases the level of realization of the social responsibility of a commercial bank. On the other hand, a situation related to the undervaluation of banking products and services of a credit institution may arise. There are no regulatory values regarding the degree of deviation; therefore, the authors also recommend performing a comparative and dynamic analysis of this indicator.

In order to increase the effectiveness of the implementation of the socio-economic responsibility of the bank's activities, attention should be paid to the quantitative segmentation of economic entities and social groups that need state financial incentives. This will determine the changes in their number and composition in the client base of the credit institution. Quantitative segmentation of the economic entities should be based on the degree of compliance of the type of activity with the areas of implementation of the social responsibility of a commercial bank, in accordance with the objectives of the development of the national economy.

With regard to social groups, the authors recommend performing quantitative social segmentation by the presence of real social characteristics, including, for example, gender, age, profession (occupation), income, marital status, place of residence, etc. Then, the selected social groups should be ranked based on their priority as a contact-consumer audience in need of state financial support, and thus falling under the principles of implementation of the social responsibility of a commercial bank. To determine the social structure of the existing client base, the quantitative composition of each separate social group sequentially with the total client base of the credit institution should be correlated.

\[ k_3 = \frac{\text{QCSGEE (QCSGSG)}}{\text{CB}}, \text{where:} (3) \]

- QCSGEE (QCSGSG) – the quantitative composition of a separate group of economic entities (social group) in need of state financial support;
- CB – Client Base volume.

The potential for increasing the number of economic entities and social groups in the client base can be identified as the ratio of the quantitative composition of a particular group of a region to the total number of subjects and residents in a region.

\[ k_4 = \frac{\text{QCSGEE (QCSGSG)}}{\text{TNEE (TNR)}}, \text{where:} (4) \]

- QCSGEE (QCSGSG) – the quantitative composition of a separate group of economic entities (social group) in need of state financial support;
- TNEE (TNR) – the total number of economic entities (residents) in the territory.

A comparative and dynamic analysis by this indicator should also be carried out, if there is information on the client base of other banks interested in the implementation of social and economic responsibility.

To characterize the level of realization of social and economic responsibility in the activities of a credit institution, the authors also recommend correlating among themselves the average level of profitability of prospective and actual corporate clients with their average lending interest rate.

\[ k_5 = \frac{\text{CReCC}}{\text{ALIRCC}}, (5) \]

where:

- CReCC – the average level of market profitability of prospective and actual corporate clients;
- ALIRCC – the average lending interest rate to prospective and actual corporate clients.

This, for example, will make it possible to determine the sufficiency of a positive financial result of economic entities in the real sector of the economy that fall under the program for implementation of social and economic responsibility of a commercial bank, which will help to attract additional borrowed resources and fulfill their obligations under them in full.

3. Results

It should be noted that over the course of five years, the level of load on branches of commercial banks increases in terms of client workload. A significant increase has been observed since the beginning of 2016 (Figure 1).
A larger number of prospective and actual clients per branch of a commercial bank, on average, during the period under consideration, is located in such regions as: Yaroslavl, Smolensk, Ivanovo and Vladimir Regions. When analyzing the results of the "k1" coefficient, it is important to pay attention to the factor components. The growing client load on the structural subdivisions of credit institutions is caused by the simultaneous growth of the population in the regions and the reduction of the branch network and the revocation of licenses of commercial banks as part of the financial market recovery policy. The results of calculations are also supported by the facts of strengthening the digitalization of the economy, which resulted in an exponential growth of remote banking services.

The analysis of the availability of banking services is carried out according to the subject principle; the price attractiveness of loan and deposit products for individuals was studied. Analyzing the results of calculations on the implementation of social responsibility by commercial banks in the framework of pricing, attention should be paid to 2018. As can be seen, the interest rate deviations on short-term loans for individuals in a regional context from the average market values in this period are smoothed, close to unity, and in a limited number of regions exceed the average interest rates in the domestic credit market of Russia (Figure 2).

The short-term loan products for individuals are most attractive by cost in the following regions: Yaroslavl, Lipetsk, Orel, Tambov, and Tver. In terms of the growth of real disposable income of the population, this will allow implementing the growth potential of regional loan debt and satisfying the deferred consumer demand. The high risk is inherent in the cost of credit products in the Ivanovo, Kursk, Ryazan and Belgorod Regions. This leads to a decrease in demand for short-term borrowed resources, to a reduction in the level of high debt ratio of the population, which can also be considered as the practical implementation of the exogenous social responsibility of credit organizations.

Considering the price attractiveness of medium-term loans for individuals, a gradual decrease in the level of exogenous social responsibility of commercial banks in the Tver, Lipetsk and Tambov Regions can be observed (Figure 3).

Considering the list of previous regions-outsiders by the price attractiveness of short-term loans, the Ivanovo, Kursk and Belgorod Regions should be emphasized. The cost of medium-term loans for individuals in these regions is often below market averages.

In connection with the presence of a direct relationship between the cost of accommodation and attracting resources, the attention should be paid to the price attractiveness of deposit products for individuals. The accumulation of the purchasing...
power of the funds of the population in an official form for the “call” period (Figure 4) and up to 1 year (except for the “call” period) (Figure 5) is socially oriented mainly in the Tver, Orel, Yaroslavl, and Kursk Regions.

Conducting a comparative analysis of the two types of deposit products in terms of urgency in a regional context, the attention should be paid to their level of price attractiveness in 2017 as part of the implementation of exogenous social responsibility. In the period under review, commercial banks for demand deposits offered interest rates, which were most often higher than the market average.

The situation is quite different with medium-term deposit products for the population in the regions of the Central Federal District. Comparing the annual values of the “k₃” indicator, it can be seen that the level of price and social attractiveness is increasing. This will indeed allow the groups of individuals to receive high interest incomes from investing in the banking sector of the economy, but it is not worth arguing about the absolute encouragement of exogenous social responsibility of credit organizations (Figure 6). This is due to the fact that the increase in the price attractiveness of the deposits and depository banking products may lead to an increase in the value of assets. Consequently, there may be an unstable contradiction in the implementation of the social responsibility of a commercial bank in the placement and attraction markets.

The identification of deferred potential to encourage the exogenous social responsibility of credit institutions in the regions under consideration is also carried out on the basis of specifying the number of citizens who are the consumers of banking products and services, and determining the number of economic entities requiring the state financial support (the “k₃” indicator) (Figure 7). According to the results of calculations, there is a high demand for the implementation of programs to support the regional economy in such regions as: Kostroma, Lipetsk, Kursk, Kaluga, and Ivanovo. The social responsibility of commercial banks in the Moscow Region is implemented most effectively.

It is important to pay attention to the fact that throughout the period under consideration, practically all regions remain in the same positions by the relevance of the social orientation of banking products and services. On the one hand, this may be due to a low growth rate of the general level of welfare of the population, on the other – to the low implementation in practice.
of customer-oriented policies at the level of the structural units of credit institutions located in the regions (Figure 8).

High demand for the socio-economic integration of banking products and services creates potential points of growth for the customer base. Consequently, there is a possibility of the liberalization of deposit and credit policies in order to optimize the principle of differentiation of active and passive operations, taking into account the degree of risk.

The results of the indicator of the sufficiency of profitability of corporate entities for participation in the loan capital market are unstable during the period under consideration (Table 1).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>The average level of economic profitability of prospective and actual corporate clients (for all corporate clients)</td>
<td>16.80</td>
<td>16.80</td>
<td>17.00</td>
</tr>
<tr>
<td>The average level of economic profitability of prospective and actual corporate clients (for SMEs)</td>
<td>9.00</td>
<td>8.70</td>
<td>14.10</td>
</tr>
<tr>
<td>Average lending interest rate for prospective and actual corporate clients (for all corporate clients)</td>
<td>10.03</td>
<td>18.14</td>
<td>13.88</td>
</tr>
<tr>
<td>Average lending interest rate for prospective and actual corporate clients (for SMEs)</td>
<td>12.56</td>
<td>18.5</td>
<td>16.22</td>
</tr>
<tr>
<td>Sufficiency level of economic profitability to increase the bank's customer base (for all corporate clients)</td>
<td>1.67</td>
<td>0.93</td>
<td>1.24</td>
</tr>
<tr>
<td>Sufficiency of the level of economic profitability for increasing the client base of the bank (for SMEs)</td>
<td>0.76</td>
<td>0.47</td>
<td>0.87</td>
</tr>
</tbody>
</table>

The corporate sector was the most solvent at the beginning of 2014, where the value of the k5 indicator was 1.67. As can be seen, in 2015 the situation changed for the worse, and in 2016, a slight recovery growth can be observed. Special attention should be paid to SMEs. During the entire period under consideration, the national economy did not provide them with sufficient funds to free up financial resources from commercial activities so that they could independently participate in the capital market without external institutional support.

4. Discussion

Based on the results of testing the set of coefficients proposed herein, the authors can draw a number of the following conclusions. The reduction in the number of credit institutions in the framework of the financial market cleansing policy, while reducing the spatially distributed branch network and strengthening the digitalization of the economy led to an increase in the client load on the branches of commercial banks in the regions. The practical implementation of the exogenous social responsibility of credit institutions in a number of regions is confirmed by the decrease in the cost of borrowed funds in the capital market.

This study complements domestic and foreign scientific research on issues related to the implementation of customer-oriented principles, future strategic development, and optimization of business models of commercial banks. The novelty of the research results is in the creation of a system of indicators that allow describing and identifying the potential to stimulate the exogenous social responsibility of credit organizations. The real benefit of the results obtained by the subjects of the Central Federal District is to identify the unevenness of encouragement.
of the exogenous social responsibility of commercial banks in the regions similar in regional socio-economic structure, growth rates of gross production. The methodology and results of this article in the primary form are applicable only to the regions of Russia. The integration into foreign practice requires the additional analysis of factors taking into account the specifics of the region, essentially those characterizing the exogenous social responsibility of financial market participants, operating in different conditions of general and special banking legislation.

5. Conclusion

With the implementation of social exogenous responsibility, the regional banking sector of the depressed regions is focused on the reduction of the high debt ratio level of the economic entities. Currently, there remains a high deferred demand for the development of exogenous social orientation of banking products and services, which is confirmed by a sufficient potential for the increase in the client base.

References


A Study of Quality Tools and Techniques in the Context of Industrial Revolution 4.0 in Malaysia. What’s New?

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Abstract

The purpose of this article was to explore a systematic pattern for selecting quality tools and techniques in industrial revolution 4.0 particularly in smart manufacturing context. This study asked, “What are the appropriate Quality Management tools and techniques in the context of the Industrial Revolution 4.0 particularly for smart manufacturing?” To answer this question, multiple case study and in-depth literature review were employed as the research design approach. Two key data collection methods (qualitative methods) were used: (1) Primary data from face-to-face interview with Toyo Memory Technology and Intel Malaysia (2) Secondary data from previous study. This review coupled with the case study analysis led to the identification on the real implementation of quality tools and techniques in the industries. Thus, the researchers gained the information on how the industries select the quality tools and techniques to manage quality performance in the organization and the researchers examined the association and prevalence of different quality tools and techniques in context of smart manufacturing. As a result, industrial revolution 4.0 for quality management practices might get high impact for the best performance assessment in which it is addressed in various ways, particularly there are very few studies in this area that have been conducted in the Malaysian manufacturing sector, and to recommend the best practices implemented from the managers’ perspectives. Finally, for scholars, this article can enhance their understanding of Industrial Revolution 4.0 and quality management practices as well as highlight opportunities for further research.

Keywords: quality management; quality tools and techniques; industrial revolution 4.0; smart manufacturing; case study.

1. Introduction

The world is facing a tremendous 4th industrial revolution in manufacturing and production control, being dominated by the penetration of internet technologies into smart manufacturing environments and a paradigm shift from hierarchic production management to self-organization and self-optimization on the manufacturing floor, also the changes in quality control will be revolutionary (Gluck, M., Wolf, J. 2014). With the involvement of the Industrial Revolution it is important to have a good through quality management where is a source that become the competitive advantage and leadership that carry the values in the organization and successfully not neglecting the technology and the capabilities of the organization have to analyse and operationalize that data towards optimizing and benefiting the organization, (Davenport et al., 2012; McAfee and Brynjolfsson, 2012; Constantiou and Kallinikos, 2015; Henke et al., 2016).

Likewise, the advanced technical features suggest that the Industry 4.0 exhibits an attractive and promising production paradigm. It has a significant contribution to the quality improvement system as well as a product which can cope with the global challenges. As such, the customized products can be produced effectively, efficiently, and profitably (Gluck, M., Wolf, J. 2014).

In turn, measure of modern quality management aiming for sustainable success does not only mean to avoid the delivery of defective products to the customer, but seek to establish maximum efficiency in the performance of all process of the company. With such optimized procedures, products of high quality can be provided with minimum effort of time and costs (Werner and Weckenmann, 2012). For all those quality improvements to be happening, the implementation of smart manufacturing is needed. Smart Manufacturing can improve quality management through improving productivity in the production process as well as manufacturing planning (Wang & Wang, 2016).

Further, the smart manufacturing can communicate with each other under quality management system to reconfigure themselves for flexible production of multiple types of products with high quality improvement. Smart manufacturing has the potential advantage in bringing stronger integration of the top floor and shop floor and thus more intelligence and flexibility to production. An additional, smart manufacturing will allow manufacturer to improve quality system through using data from production, service, and quality control which will lead to quality improvement of both product and process.

In relation to the quality perspective, several studies have been conducted to verify the priority and importance of different tools and techniques for quality improvement. For instance, previous study conducted by Tari and Sabater (2004) found that the most frequent tools and techniques used within ISO certified firms in Spain are audits, graphs, SPC, and flow charts, respectively. On the other hand, the least used tools and techniques in the firms studied were the basic tools. Another study by Drew
and Healy (2006) of Irish organisations discovered that the most and widely used quality tools were customer surveys, followed by competitive benchmarking.

In the study by Fotopoulos and Psomas (2009), it was found that two thirds of the organizations used easy to understand quality tools, which included check sheets, flow charts, and data collection, while the remaining tools and techniques had very limited implementation. Also, a study conducted by Swedish quality professionals by Lagrosen and Lagrosen (2005) revealed that the application of all quality tools and techniques was generally limited, except for flowcharts, which were used extensively. Although quality tools and techniques were used significantly more often in larger organizations (Fotopoulos & Psomas, 2009), they could be implemented in all organisations, regardless of size or type (Basu & Wright, 2012).

In most recent studies carried out by authors such as Gluck, M., Wolf, J. (2014); Mosconi, (2015) in the areas of quality management and Industrial Revolution 4.0 seem lack to see how current quality tools and techniques need to change, improvise and to be in line with development of the Industrial Revolution 4.0 particularly in the area of smart manufacturing.

Thus, all of the above literature suggests that there is an ample amount of literature review on quality management tools and techniques, the majority of studies have been conducted to measure or eliciting the view of quality management tools and techniques from customers’ perspectives or with the attention given to examining quality tools and techniques practices from managers’ and employees’ perspectives. Consequently, based on relevant quality management review, this article contributes to the quality management literature by fulfilling the following gap:

“There are very few studies in the field of quality management that have been comprehensively conducted for selecting the appropriate quality tools and techniques in industrial revolution 4.0 particularly in smart manufacturing context”.

In saying that, therefore this article aims to answer “What are the appropriate Quality Management tools and techniques in the context of the Industrial Revolution 4.0 particularly for smart manufacturing?”

The rest of the paper is structured as follows: the first section provides the literature review on the quality management tools and techniques, smart manufacturing in Industry 4.0 for quality management and quality tools and techniques of smart manufacturing in Industry 4.0. The second section discusses the methodology of the study. In the third section, the paper continues with the findings and discussion. The final section discusses the conclusion of the study.

2. Theoretical Background
2.1. Quality Management Tools and Techniques

Even though all quality tools and techniques are helpful, many companies do not utilize certain quality tools and techniques when applying them (Novak, 2005). There is increased recognition of the need to identify appropriate tools and techniques to be used in the improvement process, as there are over 400 tools and techniques in the quality management area (Basu, 2004; Charanath, 2011). Identifying such tools and techniques could use several criteria, including: their successful implementation in different circumstances; whether or not the tools and techniques selected are required or alternate in different conditions; and whether or not they apply to the manufacturing industries (Dale, 2003).

Dale further indicates that there is an urgent need for educating employees on the various benefits of quality tools and techniques. Designing a training program on how to use quality tools and techniques is essential. Although quality tools and techniques provide significant benefits, inappropriately applying them could create more problems in the quality system. Brady and Allen (2006) and Kwok and Tummaia (1998) also pinpoint that tools and techniques sometimes fail to be effectively applied because of a lack of their roles and knowing when, where, and how to apply them.

There is a need for a thorough investigation as to the reasons or preferences of using certain tools over others, and what difficulties are encountered when implementing quality tools and techniques (Barnford & Greatbanks, 2005; Fotopoulos & Psomas, 2009). A critical mistake occurs when organizations try to implement tools and techniques separately, as the major benefits of these techniques depend on their sequential implementation (Dale, 2003). In order to effectively implement quality tools and techniques in a sequential manner, they must be embedded within a systematic problem-solving approach. Among many reasons, the failure of utilizing these tools and techniques stem from the inappropriate selection of the right ones.

As such, there are abundant of studies about the degree of importance in applying various quality tools and techniques (Clegg et al., 2010; Drew & Healy, 2006; Fotopoulos & Psomas, 2009; Lagrosen & Lagrosen, 2005; Lam, 1996; Miguel, Satolo, Andrietta, & Calarge, 2012; Rowland-Jones, Thomas, & Page-Thomas, 2008; Sahran, Zeinalnezhad, & Mukhtar, 2010; Sousa, Aspinwall, Sampaio, & Rodrigues, 2005, Tari, 2005; Tari & Sabater, 2004), there are very few studies that propose a limited diagnostic methodology or a framework for implementing them (Hagemeyer et al., 2006; Miguel et al., 2012; Shahin, Abazbad, & Ghorbani, 2010; Timans, Ahaus, & Van Solingen, 2009). There are no comprehensive studies on quality tools and techniques, as many covers only a small portion of tools or one industry.

Nevertheless, according to Dale (2003) in selecting tools and techniques, he suggests to start with simpler ones, such as the seven basic quality control tools, because they are often as useful as complex techniques. Astonishingly, many Japanese companies create great benefits in quality because they utilize the seven basic quality control tools effectively together. In the West, companies tend to overlook the seven basic quality control tools by underestimating their importance or by using them inefficiently by employing them separately (Dale, 2003). While, Basu (2009) claims that one key issue for the ineffective application of tools and techniques is poor implementation, which is usually caused by the following reasons as below:

i. Tools and techniques are used routinely for work activities without full consideration to their specific roles.
ii. Using computer software exclusively for data collection and interpretation.
iii. Tools and techniques hinder change instead of causing the improvement.
iv. Tools and techniques are limited only to be used by specialists.

Thus, in the process of identifying and eliminating quality problems, it is crucial to understand that there are two types of variation that may lead to a quality problem: special causes or common causes. Special causes occur because something wrong, but controllable, has happened. On the other hand, workers cannot solve problems that occur because of common causes, because the problem is part of the system and not controlled by individuals; therefore, only management takes action to solve the problem. Quality gurus such as Deming and Juran considered that around 85% of quality problems are common causes, and that these problems can be solved by basic quality tools (Mitra, 2012; Walker, Eshennaway, Gupta, & McShane-Vaughn, 2012). Ishikawa (2012) goes further and suggested that basic quality tools can solve 95% of quality issues.

With the above background information on quality management tools and techniques, we can now turn to the quality management applications in Industry 4.0. In the following sections the researchers will illustrate on the overview of Industrial Revolution 4.0 and how this quality management tools and techniques need to correspond and in line with Industrial Revolution 4.0 particularly in smart manufacturing context.
2.2. Overview of Industrial Revolution 4.0

Modern industrial development has lasted for several hundred years and has now the era of Industry 4.0 come. The concept of Industry 4.0 was initially proposed for developing German economy in 2011 (Roblek, Mesko & Krapez, 2016; Vogel-Heuser & Hess, 2016). According to Lukac (2015), the first industrial revolution begins at the end of the 18th century and is was represented by mechanical production plants based on water and steam power; the second industrial revolution starts at the beginning of the 20th century with the symbol of mass labour production based on electrical energy; the third industrial revolution begins in the 1970s with the characteristic of automatic production based on electronics and internet technology; and right now, the fourth industrial revolution, namely Industry 4.0, is ongoing, with the characteristics of cyber physical systems (CPS) production, based on heterogeneous data and knowledge integration.

The main roles of CPS are to fulfill the agility and dynamic requirements of production, and to improve the effectiveness and efficiency of the entire industry. Industry 4.0 encompasses numerous technologies and associated paradigms, including Radio Frequency Identification (RFID), Enterprise Resource Planning (ERP), Internet of Things (IoT), cloud-based manufacturing, and social product development (Baur & Wee, 2015; Georgakopoulos, et al., 2016; Kube & Rinn, 2014; Lasi, et al., 2014; Lin, et al., 2016; Lom, Pribyl & Svitok, 2016; Pfeiffer, 2016; Roblek, Mesko & Krapez, 2016; Singer, 2016; Thames & Scharfe, 2016; Thansen & Wulf, 2016; Vijaykumar, Saravanakumar & Balamurugan, 2015; Wan, et al., 2016).

Scholars have defined Industry 4.0 from diverse perspectives. For instance, according to the Lu, (2017) Industry 4.0 is “the integration of complex physical machinery and devices with networked sensors and software, used to predict, control and plan for better business and societal outcomes.” Hermann and Johannes (2013) define Industry 4.0 as "a new level of value chain organization and management across the lifecycle of products." Hermann, Pentek, and Otto (2016) define Industry 4.0 as "a collective term for technologies and concepts of value chain organization." They note that, within the modular structured Smart Factories of Industry 4.0, Cyber Physical System (CPS) monitor physical processes, create a virtual copy of the physical world and make decentralized decisions. In turn, they also point out that over the IoT, CPS communicate and cooperate with each other and humans in real time, and that the Internet of Services (IoS), both internal and cross organizational services, is offered and utilized by participants of the value chain.

Likewise, Industry 4.0 facilitates interconnection and computation into the traditional industry. The goals of Industry 4.0 are to provide IT-enabled mass customization of manufactured products; to make automatic and flexible adaptation of the production chain; to track parts and products; to facilitate communication among parts, products, and machines; to apply human-machine interaction (HMI) paradigms; to achieve IoT-enabled production optimization in smart factories; and to provide new types of services and business models of interactions in the value chain (Shafiq et al., 2015 & 2016; Vallier, Schmidt et al. (2015) further claim that the Industry 4.0 also brings disruptive changes to supply chains, business models, and business processes.

Further, the principles of Industry 4.0 are interoperability, virtualization, decentralization, real-time capability, service orientation, and modularity (Shafiq et al., 2015 & 2016). In terms of features, Industry 4.0 can provide more flexibility, reduce lead times, customize with small batch sizes, and reduce costs (Shafiq et al., 2015 & 2016). The key fundamental principles of Industry 4.0 include cloud/intranet, data integration, flexible adaptation, intelligent self-organizing, interoperability, manufacturing process, optimization, secure communication, and service orientation (Ji et al., 2016; Vogel-Heuser & Hess, 2016).

As such, Industry 4.0 is marked by highly developed automation and digitization processes and by the use of electronics and information technologies (IT) in manufacturing and services (Obitko & Jirkovský, 2015; Roblek, Mesko & Krapez, 2016; Yuan, 2015). Real-time integrating and analysing massive malicious data will optimize resources in the manufacturing process and will achieve better performance. Mobile computing, cloud computing, big data, and the IoT are the key technologies of Industry 4.0 (Gruber, 2013; Roblek, Mesko & Krapez, 2016; Vijaykumar, Saravanakumar & Balamurugan, 2015; Wan et al., 2016). In particular, mobile computing and cloud computing provide powerful and accurate data and service for Industry 4.0 by integrating industrial IoT networks.

An IoT system is capable of offering specific and personalized products. Users can customize products via web pages. Then, web servers transmit data to the industrial cloud and plants via wired or wireless networks. Based on the data received, the manufacturer will integrate design, and will optimize, manage, and monitor the production process in order to produce products efficiently. With the help of self-optimization and autonomous decision-making mechanism, machines and equipment will adopt more to improve the performance (Roblek, Mesko & Krapez, 2016). Since manufacturing and supply are dynamic, the life cycle of a product is changeable as well. In accordance with the changes, decentralization, self-optimization, and automation can assist the dynamic process more efficiently and effectively.

Multi-agents-based products, orders, machine processes, controls, artificial intelligence, and genetic algorithms present a comprehensive process of interoperability. The information flow is cooperated, coordinated, and communicated among the manufacturing participants and agents in CPS. Thus, the agent technology is an appropriate tool to deal with complexity and planning of manufacturing of Industry 4.0.

In addition, a fifth generation (5G) will be acquired in Industry 4.0 to accomplish latent, long, reliable, and secure communication and to meet the complex demands of emerging business paradigms ( Siddiqui et al., 2016; Varghese & Tandur, 2014). Although 5G is still in its infancy, the technology of the 5G is a necessary developmental step for the Machine-to-Machine (M2M) communication associated with Industry 4.0 and with the IoT.

Furthermore, as industries are becoming more complex and more knowledge intensive, massive data appear with Industry 4.0. The drawbacks of the heterogeneous data will hamper industrial development. Thus, big data management (data mining, data classification, and data storage) becomes a large challenge. Cloud architecture can be used for analysing data depending on the security and safety structures. Machine learning algorithms for data mining associated with cloud services are a direction for future research (Mi & Zolotov, 2016; Zhou, Liu & Zhou, 2015).

In sum, all of the above arguments suggest that Industry 4.0 can be summarized as an integrated, adapted, optimized, service-oriented, and interoperable manufacturing process which is correlated with algorithms, big data, and high technologies.

2.3. Smart Manufacturing in Industry 4.0 for Quality Management

Industry 4.0 makes factories more intelligent, flexible, and dynamic by equipping manufacturing with sensors, actors, and autonomous systems (Roblek, Mesko & Krapez, 2016). Accordingly, machines and equipment will achieve high levels of self-optimization and automation. In addition, the manufacturing process has the capacity of fulfilling more complex and qualified standards and requirements of products, as expected (Roblek, Mesko & Krapez, 2016). Thus, intelligent factories and smart manufacturing are the major goals of Industry 4.0 (Sanders, Elangeswaran & Wulfsberg, 2016). Agent paradigm is recognized as one of the effective tools for smart manufacturing.

Industry 4.0 makes value-added integration occur horizontally and vertically in the manufacturing process (Shafig et al., 2016; Stock & Seliger, 2016). Specifically, the horizontal procedure is integrated with value creation modules from the material flow to the logistics of product life cycle, whereas the vertical procedure integrates product, equipment, and human needs with different aggregation levels of the value creation and manufacturing systems. Intelligence and digitization are integrated from the raw material acquisition to manufacturing. Lasi et al. (2014) point out that Industry 4.0 drives manufacturing in two directions: the application-pull procedure and the technology-push procedure. The latter induces dynamic changes caused by a new generation of industrial infrastructure. The latter requires higher level mechanization, digitalization and networking, and miniaturization.

In Industry 4.0, the manufacturing procedure will require more sensors, actors, microchips, and autonomous systems due to the quick development of technologies (Lasi et al., 2014; Oses et al., 2016; Roblek, Meško & Krapez, 2016; Rubmann et al., 2015; Sanders, Elangeswaran & Wulfsberg, 2016). Advanced methodologies of analytics, CPS, and energy conservation measures (ECM) will be implemented in manufacturing, as well (Oses et al., 2016). Based on high frequency energy metering, Oses et al. (2016) propose a model for an injection machine to estimate the adjusted baseline with lower risks and uncertainties in measuring and verifying energy conversation. Shafiq et al. (2016) propose an assimilation of virtual manufacturing at three levels: virtual engineering objects, virtual engineering processes, and virtual engineering factories.

The integrated mechanism of the three levels will be helpful for building the structure of Industry 4.0 and for achieving a higher level of intelligent machines, industrial automation, and advanced semantic analytics.

### 2.4. Quality tools and techniques of Smart Manufacturing in Industry 4.0

Having reviewed the pertinent of Industrial Revolution 4.0 literature and its characteristic, this allows the researchers to further understand on how this Industrial Revolution 4.0 context may give the impact of respective quality tools and techniques.

A study conducted by Albers et al. (2016) analyse quality-related process with an intelligent condition monitoring-based quality control system and develop a comprehensive descriptive model. In order to achieve transparency and productivity of big data, Lee et al. (2014) address the trends of manufacturing service transformation and the readiness of smart predictive informatics tools. The prognostics-monitoring system is a trend of the smart manufacturing and industrial big data environment (Lee, Kao & Yang, 2014; Vijaykumar, Saravana Kumar & Balamurugan, 2015).

Cuihua et al. (2016) present a novel approach to simplifying the scheduling problem of job shop scheduling actively by using RFID to collect real-time manufacturing data. Tari and Sabater (2004) stated in their study that large organizations tend to use cause-and-effect diagrams, flow charts, problem solving methods, and benchmarking more than smaller organizations. Also, a study of large companies in Turkey by Bayazit (2003) indicated that the most commonly used quality tools and techniques are statistical process control, process charts, Pareto charts, cause-and-effect diagrams, quality control circles, just-in-time, quality audits, and total productivity maintenance.

Although few researchers indicated no significant difference in the application of tools and techniques between manufacturing industries (Fotopoulos & Psomas, 2009; Sousa et al., 2005), several other studies clearly showed the difference between the two industries based on the priority selection of different tools and techniques (Antony et al., 2007; Antony & Banuels, 2002; Nicols, 2006).

An example of this, a study conducted by Yau (2000), the researcher found that the manufacturing industry frequently used the seven basic quality control tools, acceptance sampling, and process capability, whereas the service industry used benchmarking, gantt charts, and quality circles the most often. In another study conducted in the Saudi food industry by Alsaleh (2007), the researcher revealed that control charts, histograms, and run charts were tools and techniques used most often. In general, manufacturing organizations more often apply quality improvement tools and techniques (Tari & Sabater, 2004). Moreover, a study conducted by Burcher, Lee, and Waddell (2006) found that although quality managers in Britain and Australia have very limited skills in many quality tools and techniques, they do not pay a major effort to enhance their knowledge in that area. They do not use the most current quality tools and techniques, and they are perhaps not even aware of them. Quality managers in these two countries, mostly employed a very narrow collection of tools and techniques, which consisted of brainstorming, control charts, and pareto analysis.

In a nutshell, the more experienced an organization with the application of quality management, the more tendency it has to use different quality tools and techniques, particularly advanced ones (Revuelto-Taboada, Canet-Giner, & Balbastre-Benaven, 2011); and, the more an organization uses quality tools and techniques, the better performance it acquires, regardless of its size (Ahmed & Hasssan, 2003).

### 3. Research Methodology

This paper is an exploratory qualitative study. A systematic approach to literature review is based on the knowledge that gives a major role in evidence-based practices (Denyer & Tranfield, 2006; Rousseau, Manning, & Denyer, 2008; Tranfield, Denyer, & Smart, 2003) was adapted in this research. Process in getting literature review that has been conducted include ‘Industrial Revolution 4.0’, ‘Smart Manufacturing’, quality tools and techniques in general and as well as quality tools and techniques in Industrial Revolution 4.0.

Essentially, systematic reviews are formulated around research question. In this study, our key aim is to answer the question of “What are the appropriate Quality Management tools and techniques in the context of the Industrial Revolution 4.0 particularly for smart manufacturing?”

In saying that, the researchers have reviewed the particular issues by looking in-depth at the literature via an online database journal, such as Emerald, Science Direct, and ABI/ProQuest. These online databases cover journals in the area of quality management, namely the International Journal of Operations and Production Management, International Journal of Quality and Reliability Management, California Management Review, Managing Service Quality, The TQM Magazine, Journal of Operations Management and etc.

Next, after analysing a patent of the literature, the researchers have adopted case study approach in order to illustrate how this phenomenon – the characteristics are applied to the real world context. This is supported by Yin (2003, 2012) who claims that for the evaluation research, the case can be used to document and analyses implementation process.

Moving on from this, the researchers also want to focus and be specific at the highest level possible. As a result, researchers chose Toyo-Memory Technology and Intel Malaysia, as there are one of the companies that can fit well with the Industrial Revolution 4.0 model. These two companies devote a significant amount of time and resources into fostering an Industrial Revolution 4.0 ecosystem for communities that promote the commitment and innovation in practices in their daily operation. Therefore, the key reason for selecting these two companies is...
based on the premise that they operate successfully in the Industrial Revolution 4.0 context (i.e. The pioneer Malaysian project for Industrial Revolution 4.0), fulfilling the criterion purpose and providing the exceptional case, as they are the stepping stones and benchmarking for the other companies to learn from them.

As a result, in conducting this research, two key data collection methods (qualitative methods) were used: (1) Primary data from face-to-face interview with Toyo Memory Technology and Intel Malaysia (2) Secondary data from previous study. Accordingly, this review on the previous study allows the researchers to establish better understanding on the pertaining issue regarding the appropriate quality tools and techniques in the context of Industrial Revolution 4.0. This review coupled with the case study analysis also led to the identification on the real implementation of quality tools and techniques in the industries.

As such, in this study, respondents were selected based on their background of manufacturer that participate and living in the environment of Industry 4.0 particularly in Smart Manufacturing context. Turner (2010) and Creswell (2007) indicated that a researcher should conduct sampling strategies to get qualified respondents that will provide appropriate and valuable information. Respondents were chosen based on certain categories and characteristics that meet the research outcomes. They have; (i) implemented quality tools and techniques; (ii) various experiences in managing issues over quality management; (iii) moving towards digital manufacturing; (iv) and living in the environment of Industry 4.0 context such as smart manufacturing, digital manufacturing, fully automation and others.

In short, the respondents consisted of experts who worked in position ranging from Engineer up to General Manager of the Toyo-Memory Technology and Intel Malaysia. In addition, respondents were selected for this study, according to the following criteria: they were currently working as a manager or engineer position. They were viewed as making significant contributions to their organizations and to the field. To ensure the quality of the interview data, the respondents’ experience had to include at least three years working in the organization. Participation was voluntary, with the managers and engineers offering selections and suggestions. The respondent’s details are shown in Table 1 as follows.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Designation</th>
<th>Years of Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Manager 1, TMT</td>
<td>General Manager</td>
<td>30 Years</td>
</tr>
<tr>
<td>Senior Manager 2, TMT</td>
<td>Senior Manager, Quality Assurance</td>
<td>20 Years</td>
</tr>
<tr>
<td>Senior Manager 3, TMT</td>
<td>Senior Manager, Internal Quality</td>
<td>20 Years</td>
</tr>
<tr>
<td>Senior Engineer 1, TMT</td>
<td>Senior Engineer, Quality Assurance</td>
<td>15 Years</td>
</tr>
<tr>
<td>Senior Engineer 2, TMT</td>
<td>Senior Engineer, Quality Assurance</td>
<td>12 Years</td>
</tr>
<tr>
<td>Senior Engineer 3, TMT</td>
<td>Senior Engineer, Internal Quality</td>
<td>8 Years</td>
</tr>
<tr>
<td>Senior Engineer 4, TMT</td>
<td>Senior Engineer, Internal Quality</td>
<td>8 Years</td>
</tr>
<tr>
<td>Manager 1, INTEL</td>
<td>Manager, Strategic Integration Management (SIM), Intel</td>
<td>13 Years</td>
</tr>
<tr>
<td>Engineer 2, INTEL</td>
<td>Engineer SIM, Intel</td>
<td>10 Years</td>
</tr>
<tr>
<td>Engineer 3, INTEL</td>
<td>Engineer SIM, Intel</td>
<td>10 Years</td>
</tr>
</tbody>
</table>

Table 1. Respondents Details
Source: Originated by authors (2018)

Initially, the aim of conducting these interviews was to enrich the information regarding the companies value and practices, as this allowed the researchers to better understand what people are thinking and saying. Thus, the researchers gained the information on how the industries select the quality tools and techniques to manage quality performance in the organization and the researchers examined the association and prevalence of different quality tools and techniques in context of smart manufacturing.

4. Research Findings & Discussion

In this section, the key objective of the study is to investigate and reveal the appropriate quality tools and techniques used for achieving quality performance in Industrial Revolution 4.0 particularly in Smart Manufacturing context. Throughout this section, the researchers present the tools and techniques that have been implemented in organization for achieving quality performance. In so doing, the researchers have adopted the explanation building method, as the main method to analyse the data.

4.1. Explanation Building Analysis Method

In this research, the explanation building method was used, as the main method to analyses the data. According to Monash University (2016), in qualitative research, the analysis of the data cannot be neatly presented in tables and figures like quantitative methods, but it must be shown in words. This is because, by nature, qualitative data results are usually in a large number of written materials.

The data needs to be connected back to the layers of detail to the overarching research question it relates. The data extracts can be connected back into this structure through a process of ‘tell-show-tell’. In the discussion of the research findings, the researchers have an opportunity to develop the story found in the data, make connections between the analysis results as well as the existing theory and research. Further, Monash University (2016) states that the skill in writing the successful discussion is moving backwards and forwards between previous research and current research and to make it clear, the data can be display by:

i. What has been done by another researcher?
ii. What has been done by the researcher?
iii. How the data will complement each other?

In short, the researchers have analysed the data by using the explanation building method which consists of theory, findings from the empirical study; the researcher’s opinion based on literature synthesising and also findings from the empirical study. See also (Yin, 2008; Saunders et. al, 2012). The key research question of this research is as follows:

“What are the appropriate Quality Management tools and techniques in the context of the Industrial Revolution 4.0 particularly for smart manufacturing?”

The quality tools and techniques that being implemented were identified from the respondents, and this includes Statistical Process Control (SPC), 7 Quality Control Tools (7 QC Tools), Failure Mode Effect Analysis (FMEA), Design of Experiment (DoE), Model Based Problem Solving (MBPS), 8 Dimension, Fishbone Diagram, YY Analysis. This is consistent with previous research in the literature such as (Clegg et al., 2010; Drew & Healy, 2006; Fotopoulos & Psomas, 2009; Lagrosen & Lagrosen, 2005; Lam, 1996; Miguel, Satolo, Andrietta, & Calarge, 2012; Rowland-Jones, Thomas, & Page-Thomas, 2008; Saharan, Zeinalnezhad, & Mukhtar, 2010; Sousa, Aspinwall, Sampaio, & Rodrigues, 2005; Tari, 2005; Tari & Sabater, 2004).

General Manager of TMT that held the position as Chief Production Officer and Chief Quality Assurance claimed that, “TMT is working on enhancing the product and service quality
and continually providing the highest level of satisfaction to our customers. By using various quality tools and techniques such as Statistical Process Control (SPC), Failure Mode Effect Analysis (FMEA), Voice of Customers (VOC), Six-sigma, Execution Planning, Histogram, Pareto, YY Analysis, 7QC Tools, Fishbone Diagram, Minitab and others to solving quality issues."

(General Manager TMT)

Accordingly, Manager 2, Manager 3, Senior Engineer 1, Senior Engineer 2, Senior Engineer 3 and Senior Engineer 4 from TMT collectively agreed that the Quality tools and techniques which is Statistical Process Control (SPC), 7 Quality Control Tools (7 QC Tools), Failure Mode Effect Analysis (FMEA), Design of Experiment (DoE), 8 Dimension, Fishbone Diagram, and YY Analysis, have been used in TMT for solving the quality issues. In line with this concept, as noted by Manager 4 from Intel, “Here at Intel, all divisions, related departments and factories have introduced and are working to actively utilize Six Sigma activities in an organized manner. We are continuing our efforts to improve the quality of our products with the targets of providing top level quality and solutions by using 7 QC Tools, Design of Experiment (DoE), Model Based Problem Solving (MBPS) and others quality tools and techniques based on quality issues.”

(Manager 4, Intel)

Likewise, Engineer 5 and Engineer 6 from Intel also agreed and indicated that, “Usually at Intel, SIM department has standardized the implementation of MBPS for solving any quality problems and followed by others quality tools and techniques such as 7QC tools, DoE, SPC, FMEA, and other tools and techniques based on quality issues that happen.” (Engineer 5 and Engineer 6)

Research Objectives | Interview data from respondents
--- | ---
Quality Tools and Techniques | GM1 | SM2 | SM3 | SE1 | SE2 | SE3 | SE4 | M1 | E1 | E2
Statistical Process Control (SPC) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
7 QC Tools | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
Failure Mode Effect Analysis (FMEA) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
Design of Experiment (DoE) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
Model Based Problem Solving (MBPS) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
8 Dimension | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
Fishbone Diagram | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
YY Analysis | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
Minitab | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
Voice of Customers (VOC) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
Six-sigma | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
Execution Planning | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
Histogram | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
Pareto | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

Table 2. The summary of the case study (Key Quality Tools and Techniques used in TMT and Intel)

Source: Summarize by the researchers (2018)

Indicators:
GM1: General Manager, Chief Quality Assurance & Chief Production Officer, TMT
SM2: Senior Manager, Quality Assurance, TMT
SM3: Senior Manager, Internal Quality, TMT
SE1: Senior Engineer, Quality Assurance, TMT
SE2: Senior Engineer, Quality Assurance, TMT
SE3: Senior Engineer, Internal Quality, TMT
SE4: Senior Engineer, Internal Quality, TMT
M1: Manager, Strategic Integration Management, Intel
E2: Engineer, Strategic Integration Management, Intel
E3: Engineer, Strategic Integration Management, Intel

Apart from that, the respondents were also being asked about the difficulties of having many quality tools and techniques that have been used for solving certain quality issues. Accordingly, a critical mistake may occur when organizations try to implement tools and techniques separately, as the major benefits of these techniques depend on their sequential implementation (Dale, 2003).

In line with the above concept, Manager 4 from Intel points out that there should be a systematic or standardization on implementation of various quality tools and techniques by looking at the quality dimension and also industrial specifications. “As a starting point in Intel, we have systematized conventional Quality Control and Total Quality Control activities in a more systematic and logical way, by introducing and deploying reconstructed Model Based Problem Solving (MBPS) as main tools and techniques to solving quality issues and managing every activity on a company wide basis in order to realize the highest management quality at the six-sigma level. This can help engineer from having difficulties to run many quality tools and techniques for solving quality problems at one time.” (Manager 4, Intel)

Consistent with the statement from Manager 4, General Manager from TMT also suggested that there should be a systematic or standardization on implementation of various quality tools and techniques by mentioning, “It is good to have many
quality tools and techniques, because the tools and techniques can be used based on the quality issues that emerge. But it's better if having one systematically way that can consider from various quality tools and techniques. By having too many quality tools and techniques, it's difficult to engineer and production level to select suitable tools and it's also needed training and the knowledge about the tools itself."

(General Manager, TMT)

Based on these discussions, this suggests that although there is almost 400 quality tools and techniques available (Basu, 2004 and Charantimath, 2011), it seems that companies do selecting certain quality tools and techniques when applying them. This is supported by Bamford & Greatbanks, 2005; Fotopoulos and Psomas, 2009 in saying that there is a need for a thorough investigation as to know the reasons or preferences of using certain tools over the others, and what difficulties are encountered when implementing quality tools and techniques.

As such, General Manager TMT also highlighted that, the difficulties of having too many quality tools and techniques are when the organization needs to train the worker for getting the knowledge on how to run that particular tools and techniques. In line with this, Brady and Allen (2006), claim that tools and techniques sometimes fail to be effectively applied because of a lack of their roles and knowing when, where, and how to apply them.

Based on the above discussion, it is fair to say that the implementation of various quality tools and techniques can give great advantages for industry in solving issues regarding quality performances. However, it is also highlighted that it doesn't mean using a lot of quality tools and techniques will guarantee to solve quality issues. Thus, having too many tools and techniques implemented, may affect the employee's and make it difficult for them and this can lead to the poor-quality performance issues instead.

5. Conclusions

This article has attempted to explore a systematic pattern for selecting quality tools and techniques in Industrial Revolution 4.0 particularly in smart manufacturing context. The key aim of this research is to answer, "what are the appropriate Quality Management tools and techniques in the context of the Industrial Revolution 4.0 particularly for smart manufacturing?". In so doing, the researchers have reviewed the pertinent of Industrial Revolution 4.0 literature and its characteristic particularly in the smart manufacturing environment in corresponds to the quality tools and techniques implementation and this follows with the case study conducted.

Thus, from the analysis discussed in this study, the conclusion can be reached that it is proven that the identified quality tools and techniques have a significant effect on the quality performance in the Industrial Revolution 4.0. The key quality tools and techniques identified, namely are; Statistical Process Control (SPC), Failure Mode Effect Analysis (FMEA), Design of Experiment (DoE), Model Based Problem Solving (MBPS), 8 Dimension, Fishbone Diagram, and XY Analysis. The summary of the key quality tools and techniques used in the respective companies in this case study is shown in Table 3 as follows.

### Table 3. Key Quality Tools and Techniques used in TMT and Intel Malaysia

<table>
<thead>
<tr>
<th>Quality Tools and Techniques</th>
<th>Explanations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Statistical Process Control (SPC).</td>
<td>A method of quality control which employs statistical methods to monitor and control a process</td>
</tr>
<tr>
<td>Failure Mode Effect Analysis (FMEA)</td>
<td>To systematically analyse postulated component failures and identify the resultant effects on system operations</td>
</tr>
<tr>
<td>Design of Experiment (DoE)</td>
<td>The design of any task that aims to describe or explain the variation of information under conditions that are hypothesized to reflect the variation</td>
</tr>
<tr>
<td>Model Based Problem Solving (MBPS)</td>
<td>The development of the concept of model-based systems were an answer to the limitations of rule-based “expert systems”, which base problem solving (e.g., Diagnosis) on a representation of experiential knowledge in a domain.</td>
</tr>
<tr>
<td>8 Dimension</td>
<td>Consist of 8 Quality Dimension</td>
</tr>
<tr>
<td>Fishbone Diagram</td>
<td>To identify potential factors causing an overall effect. Each cause or reason for imperfection is a source of variation</td>
</tr>
<tr>
<td>XY Analysis</td>
<td>The table illustrates using a group of columns and rows, with factor X (input) represented by the horizontal axis and factor Y (output) represented by the vertical axis.</td>
</tr>
<tr>
<td>Voice of Customers (VOC)</td>
<td>A market research technique that produces a detailed set of customers wants and needs, organized into a hierarchical structure, and then prioritized in terms of relative importance and satisfaction with current alternatives.</td>
</tr>
<tr>
<td>Six-sigma</td>
<td>A methodology that relies on a collaborative team effort to improve performance by systematically removing waste</td>
</tr>
<tr>
<td>Execution Planning</td>
<td>Execution planning is detailed planning for the commitment of specified forces and resources</td>
</tr>
<tr>
<td>Histogram</td>
<td>To roughly assess the probability distribution of a given variable by depicting the frequencies of observations occurring in certain ranges of values.</td>
</tr>
<tr>
<td>Pareto</td>
<td>A type of chart that contains both bars and a line graph, where individual values are represented in descending order by bars, and the cumulative total is represented by the line</td>
</tr>
</tbody>
</table>

In terms of methodology, similar studies conducted in organizations similar to these respective companies are likely to yield similar results. The lessons are extracted and therefore, this on the one hand, may help quality assurance and strategic policy makers to benchmark/evaluate where their organisations are now (See Morse, 1999; Stierand & Dorfler, 2010). It also means that they do not need to start from scratch in predicting how quality management tools and techniques need to be corresponded or aligned to the Industrial Revolution 4.0 movement, as this study already provides some understanding and insights into this.

As a result of this study, the authors can confirm that the implementation of quality tools and techniques will effectively be solved many quality issues in the industry. This observation is consistent with, Revuelto-Taboada, Canet-Giner, and Balbastre-Benavent (2011) who mentioned that, the more experienced an organization with the application of quality management, the more tendency it has to use different quality tools and techniques, particularly advanced ones. Likewise, this also supported by Ahmed & Hassan (2003) that claim, the more an organization uses quality tools and techniques, the better performance it acquires, regardless of its size.

As such, all of the above discussion also suggest that although there is almost 400 quality tools and techniques available (See Basu, 2004 and Charantimath, 2011), however the key quality tools and techniques implemented by the respective companies (i.e. the case study) are mainly focused on the Statistical Process Control (SPC), Failure Mode Effect Improvement.
Analysis (FMEA), Design of Experiment (DoE), Model Based Problem Solving (MBPS), 8 Dimension, Fishbone Diagram, and XY Analysis. These tools and techniques are considered relevant, practical and effective in line with the current movement of Industrial Revolution 4.0 particularly for smart manufacturing environment.

Acknowledgement

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An Organizational Performance: The Role of Creative Knowledge Internalization Behavior

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Abstract

Learning Organizational Theory explains that learning organizations are the accumulation of experiences and routinely develop and transfer knowledge to their members. Furthermore, various researches explain that the organizational theory is not enough to only develop the tacit knowledge that is possessed, so it is necessary to attempt to develop strengthening behaviors derived from unique codified and deliberate learning of knowledge. This knowledge can be from creation, feedback intervention, interaction, and knowledge accumulation. Data from 202 organizational and learning managers were made as the subject of this study. By using AMOS version 22 to complete SEM, it was found that internalization of knowledge building behavior had an effect on improving capability with antecedents of HR practices and Manager’s Commitments.

Keywords: training program; commitment management; goal setting theory; creative knowledge internalization behavior; organizational performance.

1. Introduction

Several studies have shown the importance of the relationship between HR practices and organizational performance (Xing (2009); Alagaraja (2013); Khan et al. (2011a)). Similarly Lawler (1995), Preller (1994). In the HR literature, such as, Mello (2012), Ulrich (2009) explained the importance of strategic training in improving organizational performance. Khan et al. (2011) showed that Training and Development has a significant positive effect on organizational performance. Training and Development which is built from the elements of training design, on the job training and delivery Style.

This training program certainly requires careful planning, integrative as well as regarding the evaluation to be carried out. Many evaluation methods concerning this training. (Arthur et al. 2003) examined with a meta-analysis model regarding the effectiveness of training. Relationship between Design and Evaluation Features and the Effectiveness of Organizational Training uses the Kickpaxtric model in the analysis of need assessment and matches between skills and task characteristics. The results can be known, such as the distribution of the high and the low ability of the average workers. Nevertheless, there are still limitations including not discussing: the effect of trainers, the quality of training materials, motivation, cognitive abilities, and self-efficacy.

Truitt (2011b) discusses training evaluation regarding attitude and linked to Training and Work Productivity. The analysis involves gender on attitudes training, employment status, and proficiency that women significantly change attitude after training (73.6%) compared to men (60.0%). Sultana et al. (2012) explained that training significantly had a positive effect on employee performance. Training also has a positive and significant effect on Salary and Job Involvement.

The difference result is shown in the study of Abou-Moghli and Abo-Rumman (2012), it is stated that human resource practices are only partly supported in improving organizational performance. In this case, Training and Development, Compensation and Remuneration, Worker Participation and Internal Communication System have no significant effect on organizational performance. Ghosh (2012) describes the effectiveness and satisfaction of training, there are seven variables tested and there are two things that fail to satisfy the training, namely: Unclear Concepts and the ability to maintain each training session to stay alive and interesting.

Although the positive effects result from training at all levels of organizational outcomes: individual, team, organizational and social (Aguinis and Krager, 2009), but the empirical research that focuses on performance-training links does not always provide evidence to support the relationship. A number of reasons have been proposed to explain why some studies have not found empirical support for a positive relationship between training and performance. The challenging concept of knowledge management associated with goal setting theory will be a solution to close the gap between training programs and organizational performance.

2. Literature Review

2.1. Knowledge Management

In this era, knowledge management becomes an important thing to survive in the competition. The capability of utilizing knowledge is a source of competitive advantage. Knowledge is created spiral like the antithesis of concepts like order-chaos, micro-macro, partial-whole, mind-action, tacit-explicit, self-together, deduction-induction, creativity-efficiency (Nonaka and Toyama 2003).

The study of Knowledge Management is increasingly developing, such as, in the perspective of organizational capabilities is like (Corner 2015; Darroch and McNaughton 2002; Gold et al. 2001; Massa and Testa 2009a). The discussions
include of how the organization has leverage so that its competence can develop absorptive capacity. Linking the result of the role of knowledge management with various types of innovation and organizational practices is significant.

Jafari and Kalanaki (2012) explained that currently, Knowledge Management is the starting point in the action of every business, how it plays a role in explaining the value of a business process. Recently, in maintaining business and creating competitive advantage, Creative knowledge is needed and aligned as well as the ability to create and utilize knowledge. Creative organizations will certainly create competitive advantage and creativity will be tested for their role in this study.

2.2. Goal Setting Theory

The literature on goal setting is a procedure for substance in this theory. Wood et al. (1987), has studied nearly 200 empirical studies. The purpose of the theory and the determination of the hypothesis are that the goal is immediate, though not always, the human action regulator. The performance will improve if the goal is made difficult, specific and accepted by individuals. In general, the literature on goal setting supports this proposition and provides clear guidance on how to operate this theory for good effects (Locke and Latham 1991).

The Goal Setting theory built from the Behavior theory which becomes a theory stated by John Watson (1913). It was about behavior change as a result of experience. Then, this theory developed into a flow of learning psychology that influenced the development of educational theory and management that was known as behaviorist flow. This theory emphasizes learning that can be measured, how the role of reinforcement and stimulus in learning success.

The development of this theory continues to develop one of the relevant models, such as, The Theory of Planned Behavior (Ajzen, 2006) which has the antecedents of Attitude, Subject Norm and Perceived Control. This theory is based on the organization as a composite, Action/behavior management based on rationality and avoiding uncertainty so that the type of manager is distinguished by engineering, institutional, and organizational. The purpose of influencing actions indirectly by directing the spirit of discovery/innovation or the use of knowledge relevant to the task and strategy (Locke and Latham 2002). This is a virtual axiom that all actions are the result of cognitive and motivational elements, but these elements can interact in creative ways.

The Locke and Latham model also emphasizes that goals must be specific and difficult, so that intermediate goals, instructions for mechanisms and strategies are needed. So that satisfaction and commitment will be obtained for achieving various challenges.

2.3. Creative Knowledge Internalization Behavior

Knowledge Management is useful to create market value and improve and maintain competitive advantage (Wig, 1997; Teece, 2000; Davenport and Prusak, 1998; Sveiby, 2001; Lee and Yang, 2000; Quintas et al., 1997; Beijerse, 2000; Ruggles, 1998). While knowledge asset is based on individual experience and expertise, companies provide physical, social, and resource allocation structures so that knowledge can be established and formed into competencies (Teece, 1998).

Nonaka (2003) maps the process of synthesizing knowledge creation, or it is known as SECI (Socialization, Externalization, Combination, Internalization) concept. Internalization is the final process that determines the organization's efforts to create explicit knowledge from tacit knowledge. This process requires the practice of action by means of simulations and experiments.

The process of building innovation excellence in addition to building strategic individuals (Jung and Avolio 1999) also requires organizational alignment including commitment (Meyer, 1996), Leadership, Dong, (1991) and change readiness (Corner 2015). The behavior of knowledge internalization has dimensions of Knowledge creation, knowledge storage, knowledge acquisition, a locus of control, feedback assessment.

This process is carried out continuously so that management will be responsible for the success of this process (Chang and Lee 2008). Then, creating value and capability will be obtained. Human Resources that have accumulated knowledge can make alliances with other stakeholders.

2.4. Empirical Models and Hypotheses

2.4.1. Relationship between training program and organizational performance

(Aguinis and Kraiger 2009; Khan et al. 2011b; P. 2014) examine the role of training on organizational performance, they find significant evidence. However, there are some researchers who find insignificant relationships or indicators such as (Magazzini et al. 2012; Roberts and McDonald 1995; Steensma and Groeneveld 2010). So that the hypothesis can be formulated as:

H1: Training programs have a positive effect on Organizational Performance.

2.4.2. Relationship between the Training Program and Internalization Knowledge Behavior

Internalization knowledge is the process of creating explicit knowledge from a knowledge that is tacit then it must be sought with various HR development programs including training programs. Cognitive and affective potential must start from the Training Need Assessment process until training evaluation. (Aguinis and Kraiger 2009) stated that training can improve learning systematically for individual, team, and organizational effectiveness. Training is expected to improve Knowledge, Skill, and Attitude. (Kirkpatrick and Kirkpatrick 2009) conducted a study on evaluation of training programs regarding Reaction, Learning, Behavior, and Results.

Research implication on the role of Knowledge management is related to the research on paradox training and development in China. (Wong et al. 2013) suggest that management considers inertia (rejecting change) and resistance to changes in the workplace, awareness of current temporary skills and alignment organizational culture to workers’ culture. Thus, the role of this training will spread new knowledge that will result in competitive advantage. The hypothesis built is:

H2: Training Program has a positive influence on Creative Knowledge Internalization Behavior.

2.4.3. Relationship between Creative Knowledge Internalization Behavior and Organizational Performance

(Massa and Testa 2009b) examines how companies build competitive advantage through knowledge management. Internalization Knowledge management consists of transforming tacit knowledge into explicit knowledge through the process of experience, learning, awareness and other methods (Maruta, 2014). With other qualitative or value chain, knowledge management creation can increase competitive advantage. The performance will increase if the position of competitive advantage increases (Chien and Tsai 2012; Klett 2010). So the hypothesis is built:

H3: Creative Knowledge Internalization Behavior will improve the Manager’s Performance.

2.4.4. Relationship between Management Commitment and Creative Knowledge Internalization Behavior.

Study of (Meyer and Allen 1991) divides commitment in 3 models. They are affective commitment, normative commitment, and continuance commitment. Each person has 3 aspects,
although they have different degrees of importance. Knowledge management has one dimension, namely feedback technology (Henderson and Phillips 2014). While E. Kevin Kelloway (1999) reveals how to increase transformational leadership commitment through the role of technology and feedback to produce a conclusion that commitment and feedback affect the knowledge management process.

A commitment will be expanded with instrumental commitment and commitment to be the best that each person has different perceptions (Kanter 1968). Leadership is a measure of the success of an organization's leadership style and it will be one dimension of measurement.

H4: Leadership commitment has a positive effect on Creative Knowledge Internalization Behavior.

2.4.5. Relationship between Management Commitment and Organizational Performance

Study on the relationship between commitment and outcome as performance is low (Cohen, 1991) due to the assessment of organizational commitment and overly general behavior (such as OCB). Now, some studies are deepened including a commitment to survive from work, role in the job, and extra behavior (Matteu, 2002; Mayer, 2002).

Alexandra Neininger (2010) conducted a study of the influences of team on organizational commitment and then related to performance. Meyer and Herscovitch (2001, p. 301) proposed that commitment is "a force that binds an individual to an action that is relevant to one or more targets". Therefore, Hypothesis built is as follows:

H5: Leadership Commitment has a positive effect on organizational performance.

3. Methodology

3.1. Population and Sample

The empirical study of this research was conducted on respondents of corporate leaders and formal learners in Central Java and Yogyakarta. The selection of the company or training service industry aims to make sure that the company observed had an employee development program in the form of training and the company was relatively developing. The number of respondents is 200-250 managers according to the rules of SEM (JR et al. 2010).

3.2. Variable Measurement

The training program was built with 5 indicators developed from the dimensions of the training program including the Importance of TNA (Anderson 1994), Variant Training, Training Evaluation (Chatzoglou 2012; Steensma and Groeneveld 2010; Storr and Hurst 2001; Truitt 2011; Ubeda-García et al. 2013), and Transfer training (Saks and Burke 2012). Each indicator is measured by 1 question, 1-7 scales from strongly disagree to strongly agree.

Creative Knowledge Internalization Behavior is built with 6 indicators from instruments developed by (Maruta 2014; Massa and Testa 2009a; Mooradian 2005; Nonaka and Toyama 2003; Tsai and Lee 2006) consisting of Knowledge creation, Knowledge storage, feedback assessment, a locus of control, accumulation knowledge, and Stakeholder Interaction. Leadership commitment was built with 5 indicators of study conducted by (Meyer and Allen 1991) and (Kundi and Saleh 1993) (Zhao et al. 2014). Management performance was built with 6 indicators built from Aragón et al. (2014); (Che-Ha et al. (2014); Theriou and Chatzoglou (2008)) Lepak and Snell (1999). Each indicator is measured by 1 question. For each response has scale 1 - 7 from strongly disagree to strongly agree.

Questionnaires distributed were 278, while questionnaires accepted to the researchers to be checked their feasibility and there were 60 sets of questionnaires that were damaged. So that a decent amount to be analyzed in this study were 218 questionnaires. With AMOS analysis, outlier data were identified as much as 16 or 7.33%. Furthermore, the data classified as outliers were issued as data analysis material, so that the data used was 202 sets (92.7% set).

The number of final sample was 202. The sample met the requirements for using the SEM with AMOS (Tabachnick and Fidell 2007; JR et al. 2010). This sample has passed the outlier and normality test.

4. Result and Discussion

The SEM step starts with a Confirmatory Factor Analysis (CFA) test to get the right reflective indicator for construct manifest. The loading factor for each indicator is ≥ 0.5 which means that it is strong enough to make the SEM model. AVE value is between 0.49 - 0.55 and CR > 0.849, thus the SEM Model can be analyzed. SEM Output Results as shown in Figure 1.
The goodness of fit index results show that the model is fit, where GFI = 0.905 (≥ 0.90), TLI = 0.976 (≥ 0.90), AGFI = 0.881 (Marginal); RMSEA = 0.028 (≤ 0.08). It is concluded that the SEM model is fit so that the proposed hypothesis can be tested as Table 1.

Looking at the results of SEM as Table 1, we find that Hypothesis 1 is not supported. It means that the training program failed to significantly improve organizational performance (β = 0.022). The hypotheses 2, 3, 4 and 5 are all supported significantly with β of each hypotheses are 0.196; 0.274; 0.307 and 0.213.

Hypothesis 1 shows that training programs fail to significantly affect organizational performance. This study is similar to the research of Saks and Burke (2012) where classical model training failed to improve performance. Failure to establish significant direct relationships can be because management manages less varied programs or documentation. Training is perceived as routine and tends to waste funds (Grip and Sauermann 2013; Magazzini et al. 2012; P. 2014; Roberts and McDonald 1995). Currently, the training has led to e-learning performance and growth of industry 4.0 so the reason why Hypothesis 1 is not supported is quite rational (Berardinelli et al. 1995; Derouin et al. 2005).

Hypothesis 2 shows that training programs positively and significantly influence the Creative Knowledge Internalization Behavior. This model should be massively applied in organizations. As (Darroch and McNaughton 2002; Nonaka and Toyama 2003; Tsai and Lee 2006) stated that through the practice of strategic management we can build knowledge. By looking at the indicators built, training need assessment can be linked to feedback assessment and locus of control creative knowledge. Training will result in creative HR behavior through 4 Kirkpatrick models (Bates 2004; Padden and Faulder 1983).

Hypothesis 3 shows that the Creative Knowledge Internalization Behavior has a positive effect on Organizational Performance significantly. Creativity will produce innovation and become a determinant of organizational performance. This creative behavior as an indicator will be a long-term part of organizational culture (Lundvall and Nielsen 2007; Moustaghfir and Schiuma 2013). Organization in its behavior need to develop interaction with stakeholders as a smart position to build competitive advantage as Tucker (2008) and Godes et al. (2005) stated. Creative knowledge will become an artifact after being developed tacit and explicit knowledge continuously (Berg 2013).

Hypothesis 4 shows that Leadership Commitment has a positive effect on the Creative Knowledge Internalization Behavior significantly. Based on these results, good leadership can create good behavior. Leadership is built from a variety of supportive commitments. Related to a commitment, a superior organization will result in a variety of knowledge accumulations (Inkinen et al. 2016; Omotayo 2015; Perez and Pablos 2003; Schmid and Kern 2014; Tsai and Lee 2006). Commitment to complete the task will affect the creation of knowledge and develop feedback based on goal setting. It is expected that the organization will be the best and have an idealized influence, inspirational motivation, intellectual simulation and individualized consideration.

Hypothesis 5 shows that leadership commitment has a significant effect on organizational performance. It can be observed that each leadership commitment will influence adaptation, and organizational capabilities (Jaros 2007; Kanter 1968; Kundi and Saleh 1993; Meyer and Allen 1991). Related to the transformation process, Organizational performance will be supported if the commitment to sustainability is higher.

Creative Knowledge Internalization Behavior becomes a mediating variable of training programs with organizational performance. This result can be shown as Figure 2.

5. Conclusion and Implication

Management as the manager of the training program needs to look more closely at the dimensions of the training program, especially regarding training planning. The training program should be arranged based on strategic planning to include stakeholder considerations and have careful guidance on the Creative Knowledge Internalization Behavior so that training programs can improve organizational performance.

Creative Knowledge Internalization Behavior must be an organizational culture so that training programs and leadership commitments can be further enhanced in their role in improving organizational performance. This mediation model is in line with Aragón et al. (2014) where organizational learning becomes a knife analysis to solve the training program gap with organizational performance. Empirical Model of this research develops knowledge management theory aligned with the theory of feedback and goal setting theory. It can be a literary repertoire especially the HR Management literature.

This research still has limitations in the use of samples that have not involved n-users (institutions that send trainees). Therefore, future researches need to extend the sample research. Future research is also expected to strengthen the variables that are sustainable so that research models can be developed with experimental models.

References


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ENVIRONMENTAL MANAGEMENT

The Scope of Applicability of the Standard of the Global Reporting Initiative (GRI) for Sustainability in the Iraqi’s Environment

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Abstract

The concept of sustainability takes a particular importance in the light of economic and social developments which witnesses various countries around the world. This has forced the accounting profession to correspond with the requirements of this concept and expand its disclosures to extend to the social, economic and environmental aspects. And Iraq is not in isolation from the outside world so the purpose of this research is to identify the reality of disclosure of the areas of sustainability in Iraqi’s companies and the scope of applicability of the standard of the Global Reporting Initiative (GRI) for sustainability in the Iraqi environment. As these standards included principles and guidelines covering different aspects of activity in the performance of companies, and thus leads to provide useful information to multiple users as well as improving the content of reports of the companies and in line with developments in the global business environment. The research has found a number of conclusions, the most important of is that the financial reports of the Iraqi companies lack any information about the dimensions of sustainability economically, environmentally and socially as well as the constituents of employing the international standards for sustainability in the Iraqi environment are still incomplete in terms of the availability of the appropriate political environment, the legal, legislative environment and the economic. The most important recommendations of the research are the need to carry out radical reforms at various political, legal, economic, educational, cultural and organizational levels in order to create the appropriate atmosphere that has required by the process of Compliance with global standards of sustainability.

Keywords: environment; sustainability; standard of the Global Reporting Initiative (GRI).

1. Introduction

1.1. Methodology

The research problem: The financial reports that have been prepared by Iraqi companies provide only financial information that does not match with the requirements of global sustainability standards, which requires the various economic units to prepare sustainability reports to present useful information on various economic, social and environmental aspects to all decision makers.

1.2. Research objectives

The research aims to achieve the following:
1. Identify the nature and mechanisms of the Global Initiative for Sustainability and its mechanisms application.
2. To determine the availability of the requirements for applying the Global Initiative for Sustainability in Iraqi companies.
3. Recognize the difficulties that have been encountered by Iraqi companies in the application of the criteria of the Global Initiative for Sustainability.
4. Declaration of the reflection of the application of the Global Initiative for Sustainability standards on the quality of information contained in the financial reports of Iraqi companies.

1.3. The importance of research

The study takes its importance from the definite reflections that have been resulted by the application of Iraqi companies sustainability reports, especially those have been issued by the Global Reporting Initiative in 2016, principally keeping pace with developments in the international accounting environment and fill the deficiencies in financial reports that have been issued by Iraqi companies as well as the synthesis of the Iraqi economy with the global economy and increasing recognition of Iraqi companies at the international level.

1.4. The hypothesis of research

The hypothesis of the research outlines a main hypothesis summarizes as:

It can be able to apply the criteria of the Global Reporting Initiative’s sustainability by Iraqi companies to keep up the developments in the global business environment.

1.5. Sample of the research

It has been selected a sample of knowledgeable and endured in the field of accounting, economic and control, where 45 people were selected as a sample of the research distributed as follows:
1. (15) University professors who have the title of professor or assistant professor in accounting and economics departments in various Iraqi universities.
2. (15) accounts auditor of the first category who is licensees to work in accordance with the Bulletin of the Council of the profession of auditing and control for the year 2017.
3. (15) accounts manager out of the Iraqi accounts manager’s
companies listed in the Iraq Stock Exchange.

1.6. Methods of collection data

1. In the theoretical perspective of the research, all the available books, research, messages and papers presented on the subject of the research, as well as on the websites of the Internet, in particular the Global Reporting Initiative for Sustainability, the International Accounting Organizations and other international organizations, were used to obtain the latest information.

2. On the scientific side, a questionnaire was prepared and distributed to the selected sample members. The questionnaire included five stages as follow:

The first axis: It has concentrated on finding out the availability of the elements of the political environment to apply the international standards for sustainability. And it has been involved in four questions.

The second axis: It has focused on identifying the availability of the legal and legislative environment for applying the international standards for sustainability and involved five questions.

The third axis: It has concentrated on identifying the availability of the constituents of the economic environment in order to apply the global standards of sustainability and it has included three questions.

The fourth axis: It focused on identifying the amount of the availability of the educational and cultural environment to apply the international standards of sustainability and included five questions.

The fifth axis: This case has focused on identifying the availability of the regulatory environment for the application of global sustainability standards and involved four questions.

2. The nature of the concept of the Global Reporting Initiative sustainability standards

2.1. Definition of sustainability and its organizational regulation

The financial report represents the main source of financial information for the activities of the economic units and occupies a prominent position among the users of financial information for their use in making informed decisions. However, with the rapid developments in the business environment and increasing the interest of stakeholders and their increasing needs for additional information not covered by the financial report related to social and environmental aspects, the economic aspects of the performance of economic units, where users have recently increased their interest in information that reflects the economic unity of their responsibilities and information on activities reflect the environmental impacts, both positive and negative, of the performance of the unit as well as the economic performance. These aspects combined were defined as sustainability or sustainable development.

Sustainable development is defined as growth that meets the needs of present generations without compromising the ability of future generations to meet their requirements. Sustainability is, therefore, a broad concept that integrates many of the inequalities related to the exploitation of natural resources such as water, air, metals, oil and gas, etc. (James, 2013, 23).

That is, the concept of sustainable development is characterized by its great comprehensiveness, but that comprehensiveness usually makes the definitions differ according to the angle of dealing with the concept. The concept of sustainable development can be summed up from the different definitions that have been given to it as follows:

- keeping resources preserved and focusing on asceticism culture.
- Personal responsibility, trust and guarantee for the future generations.

- Human is the cornerstone to achieve sustainable development.
- Emphasis on the rehabilitation of human’s humanity.
- Citizenship and freedom and the liberation of energies and equality.
- Formulation of the globalization we live in, especially institutions that perpetuate inequality and all concepts and practices of justice.
- Balanced development that achieves current needs without compromising the needs of future generations.
- Organize the relationship between man, the universe and natural intelligence and harmony between man and nature.

Proceding from the importance of sustainability come to the light of the need to move towards what is known as the sustainability of companies. The omission or lack of disclosure of sustainability information makes the financial report misleading and does not give information reflecting all aspects that constitute the value of the company, which affects the decisions of users of those reports.

In recent years, there has been increasing interest in the preparation of sustainability reports, to avoid deficiencies in the financial report, which necessitates the existence of standards and guidelines. Therefore, this is to assist in the preparation and inclusion of useful and comparable information in reports providing users with the necessary information. This matter has led to an increase the interest of professional organizations and specialists by setting standards to control the reporting and disclosing process on the sustainability of companies that have reflected on the social, environmental and economic aspects of the companies’ activities.

Considering the efforts of the Global Reports Intuitive (GRI) committee which is an independent and leading organization in the preparation of the guiding principles for sustainability report since 1997.

Recognizing the efforts of the Global Reports Intuitive committee (GRI) which is an independent and leading organization in the preparation of the guiding principles for sustainability reports since 1997, that has emerged from the Coalition for Environmentally Responsible Economies (CERES), one of the most prominent efforts in this area, as it has established the sustainability standards, which guided by the sustainability reports preparation which can be applied internationally. Even GRI has become a global standard for the sustainability reports disclosure (Ismail, 2016: 32).

The first version of the GRI standards had been launched in 2000 G 1 to include social and economic issues and governance as well as environmental issues. The second generation G2 was released in 2002 while the third generation G3 released in 2006 while the fourth generation released in 2013 G4. (Al-kafrawi, 2016: 345).

Finally, the latest version of the (GRI) has released in 2016, which included guiding standards covering the economic, environmental and social aspects, as well as basic standards that included general principles for the preparation and quality of the report. It included (6) standards for economic aspects, (8) standards for the environmental side and (19) standards for the social side. The validity date of the standards begins on (1 of July in 2018) with the encouragement of early application (GRI, 2016).

It is evident from the above that the new GRI standards represent the latest in the preparation of sustainability reports, developed over 15 years. As the world’s first global sustainability reporting standard, the GRI provides companies, non-governmental organizations and government agencies with a common language for nonfinancial disclosure. The application of the new standards will drive a new wave of global sustainability reports, which will increase corporate transparency about their impact on the economy, environment and society. The standards are also designed to help the organizations to make more sustainable decisions and contribute to the achievement of the goals of the
United Nations for sustainable development.

It could be able to summarize the standards of Global Reporting Initiative (GRI) for sustainability according to the latest version as the following table:

<table>
<thead>
<tr>
<th>subject</th>
<th>issue</th>
<th>standard</th>
<th>indicators</th>
<th>details</th>
</tr>
</thead>
<tbody>
<tr>
<td>The general standards</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General standard 100</td>
<td>Base</td>
<td>GRI 101</td>
<td></td>
<td>It includes two types of report preparation principles (the principles of determining the content of the report and determining the quality of the report). The use of GRI is based on one of the two options (primary or preferred).</td>
</tr>
<tr>
<td>General standard 100</td>
<td>General disclosure</td>
<td>GRI 102</td>
<td>56 indicators</td>
<td>The disclosure requirements include on Company Profile 13 indicator, Strategy 2 Indicator, Ethics and Integrity 2 Indicator, Governance 22 Indicator, Stakeholder Engagement 5 Indicators, Reporting Practices 12 Indicator.</td>
</tr>
<tr>
<td>General standard 100</td>
<td>Management approach</td>
<td>GRI 103</td>
<td></td>
<td>Includes general requirements and reporting statements on management approaches in what concerns with physical topics.</td>
</tr>
<tr>
<td>Special or limit standards</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economics 200</td>
<td>Economic performance</td>
<td>GRI 201</td>
<td>4 indicators</td>
<td>It restricts the reporting requirements on the subject of economic performance include the direct economic value generated and distributed, the financial and other risks and opportunities of the company's activities as a result of climate change, the coverage of the company's obligations under the defined benefit plan, financial assistance received from the Government.</td>
</tr>
<tr>
<td>Economics 200</td>
<td>Market presence</td>
<td>GRI 202</td>
<td>2 indicator</td>
<td>Defines the reporting requirements in what concerns with the subject of the market presence. These include the standard wage rate of a gender-adjusted level of work in comparison to the local minimum wage, the senior management ratio recruited from the community.</td>
</tr>
<tr>
<td>Economic 200</td>
<td>Indirect economic effects</td>
<td>GRI 203</td>
<td>2 indicator</td>
<td>Determine the Reporting requirements on the subject of indirect economic impacts, including the development of infrastructure investments and subsidized services, identify significant indirect economic impacts, including the extent of impact.</td>
</tr>
<tr>
<td>Economic 200</td>
<td>Purchasing practices</td>
<td>GRI 204</td>
<td></td>
<td>Purchasing practices, including the percentage of expenditure on domestic suppliers.</td>
</tr>
<tr>
<td>Economic 200</td>
<td>Anti-corruption</td>
<td>GRI 205</td>
<td>3 indicator</td>
<td>Determine the reporting requirements for anti-corruption, which include disclosures on the number of transactions that have evaluated for risks which related to corruption, communications and training on anti-corruption policies and procedures, confirmed corruption incidents and the taken procedures.</td>
</tr>
<tr>
<td>Economic 200</td>
<td>Anti-competitive behavior</td>
<td>GRI 206</td>
<td>1 indicator</td>
<td>Define the reporting requirements for anti-competitive behaviour, and it includes the disclosures on the number of legal procedures that are resulting from the behaviour of anti-competitive and anti-monopoly practices.</td>
</tr>
<tr>
<td>Environment 300</td>
<td>Material</td>
<td>GRI 301</td>
<td>2 indicator</td>
<td>Determine the reporting requirements concerning the materials and that include the used materials are classified either by weight or volume, the percentage of materials used for recycled input materials, reclaimed products and special packaging resources.</td>
</tr>
<tr>
<td>Environment 300</td>
<td>Energy</td>
<td>GRI 302</td>
<td>5 indicator</td>
<td>Determine the reporting requirements concerning the energy which includes energy consumption within the company, outside the company, energy intensity, reducing energy consumption, reducing the energy required for products and services.</td>
</tr>
<tr>
<td>Environment 300</td>
<td>Water</td>
<td>GRI 303</td>
<td>3 indicator</td>
<td>Determine the reporting requirements on water, and it includes disclosures of water withdrawn by source, water sources severely affected by water withdrawal, recycled water and its use.</td>
</tr>
<tr>
<td>Environment 300</td>
<td>Biodiversity</td>
<td>GRI 304</td>
<td>4 indicator</td>
<td>Determine the reporting requirements for biodiversity which includes Operating locations owned, rented or managed in or next to the protected areas and areas of high value for diversity, that have a significant impacts on activities, products and services on biodiversity, protected or restored populations, total number of species have included in the red list of (IUCN). Also, the species listed on national conservation lists in the areas that have affected by operations and have classified by risk level of extinction.</td>
</tr>
<tr>
<td>Environment 300</td>
<td>Emission</td>
<td>GRI 305</td>
<td>7 indicator</td>
<td>Determine the reporting requirements for emission, and it includes direct and indirect gas emissions from energy and other indirect consumption, the intensity of greenhouse gas emissions, reduction of greenhouse gas emissions, emissions the exhausted substances to the Ozone layer, nitrogen oxides, sulfur oxides and other important air emissions.</td>
</tr>
<tr>
<td>Environment 300</td>
<td>Solid and liquid wastes</td>
<td>GRI 306</td>
<td>5 indicator</td>
<td>Determine the reporting requirements for solid and liquid wastes. It includes the total Water drainage is classified according to quality and destination, waste by type and disposal method, number of large spills and volume, hazardous waste transferred, the discharge water bodies by water drainage.</td>
</tr>
<tr>
<td>Environment 300</td>
<td>Environmental compliance</td>
<td>GRI 307</td>
<td>1 indicator</td>
<td>Determine the reporting requirements for compliance. It includes non-compliance with laws and environmental regulations.</td>
</tr>
<tr>
<td>Environment 300</td>
<td>Suppliers environmental assessment</td>
<td>GRI 308</td>
<td>2 indicator</td>
<td>The impact of the actual and potential negative environmental for the supply chain and the procedures taken.</td>
</tr>
<tr>
<td>Social 400</td>
<td>GRI</td>
<td>Indicator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>-----</td>
<td>-----------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Recruitment</td>
<td>GRI 401</td>
<td>3 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Employment / Management Relationships</td>
<td>GRI 402</td>
<td>1 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Occupational Health and Safety</td>
<td>GRI 403</td>
<td>4 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Training and education</td>
<td>GRI 404</td>
<td>3 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Diversity and equal opportunities</td>
<td>GRI 405</td>
<td>2 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Non-discrimination</td>
<td>GRI 406</td>
<td>1 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Freedom of syndicate and collective bargaining</td>
<td>GRI 407</td>
<td>1 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Child labor</td>
<td>GRI 408</td>
<td>1 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Forced labour</td>
<td>GRI 409</td>
<td>1 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Security practices</td>
<td>GRI 410</td>
<td>1 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Rights of indigenous peoples</td>
<td>GRI 411</td>
<td>1 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Human rights evaluation</td>
<td>GRI 412</td>
<td>3 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Evaluation of suppliers in what concerns with impacts</td>
<td>GRI 413</td>
<td>2 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>General policies</td>
<td>GRI 414</td>
<td>1 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Health and safety of customer</td>
<td>GRI 415</td>
<td>2 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Marketing and labeling</td>
<td>GRI 416</td>
<td>3 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Customer privacy</td>
<td>GRI 417</td>
<td>3 indicator</td>
<td></td>
</tr>
<tr>
<td>Social 400</td>
<td>Socio-economic compliance</td>
<td>GRI 418</td>
<td>1 indicator</td>
<td></td>
</tr>
</tbody>
</table>

Table 1. GRI standards for sustainability

Resource: researcher preparation by using the electronic web site of GRI

2.2. Advantages of reporting sustainability

Sustainability Reporting is a relatively recent term for each subject. This term is shaped by how economic units deal with important financial and non-financial realities such as governance, environmental, social and economic issues, risks and opportunities that can affect the future performance of economic units and Income and value. Sustainability reports typically...
focus mainly on the organizational performance elements of the environment and society. In most cases, non-financial reporting is therefore optional. Sustainability reports are primarily a practice of relationships and are sometimes called "greenwash" to give an impression of concern about social and environmental issues. The question remains, what is the importance of sustainability reports and what are the benefits?

Different economic units need to focus increasingly on the consequences of their ability to stay as a result of increased interest in sustainability, social and environmental responsibility, risks and opportunities. So many economic units around the world have integrated the concept of sustainability into their activities and operations. This has resulted in several advantages, such that the performance of good sustainability and reporting sustainability has multiple advantages and can be summarized as follows: - (Abu Zer: 4, 2011).

1. The sustainability report is a measure of the effectiveness of the initiatives being launched and organized.
2. It is a guide and reference for future initiatives.
3. It considers a stimulation for creativity and talent development.
4. Helps and facilitates new business opportunities.
5. Improve the level of impact on society.
6. Risk Reduction.
7. Cost efficiency.
8. Support customers in order to achieve their aspirations and ambitions.
9. Capability to improve the brand value of the economic unit.
10. Engaging influential people in the exchange of information.
11. Explain what the Economic Unit is doing on environmental, health and social issues.
12. Consolidate the principles of governance in order to achieve sustainable development.
13. Provide an advanced and efficient infrastructure that will provide a solid foundation for building sustainable cities and building a vibrant economy that will provide long-term growth.

2.3. Sustainability reporting preparation principles

The knowledge of preparing sustainability reports can be hard for beginners. Preparing Sustainability reporting is a journey in a world of complex challenges, where change is sometimes the only constant, a report that recognizes impacts and risks and transparently identifies the challenges facing economic unity and the steps to be taken to overcome them. It is also a measure of economic unity initiatives and an indicator on the extent to which they follow the direction of the environment, society and economy.

The most important principles that the sustainability reports preparation principle are based on as follow (Saad, 2018):
- The principle of Legal Compliance: The Economic Unit shall abide by all laws, and local regulations, ad international written, declared, and fulfilment in accordance with established and specific procedures and knowledgeable.
- The principle of Respect the international norms: That economic unity should respect international conventions, governmental, Executive Regulations, declaration, charters, resolutions and guidelines when developing policies and practices for sustainability.
- The respect for the interests of the concerned party's principles: To recognize the economic unity and has accepted, that there is an interest's diversity of the concerned parties; diversity in the activities and products of the primary and secondary economic unit; and other elements that may have affected those concerned parties.
- The principle of transparency: Economic unity should clearly and accurately disclose its policies, decisions and activities, including known and potential impacts on the environment and society, and should this information be available to persons affected or they probably substantially affected.
- The principle of respect for human rights: that economic unity implements policies and practices that would respect the rights contained in the Universal Declaration of Human Rights.

The principles for confirming the quality of the Sustainability Report were identified as follows:

- Balance: The report should reflect the positive and negative aspects, of the organization's performance, to ensure a logical evaluation of overall performance.
- Comparison: The information in the report should be reported so that stakeholders can analyze the changes in the performance of the organization and supporting the analysis of other organizations.
- Accuracy: The information reported in the report should be accurate and detailed enough to enable stakeholders to assess the organization's performance properly.
- Timing: must be reported according to a specific timetable, and information should be available in a timely manner to stakeholders to enable them to make informed decisions.
- Clarity: Information should be readily accessible to the stakeholders who use the report.
- Reliability: The information and processes were used in the preparation of the report that must be recorded, tabulated and analysed, and disclosed in such a way that they can be examined and subject to quality standards.

While the issues that you should keep in mind when you are preparing sustainability reports are:

1. Importance of combining quantitative and qualitative information. In addition to quantitative evaluation through accounting measurement, the report can conclude a description of the activities carried out by the economic unit in fulfilment of its social obligations and not quantified.
2. The possibility of conducting a questionnaire for community members and all stakeholders in order to obtain information that will help in evaluating the performance of the economic unit in the area of sustainability and its results will be used later in the Sustainability Report.
3. Each report has its own form and theme according to the approach of the economic unit that issuing the report, its view of the stakeholders and their needs, the nature of the programs of social responsibility and sustainable development that it carries out.
4. It's better not to issue sustainability reports separately from annual financial reports, so as not to disperse the reader between financial performance, environmental performance and social performance, so as to facilitate the comparison. It is important that financial, social and environmental reports are simultaneously published in the form of annual reports.
5. The report should be credible and transparent, honestly, reflect the effectiveness of sustainable economic development programs, and should not be aimed at gaining the satisfaction of stakeholders, as this may lead to the writing of random information that may be completely inaccurate.
6. Social reporting should not disclose information that may threaten the position of the competitive economic unit, so privacy and confidentiality should be taken into consideration when writing the Sustainability Report.
7. Whenever the report was relevance and credible to the models in international initiatives, the use of consultants and expert offices and the social auditors will make the report more ideal.
8. The report should not focus on one side at the expense of another. Economic units often focus on environmental standards, neglecting different social norms, which may reduce the value and usefulness of the report.
9. The best reports are those whose have fewer pages but are summarized and comprehensive of the most important aspects of social commitment and adherence to sustainability standards.
10. The report should not be limited to an electronic version of the Internet only, as this excludes non-Internet stakeholders.
Fourth: The stages of preparing sustainability reports:

**Phase I: Preparation** (planning the processes that required to complete the report) This phase includes the following steps:

1. Planning for the preparation of the report: it means to put a full perception of the final form of the report, development of a plan of action, a timetable, identification of responsibilities and the establishment of a sustainability reporting team. And the organization of the main reporting stages.
2. Holding the initial meeting: any meeting of the group with the senior management and internal and external stakeholders with a clear agenda, and identify points of discussion to include the identification of the negative effects of their daily activities and agree on the process and steps of reporting, and parties to be involved, the report.
3. Review of the impact of economic unit activities: This includes the identification of environmental, economic and social issues through an analysis of the effects of the Unit's daily economic activities. And stakeholders' participation with a view to identifying key issues to be mentioned in the report.

**Phase II: Interconnection or intercommunication:** This phase involves the identification of stakeholders. And stakeholder consultation and involvement, with the use of effective and appropriate means of dialogue and communication with stakeholders. Also, identify the core themes (topics of relative importance) to be announced in the report.

**Phase III: Definition:** It includes the identification of subjects to be announced in the report. And to make the final decision regarding the content of the report. Also, to decide on indicators that the economic unit cannot announce, because they are not available, indicating why they are not available. Or that disclosure is not permitted under domestic law or because it is considered confidential. Examination of internal procedures and internal control systems, and making the necessary changes to verify their ability to provide the required information. Conducting the discussion and setting performance targets.

**Phase IV: Monitoring** (report building): It includes the examination of operations and monitoring of activities and the emphasis on the quality of information through the application of the principles of quality.

**Phase V: Drafting of the Report** (Examination, Reporting and Submission): The final stage is the drafting of an explanatory introduction, highlighting the importance of sustainability reporting and the importance of the report for the economic unit. Selecting the best way to present the report in paper or electronically, and how to distribute it to stakeholders and make it accessible to stakeholders. At last finalization of the report.

The process of preparing a sustainability report may face some of the challenges that need to be addressed as they are the components of sustainability reporting. These are:

- Ensure staff commitment to sustainable development at all levels.
- Understand reporting methodology.
- Select a group of stakeholders who are concerned with the actions of an economic unit and communicate with them.
- Identify Practical objectives (intelligent) for the reporting period.
- Paraphrase the vision, mission, values and goals.
- Prepare of systems, evidence and procedures for internal operations between departments and branches.
- Collecting, organizing and archiving information.
- State the negative results and issues with utmost transparency.
- The report is supposed to be more than just a marketing tool.
- Identify the target audience of the report.
- Formulate a clear document that meets the needs of readers.

3. Practical Work

In this section, we are going to analyze and discuss the responses of the sample members, on the availability of the elements of applying the global reporting standards for sustainability in the Iraqi environment as a follow:

**First axis** / The political environment:

In order to identify the extent of the availability of the appropriate political environment to apply the global reporting standards for sustainability, the views of the selected sample, were polled and their answers, were as shown in the following table:

<table>
<thead>
<tr>
<th>Table 2. Respondents’ answers to questions related to the extent of the availability of the political environment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Do you think that the mainstream political system supports the trend towards global sustainability reporting standards?</strong></td>
</tr>
<tr>
<td><strong>2. Are there pressures from governmental and non-governmental bodies towards the application of global reporting standards for sustainability?</strong></td>
</tr>
<tr>
<td><strong>3. The unstable security situation affects the efficiency of the application of global reporting standards for sustainability.</strong></td>
</tr>
<tr>
<td><strong>4. Do you think that the influence of international organizations, especially the United Nations, the World Bank and the International Monetary Fund, is a pressure tool for the Iraqi government to implement the global reporting standards for sustainability?</strong></td>
</tr>
</tbody>
</table>

It is clear from the previous table that the majority were in favour of the third and fourth questions, with almost 100% supporting the impact of international organizations, especially the UN, the World Bank and the IMF, as a pressure tool for the Iraqi government to implement global reporting standards for sustainability, as for the answers to the first and second questions, the majority of sample members were towards the disagreement. Where the ratio of the rejected to the first question was 67% whom they believe, that the political system does not support the trend towards applying the criteria. Also, (56%) of the respondents do not believe that there is pressure from governmental and non-governmental bodies towards the implementation of the global reporting standards for sustainability. It has been noted that the political environment is not prepared to implement the global reporting standards for sustainability. And that supports the tendency of the respondents towards that political factor is one of the factors affecting the various systems, especially that the political system in Iraq is still unstable despite the passage of fifteen years The transformation from a totalitarian system to a parliamentary system, but still the conflict and mistrust between the political blocs as well as the benefits of blocs and parties are dominant in the political arena without thinking about the interest of future generations. Thus, the philosophy of global sustainability reporting is not coming from the ideology of the political system prevailing in Iraq. But they may comply with the application of these standards as a result of the pressure by international organizations such as the World Bank, the International Monetary Fund and the United Nations. Especially that Iraq in this period suffers from a fiscal deficit in the budget, as well as go towards
reconstruction, which leads to borrowing from these organi-
izations to fill the deficit, which made these organizations impose certain conditions may be one of them is the implementa-
tion of the global reporting standards for sustainability.

Second axis / The legal and legislative environment: Identifying to provide the appropriate legal and legislative en-
vironment for the implementation of the global reporting standards for sustainability, that it has been polled the opinions of the selected sample, and their answers were as shown in the following table:

<table>
<thead>
<tr>
<th>s</th>
<th>questions</th>
<th>yes</th>
<th>ratio</th>
<th>partly ratio</th>
<th>no</th>
<th>ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Do Iraqi laws oblige the implementation of global reporting standards for sustainability?</td>
<td>5</td>
<td>11%</td>
<td>25</td>
<td>45%</td>
<td>15</td>
</tr>
<tr>
<td>2.</td>
<td>Do you think there is a conflict of some laws with regard to the mandatory application of global reporting standards for sustainability.</td>
<td>25</td>
<td>56%</td>
<td>15</td>
<td>33%</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>Recently the central bank’s approach to the application of international accounting standards in Iraqi banks starting in 2016 that facilitates the application of global reporting standards for sustainability.</td>
<td>25</td>
<td>56%</td>
<td>15</td>
<td>33%</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>The unified accounting system applied in Iraq is consistent with the Global Reporting Standards for Sustainability.</td>
<td>10</td>
<td>22%</td>
<td>5</td>
<td>11%</td>
<td>30</td>
</tr>
<tr>
<td>5.</td>
<td>Do you support establishing of new legislation or reforms on the existing laws obliged taking actions that adopt global reporting standards for sustainability.</td>
<td>35</td>
<td>78%</td>
<td>5</td>
<td>11%</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 3. Answers of sample members on questions related to the availability of the legal and legislative environment

It is clear from the previous table that the answers to the first question were wavering between acceptance and rejection. While the majority (45%) was in favour of moderation. This may be justified the instability, by the fact that there is no explicit provision in Iraqi law, that obliges to apply the global reporting standards for sustainability, but the existing provisions of some laws, most of which are outdated, may be consistent with some of those standards. As for the second question, most respondents (56%) agreed that there is a conflict in some laws regarding the mandatory application of the global reporting standards for sustainability. The sample may justify by the existence of some paragraphs of a law that conflict with other laws, which may not permit the proper application of global reporting standards for sustainability. As for the third question, most of the respondents also agreed with (56%) positively. In other words, this percentage believes that the Central Bank of Iraq CBI’s approach to applying international accounting standards will facilitate the application of the Global Reporting Standards for Sustainability. Apparently, this approach justifies the fact that the international accounting standards and the global reporting standards for sustainability have the same orientation, particularly in the direction of integrated reporting, which includes financial information as well as economic, social and environmental, while in the fourth question, 67% of the respondents supported the fact that the current unified accounting system does not comply with the global reporting standards for sustainability. This may be because the system has been old since the 1980s, and although it was revised in 2011, it remained within the domestic framework and did not take into account the global reporting standards for sustainability. As to the fifth question, 89% of the respondents supported in absolute terms or to a certain extent new legislation or amendments to the prevailing laws oblige to take measures that adopt the global reporting standards for sustainability. The reason for this trend may be that there must be a clear and explicit legal material that calls for the application of global reporting standards for sustainability more legally than a reference in this law or that and subject to several interpretations and interpretations that may obscure the truth and lead to differences and thus the lack of a clear vision and uniform application.

The third axis / The economic environment: To determine the availability of the appropriate economic environment for the application of the global reporting standards for sustainability, then it has polled the views of the selected sample and their answers were as shown in the following table:

<table>
<thead>
<tr>
<th>s</th>
<th>questions</th>
<th>yes</th>
<th>ratio</th>
<th>partly ratio</th>
<th>no</th>
<th>ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The current nature of the economy is encouraging for the application of global reporting standards for sustainability.</td>
<td>5</td>
<td>11%</td>
<td>16</td>
<td>36%</td>
<td>24</td>
</tr>
<tr>
<td>2.</td>
<td>Do you think that international economic pressures have an impact on the implementation of global reporting standards for sustainability?</td>
<td>25</td>
<td>56%</td>
<td>15</td>
<td>33%</td>
<td>5</td>
</tr>
<tr>
<td>3.</td>
<td>Do you think Iraqi companies are able to deal with global reporting standards for sustainability?</td>
<td>10</td>
<td>22%</td>
<td>20</td>
<td>45%</td>
<td>15</td>
</tr>
</tbody>
</table>

Table 4. answers of sample members on questions related to the availability of the economic environment

Obviously from the previous table that the first question was (89%) overwhelmingly supported or partly that the nature of the current Iraqi economy is not encouragement to the application of global reporting standards for sustainability. This may justify the orientation of the sample, is because of the vagueness of the Iraqi economy. The nature and sort of the Iraqi economy are unclear. Before 2003, it was socialist-oriented. And after 2003, it was based on the transformation to a market economy, but only the advertiser and the practitioner are still socialist or perhaps a mixture of these. While the second question (89%) of the respondents conclusively agreed or partly that international economic pressures have an impact on the application of global reporting standards for sustainability. This may be justified by the pressures of the international financial institutions to under-take several measures to obtain loans or credit facilities as well as World Trade Organization (WTO) requirements to allow Iraq to join them. As for the third question, the answers ranged between acceptance and rejection, while the majority (45%) was in favour of moderation. This may be due to the belief that Iraqi companies do not possess the necessary resources to carry out this task in terms of the availability of tools and means as well as qualified staff to do so.

Fourth Axis / Educational and Cultural Environment: To determine the availability of the appropriate educational and cultural environment for the application of the global reporting standards for sustainability, the views of the selected sample were surveyed. The answers were as shown in the following table:
Table 5. Answers of sample members on questions related to the availability of the educational and cultural environment.

<table>
<thead>
<tr>
<th>s</th>
<th>questions</th>
<th>yes</th>
<th>ratio</th>
<th>partly</th>
<th>ratio</th>
<th>no</th>
<th>ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you think that accounting culture encourages the application of</td>
<td>5</td>
<td>11%</td>
<td>10</td>
<td>22%</td>
<td>30</td>
<td>67%</td>
</tr>
<tr>
<td></td>
<td>global reporting standards for sustainability?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Do you think graduates of accounting departments are able to apply</td>
<td>10</td>
<td>22%</td>
<td>10</td>
<td>22%</td>
<td>25</td>
<td>56%</td>
</tr>
<tr>
<td></td>
<td>global reporting standards for sustainability?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The current Curriculum for international accounting, which is taught in</td>
<td>15</td>
<td>33%</td>
<td>10</td>
<td>22%</td>
<td>20</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>accounting departments, adequately covers the global reporting standards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>for sustainability.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Do you think that adhering to the Islamic religion prohibits dealing with</td>
<td>5</td>
<td>11%</td>
<td>10</td>
<td>22%</td>
<td>30</td>
<td>67%</td>
</tr>
<tr>
<td></td>
<td>global reporting standards for sustainability?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The vocational institutes have the ability to graduate professional</td>
<td>25</td>
<td>56%</td>
<td>10</td>
<td>22%</td>
<td>10</td>
<td>22%</td>
</tr>
<tr>
<td></td>
<td>accountants who are able to audit statements prepared in accordance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>with the Global Reporting Standards for Sustainability.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Obviously from the previous table that the first question was rejected by (89%) absolutely or partly, that the Iraqi accounting culture does not encourage the application of global reporting standards for sustainability. This may justify the belief that the culture rooted in the Iraqi accounting mind is limited to the preparation of financial statements and reports without paying attention to sustainability reports. Some information on sustainability may be included in the attached notes. While in what concerns the second question was rejected by (78%) in absolute or to some extent that graduates of the accounting departments are unable to apply the standards of global reporting of sustainability, and may be due to the lack of practical side where the student receives accounting material theoretically without having a practical echo. As well as an emphasis on accounting systems applied in the Iraqi environment rather than global sustainability reporting standards. As for the third question, 77% support in absolute terms or to some extent that the current accounting curriculum does not adequately cover the global reporting standards for sustainability. And this may justify the belief of the sample that there is no material related to these standards, but may be included in the international accounting, which is taught in the fourth stage only and for two hours per week and therefore it is difficult to cover the standards adequately and the standards are constantly changing and therefore it is difficult to keep up with these changes continuously. While the fourth question was rejected by (89%), that is, they believe that adhering to the Islamic religion does not prohibit dealing with the global reporting standards for sustainability. The reason for this is that the doctrines of the Islamic religion do not prevent the development and taking of what is modern in the world in a way that does not affect the principles of Islamic law and the Islamic religion is the first to be called to preserve the environment and society. As for the fifth question, 78% agreed that the graduates of the vocational accounting institutes have the ability and the proficiency to audit the statements according to the global reporting standards for sustainability. This may be justified by the legacy of vocational degrees in Iraq, which its dates establish back to the 1970s, and the curricula of vocational institutes are somewhat identical to the curricula of international vocational institutes. But the long practice of auditors in Iraq on the audit of the accounts that were prepared according to the consolidated accounting system, this may be difficult when the audit of the statements that are in accordance with the criteria of global reporting of sustainability and I think this the reason which stimulated (22%) of the sample rejected that.

Fifth axis / Organizational environment: to determine the availability of the appropriate regulatory environment for the application of the global reporting standards for sustainability, it has been polled the opinions of the sample on that and their answers appear in the following table:

Table 6. Answers of respondents to questions related to the availability of the regulatory environment.

<table>
<thead>
<tr>
<th>s</th>
<th>questions</th>
<th>yes</th>
<th>ratio</th>
<th>partly</th>
<th>ratio</th>
<th>no</th>
<th>ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Is there a specialized central authority to implement the Global</td>
<td>5</td>
<td>11%</td>
<td>10</td>
<td>22%</td>
<td>30</td>
<td>67%</td>
</tr>
<tr>
<td></td>
<td>Reporting Standards for Sustainability?</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Is there a role for the federal board of supreme audit and the Board of</td>
<td>15</td>
<td>33%</td>
<td>10</td>
<td>22%</td>
<td>20</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>Accounting and Control Standards arising from in the process of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>applying the Global Reporting Standards for Sustainability.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>The role of the Association of Accountants and Auditors is influential</td>
<td>5</td>
<td>11%</td>
<td>15</td>
<td>33%</td>
<td>25</td>
<td>56%</td>
</tr>
<tr>
<td></td>
<td>in the process of applying global reporting standards for sustainability.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>For the Association of profession of Accountants and Auditors has a</td>
<td>15</td>
<td>33%</td>
<td>10</td>
<td>22%</td>
<td>20</td>
<td>45%</td>
</tr>
<tr>
<td></td>
<td>major role in ensuring the application of global reporting standards for</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sustainability.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The previous table shows the weakness of the regulatory role of the staff and supervisors of accounting and auditing practices in Iraq in order to do their real role in the process of applying the Global Reporting Standards for Sustainability, 67% of respondents supported the absence of existing a central authority to implement the global reporting standards for sustainability, while the remaining 11% supported the existence of this entity. This may justify the fact that the majority assumes that existing a central authority has an independent entity to oversee and follow up the implementation of these standards. The second question related to the role of the federal board of supreme audit and the Board of Accounting and Control Standards that spouted from the process of applying the Global Reporting Standards for Sustainability. The responses of the sample ranged from acceptance to rejection, with 55% of respondents in absolute or partial terms. Those who reject this role (45%). This inconstancy in the answers may justify that everyone expected a more positive role from the federal board of supreme audit in this regard, particularly since the status and the prestige of the federal board of supreme audit require it to have a central role in this area, especially as it is the highest supervisory body in the country, and it includes distinguished expertise and competencies as well as its outstanding relations with the highest audit figures in the variety of countries of the world. As for the third question, 56% support that there is no effective role for the Association of Accountants and Auditors in the process of applying the global reporting standards for sustainability. While 44% believe the opposite. This fluctuation in
the answers may also justify that the role of the union was not at the desired level and expected of it as the oldest professional organization in Iraq that hosts accountants and auditors, whose role is limited to holding seminars, workshops and conferences. While the fourth question was to the supporters of existing a huge role to the Association of the profession of Accountants and Auditors in the process of applying the global reporting standards for sustainability amounted to (55%) in an absolute or partial term. While 45% say the opposite. It may also justify the belief of the sample that the Council of the profession was not at the required level, which is supposed to be in this area, especially the regulator of the work of auditors in Iraq, it must have a role in the preparation of the supervisory staff capable of dealing with the statements of reporting standards Global for Sustainability. It is clear from the above that there is a lack of implementation of the global reporting standards for sustainability. That's mean, the research hypothesis that states as follow: The standards of the Global Reporting Initiative for Sustainability can be applied by Iraqi companies and in keeping with developments in the global business environment. It can be said that there is a possibility to apply but after completing all the components of the application that was marked on the practical side.

4. Conclusions and Recommendations

4.1. Conclusions

1. In the light of the economic and social developments taking place in various countries of the world, the concept of sustainability occupies a unique importance nowadays, which forced the accounting profession to keep pace with the requirements of this concept and expand its disclosures to social, economic and environmental aspects.

2. Because of the importance and expanding of the concept of sustainability at the international level, this leads to increase the interest of vocational and professional organizations in setting standards for reporting and disclosure on companies’ sustainability that reflect the social, environmental and economic aspects of the company’s activities.

3. The efforts of the Global Sustainability Reporting Initiative (GRI) which is an independent and leading organization in the preparation of corporate sustainability reporting guidelines, that established in 1997 and based in the Netherlands. One of the most prominent efforts in this field. It was the establishment of sustainability standards to guide the preparation of sustainability reports of companies and can be applied at an international level.

4. The latest version of the initiative begun in 2016, which included guiding standards covering the economic, environmental and social aspects as well as basic criteria including general principles for the preparation of the report and principles that determine the quality of the report. These included (6) economic criteria and (8) And (19) a standard for social aspects. The entry date of the Standards will take effect on July 1, 2018, with early encourage to apply.

5. The objective of the initiative is to improve the media content of the sustainability report by providing information on the company’s activity in all its aspects. In order to achieve sustainability reports prepared according to the GRI standards, the objectives of these reports should be of quality and quality is determined by the availability of the qualitative characteristics of the information they contain in terms of their usefulness and feasibility for comparison, balance, accuracy, timing, clarity, reliability.

6. The initiative provides non-governmental companies, organizations and government agencies with a common language for non-financial information. The implementation of the new standards will lead to a new wave of global sustainability reports, which will increase transparency for companies about their impact on the economy, environment and society.

7. There is a confident by all international companies and their boards of directors that financial and accounting reporting is a unit that cannot fully collect the performance of the company and its wealth and provide complete information on its social and environmental performance and its service to the surrounding community. Therefore, the countries of the developed world tend to design the sustainability reporting framework under the International Financial Reporting Standards (IFRS) standards.

8. That the principles for utilizing the international standards for sustainability in the Iraqi environment are still incomplete in terms of the availability of the appropriate political environment and the legal and legislative environment, that underpin this application, as well as the economic, educational, cultural and organizational environment.

9. The financial reports of the Iraqi companies lack any information on the dimensions of economic sustainability, environment and social because the preparation of these reports depends on the accounting regulations and rules applied in the Iraqi environment, where there is nothing to support the disclosure of such information clearly.

4.2. Recommendations

1. Despite the potential positive impact of the Iraqi economy on the implementation of global standards for sustainability. However, this does not mean that the application process is not accompanied by negative repercussions. Therefore, it is necessary to carry out the steps of application in a scientific, thoughtful, planned and assigned to the task of a specific central and technical to reap the benefits of this application and avoid the negatives that may occur.

2. The necessity for radical reforms at various political, legal, economic, educational, cultural and organizational levels in order to create the appropriate atmosphere required by the process of applying global standards for sustainability.

3. The need to optimize the utilization of loans will be received from international organizations and employ them properly, which ensures the implementation of global standards for sustainability to reflect positively on the development of the Iraqi economy rather than spend as operational expenses to fill the budget deficit without any benefit of them.

4. The professional bodies and organization of the profession of accounting and auditing in Iraq (the federal board of supreme audit, Union of Accountants and Auditors, the Board of Accounting and Auditing Standards, the Council of the profession of control and auditing) to practice its real role and be the leader in the process of applying global standards for sustainability.

5. The accounting and economics departments of Iraqi universities should maintain and support the implementation of international standards for sustainability by modernizing and enhancing sustainability accounting methodologies in the accounting and economic impact departments resulting from their application in the economy to produce an accounting and economic generation capable of dealing with global standards for sustainability.

6. The need for existing educational programs supported by the state mainly as well as professional organizations, financial, banking and civil society organizations include seminars, conferences, workshops and forums of various levels in order to define the global standards of sustainability and its importance and how to apply them in a right manner that ensures the achievement of the positive benefits of it.
References


Green Reputation of Hotel Improvement through Green Accounting and Harmonious Culture

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Abstract

This study aims to test green accounting which is moderated by harmonious culture (green culture) in building a green reputation of a hotel. Green accounting activities consisted of environmental awareness, environmental involvement, and environmental reporting. The concept of harmonious culture emphasises the harmonisation with God, human being, and the environment to reach happiness. The implementation of the two variables legitimates a green hotel, and therefore acts as a signal for consumers to help in hotel selection. Quantitative analysis with Partial Least Square (PLS) method was used to process data collected through questionnaires. Sampling was conducted using purposive sampling with criteria of the hotels participating in tri hita karana award in 2016. There were 124 hotels that met the criteria and 100 who were willing to fill the questionnaire. The research results indicated that environmental awareness, environmental involvement, and environmental reporting had a contribution in creating hotel’s green reputation. Whereas, green culture implemented at the hotel was able to legitimate hotel’s green reputation based on consumers’ perceptions. The results also showed that consumers had more trust on the services of a hotel were aware on the environment of its neighbourhood and provided implications on the legitimating theory that green accounting and green culture became a model to gain recognition from the society related to green hotel. The new model used in this research used green culture, sourced from local wisdom in developing hotel’s green reputation and could be used as a business strategy to face global competition. The hotel managers, therefore, should build awareness among their employees to maintain harmonious relationship with God, human beings and environment to strengthen the position of the hotel among the consumers, thus impacts the sustainability of the hotel in Indonesia.

Keywords: green accounting; harmonious culture; green reputation.

1. Introduction

Environmental issue is something that is still debated today, which makes it an interesting issue to be explored. The condition is proven by the increasing global warming that influences companies. Many companies are struggling to bring the green issue to build their reputation (Beckmann et al., 2014). The environmental issues are also utilised as competitiveness for the companies to implement their strategy (Christmann, 2004; King & Shaver, 2001; Beckmann et al., 2014). The companies give priority in environmental conservation and put it in a rule (Dowell et al., 2000; Christmann, 2004). Currently, it is a necessity for big companies to build their reputation through the awareness of the environment (Marcus & Fremeth, 2009; Searcy, 2012; Tang et al., 2012; Dangelico, 2015; Delmas et al., 2015). However, there are many companies that are unable to implement green concept perfectly despite their statement on their website, they also struggle to create green reputation among their customers or the societies (Parguel et al., 2011).

Green reputation for a companies can be a strategy to build competitiveness (Porter, 1990) since it is an intangible asset that give power to create a good name. Green reputation is measured through social responsibility, sustainability, and environmental report (Maak, 2008; van den Brink & van der Woerd, 2004). Some studies have been conducted in accommodation companies that has disclosed their environmental awareness based on the belief that it will bring positive impact on the company as a whole. For example, Tuwarij et al (2004) found that companies conducting good and transparent social and environmental responsibilities disclosure would have positive impact on the increase in their economic performance. Further, a study by Bennett et al. (2003) also stated that the higher the effort of a company in applying and implementing environmental management accounting could bring positive and significant change on the increase in its financial performance. A study by Russo and Fouts (1997) and Setiawan and Darmawan (2011) also found that there were positive relationships between environmental performance, environmental performance disclosure and the value of the company. Other studies testing the relationship between environmental performance disclosure and market reaction were also conducted by Guidri and Pattern (2010) and Belkaoui and Karpik (1989), their findings indicated positive relationships between both variables.

The disclosure of environmental awareness through transparent accounting reports by accommodation companies is still limited; therefore, it is important to study the company awareness on social and environmental responsibility presented through the accounting report. This study refers the company’s awareness on social and environmental responsibility through the accounting report as green accounting. This study is triggered by various research results such as Caliskan (2014); Jones, (2010a, 2010b). They stated that green accounting has not been widely studied, especially those related to sustainable development that have sustainability reporting, environmental, social and economic indicators and plays an important role in providing information to all parties related to the awareness of the
company in sustainable development (Caliskan, 2014; Jones, 2010a, 2010b). Green accounting reports consisting of awareness, involvement, and reporting of performance (Caliskan, 2014) on the environment can be an issue to create green opinion of the company.

Green accounting reports prepared by accounting department represent the holistic illustration of company’s sustainability activities and indicate how and to what extent the company gives contribution to the sustainable development (Herzig & Schaltegger, 2011). A company is expected to exceed the traditional financial reporting reflecting past activities and decisions as well as historical data of the company by reporting future risks, opportunities, and strategies related to sustainability (ACCA, 2008). The accounting department might be effective in configuration and must prepare a sustainability report and offers opinion on the need of new reporting due to the change in the level and characteristic of the company’s activities as well as in law (ACCA, 2008). Thus, it creates long term value needed to evaluate future risks and modification based on the decision (Closs et al., 2011). It allows balance to be found between the economic goals of the organisation and the social and environmental needs.

The balance in the achievement of the company’s goals is influenced by the organisational culture (Schein, 2004); therefore, an effort is needed to establish green behavior in the company. Indonesia implements the green culture in hotel management that promotes the harmony with God as the creator of nature and its contents, harmony with human being (stakeholders), and harmony with the natural environment. The three relationships in green culture (tri hita karana or harmony culture) are rooted from the local culture of Balinese society implemented in the daily life of the communities, companies, and the government. The green cultural concept has similar values to Schein (2004) and gives influence on the organizational culture and the performance of companies in Bali (Astawa et al., 2016; Astawa et al., 2016; Putu Astawa et al., 2016; Astawa & Sukitaka, 2015; Astawa, 2013).

Based on previous researches, such as Caliskan (2014) and Jones (2010a, 2010b) that gave emphasize only on green accounting and sustainable development, stated that this type of study is limited. In contrast, Behrend et al., 2009; Fairchild, 2008; Maak, 2008; van den Brink & van der Woerd, 2004 gave emphasize on the activity of companies that environmentally aware and not on the reporting that impacted the reputation of the companies. These different opinions indicate an issue on how the influence of green accounting in creating green reputation. Therefore, the aim of the research was to test green accounting, developed by Caliskan (2014) by adding green reputation (Maak, 2008; van den Brink & van der Woerd, 2004) and green culture (Astawa et al., 2016).

According to Deegan (2004), legitimization theory is related to the effort of a company to ensure that it operates within the limits of values and norms prevailed in or related to the society and how it interacts with the surrounding communities, thus can receive legitimation from the community. Bell and Lehman (1999) define green accounting as a temporary concept in accounting science that support the green movement of a company or organisation by recognising, quantifying, measuring, and disclosing the contribution of the environment to the business processes of the company. Green accounting, according to Cohen and Robbin (2011), is various efforts to collect, analyze, appraise, and prepare reports both related to the environment or to the financial data with the future goal of reducing the effect and cost caused by environmental damage. Polimeni et al. (2010) stated that there are various reasons to be considered by a company to decide whether to implement environmental accounting or green accounting, which is fulfilling consumers’ expectation of more environmentally friendly products or raw materials, among others. Green accounting usually discloses through a report known as sustainability reporting. According to Dilling (2009), the Global Reporting Initiative (GRI), which is an institution focusing on the effort of quality improvement of environmental accounting reports, defines sustainability accounting as a company’s effort to measure and disclose its activities related to its environment and social as a concrete step to create environmental and social responsibilities. The environmental awareness creates identity or reputation of the company (Massey, 2001).

Fombrun (1996) explained that company reputation is the explanation of the activities conducted by the company in the past and in the future with better attribute compare to their competitors. Limited information on company reputation becomes the signal for stakeholders in considering a decision (Myers & Majluf, 1984; Behrend et al., 2009). Reputation is determined by the company’s society reputation and various activities conducted by the company (Love & Kraatz, 2009; Rindova et al., 2005). Companies will try to use all their resources, including reputation, to design business strategies (Barney & Hesterly, 2012). They will deliver various important issues as signal that able to significantly influence society’s opinion. The important issues include a report on corporate social responsibility activities consisting of a report on environmental awareness (Brammer & Pavelin, 2006). The commitment of the company to the environmental awareness will form green corporate reputation that is important for workers and investors (Behrend et al., 2009; Fairchild, 2008) as well as acts as a mechanism in managing reputation risk (Bebbington & Moneva, 2008). Based on the previous explanation hypothesis 1 (H1) can be proposed that green accounting has influence on green reputation.

Tri hita karana (the three cause of happiness) or harmonious culture is called as green culture as it consists of concept on environmental stability which has similar concept to World Tourism Organisation that require anyone involve with tourism should keep harmonization of being and maintain environmental stability (lee, 2013; Miller et al. 2015; Mihalic, 2016 ). Green culture implemented in Indonesia contains spiritual aspects to maintain a harmonious relationship with God (parahyangan), human being (pawongan), and the nature (palemahan) (Putu Astawa et al., 2016).

Green culture should be used as a basis for hotel’s operation as indicated by Schein (2004) who considered that organizational culture can be formed from a local culture that consisted of three components: artifacts, espouse values, and basic assumptions. Culture is a behavior that continuously conducted and becomes the characteristic that strengthen company name. Culture developed in each country has implication to the existing companies; therefore, various opinions occur that culture is able to increase performance (Astawa & Sukawati, 2016; Astawa et al., 2016; Astawa & Sukitaka, 2015; Astawa, 2013).

The role of culture is needed to develop the character of each individual so that a view of a company that has environmental awareness is occurred since it has succeeded in developing green culture in the company. One form of environmental-awareness culture is tri hita karana (THK) that has significant influence on companies in Bali (Astawa et al., 2016). The cultural concept gives emphasize on maintaining harmony with God as the creator of nature and contents, with fellow human being, and with the nature. The cultural concept emphasizes on maintaining the harmony with God (parahyangan) as the creator of the nature and its contents, with other human being (pawongan), and with the nature (palemahan). The cultural concept has been recognized by the world in the tourism industry by aligning the three concepts in running a hospitality business. The three dimensions of the green culture are basically attached to the values of the organizational culture developed by various experts such as Kotter & Haskett, 1997 and Denison & Mishra, 1992. Based on the green culture, Indonesia becomes a cultural-based world tourism destination and gives image of environmental friendly (Astawa & Sukawati, 2016).

Bartikowski et al. (2011) mentioned that national culture is developed from local culture that able to be used as a good moderation to the relationship between customers loyalty and
company’s reputation. In addition, Oswari (2011) indicated that local culture is a variable that able to decrease company’s risk and improve performance.

The power of local culture combined with organisational culture may bring impact to individual’s behaviour of the staff to perform better. Organisational culture is created to give behavioural direction and also as the representation of the company. Based on this discussion, hypothesis 2 (H2) can be proposed as “green accounting has influence on green reputation with the moderation of green culture”.

2. Materials and Methods

The research was different from previous studies where green culture was used as a moderating variable in green accounting disclosure to achieve green reputation. The aim was to find out the role of green culture implemented in strengthening the relationship between green accounting and green reputation. Theories on green accounting, green culture, and green reputation based on legitimacy theory (Doegen, 2004) and signaling theory (Besley & Brigham, 2008) were used to build hypothesis. The research used quantitative analysis with Partial Least Square (PLS) method. Purposive sampling was conducted with the following criteria: hotels that participate in the *tri hita karana* award and had been established at least five years and it resulted in sample of 124 hotels. The result of study indicated that green culture implemented was dominantly toward the environment, whereas attention to employees and God was limited and had not disclosed clearly in green accounting reports. Green culture gives a new power in building green reputation, thus strengthen the company’s good name.

The design of the research model can be explained in Figure 1 where the exogenous variable was green accounting consisted of awareness, involvement and reporting (Caliskan, 2014), endogenous variable of green reputation measured through social responsibility, sustainability, and environmental reports (Maak, 2008; van den Brink & van der Woerd, 2004), and moderating variable of green culture, referred to the research of Astawa et al. (2016), consisted of parahyangan, pawongan and palemahan. The research was conducted at star hotels in Indonesia from January to December 2016. Data was collected through questionnaire with Likert scale of 1 to 5 where 1 – disagree, 2 – somewhat disagree, 3 – somewhat agree, 4 – agree and 5 – strongly agree. The questionnaires were sent to the hotels through email or mail and addressed to the general manager. For questionnaires sent through mail were attached with a return envelope and stamp to send the questionnaire back to the researcher. For questionnaire with unclear responses, phone confirmation was conducted with previous permission obtained by emailing the hotel.

The number of population of star hotel in Indonesia was 2,387 (Bureau of Statistics, 2016). Sampling was conducted using purposive sampling with criteria (Ghozali, 2006) of hotels participating in the *Tri Hita Karana* Award and had been operating at minimum of five years. The number of sample met the criteria was 124 hotels and 100 of them were willing to fill the questionnaire. The reason for the unwillingness of the hotels to fill the questionnaire was due to their rush activities and the availability of data related to green accounting. Green accounting in a hotel is a report containing all the hotel environmental and social activities as a concrete step to create environmental and social responsibilities (Bell & Lehman, 1999; Dilling, 2009; Cohen & Robbin, 2011; Caliskan, 2014; Jones; 2010a, 2010b). Green accounting variable consisted of three indicators, namely, awareness, involvement, and reporting that each measured by fifteen question items scaled 1 to 5 (Caliskan, 2014). Green culture (harmonious culture / *parahyangan*) is a culture implemented by the hotel that put forward harmonious relationship between hotel and God (*parahyangan*), employees / consumers (*pawongan*), and environment (*palemahan*) (Astawa et al. 2016). Green reputation variable consisted of three indicators, namely, *pawongan*, *pawongan* and *palemahan*, each measured by 17 items in scale of 1 – 5 (Astawa et al. 2016). Green reputation is all activities conducted by the hotel related to social responsibility, sustainability, and environmental reports. Each of the activity was measured by five question items in scale of 1 – 5 (Maak, 2008; van den Brink & van der Woerd, 2004).

The research used quantitative approach with PLS as the tool of model testing (Solimun, 2007). The equation of outer model for green accounting (X1) was $x_{1.1} = \lambda_{1.1} \ X_1 + \delta_1$; $x_{1.2} = \lambda_{1.2} \ X_1 + \delta_2$; $x_{1.3} = \lambda_{1.3} \ X_1 + \delta_3$. For Green Culture (*X2*) the variable equation was formative, $x_{2.1} = \lambda_{2.1} \ X_2 + \delta_2$; $x_{2.2} = \lambda_{2.2} \ X_2 + \delta_2$; $x_{2.3} = \lambda_{2.3} \ X_2 + \delta_2$. (Caliskan, 2014; Solimun, 2007). Based on the model equation, it can be explained that $x_{1.1}, x_{1.2}, x_{1.3}$ were the indicators of awareness, involvement, and reporting, which were the indicators of green accounting that reflective toward latent variable of green culture. The value of $\lambda_{1.1}, \lambda_{1.2}, \lambda_{1.3}$ was the loading factor for $x_{1.1}, x_{1.2}, x_{1.3}$ and $\delta_1$ was an error of measurement of manifest variable for exogenous variable of green accounting. $x_{2.1} (palemahan), x_{2.2} (parahyangan)$, and $x_{2.3} (pawongan)$ were formative indicators toward latent variable of green culture ($X_2$). Coefficient of $\lambda_{2.1}, \lambda_{2.2}, \lambda_{2.3}$, respectively, was the loading factor for indicator $x_{2.1}, x_{2.2}, x_{2.3}$, and $\delta_2$ was the error of measurement for exogenous variable of green culture. Exogenous latent variable of the interaction between green accounting and green culture was explained with the following equation: $x_{1.1} \ x_2 = \lambda_{1.1} \ y_{1.1} + \epsilon_1$; $y_{1.2} = \lambda_{1.2} \ y_{1.1} + \epsilon_1$; $y_{1.3} = \lambda_{1.3} \ y_{1.1} + \epsilon_1$. Where $x_{1.1} \ x_2$ was the indicator of interaction that was reflective toward latent variable of the interaction between green accounting and green culture. $\lambda_{1.1} \ x_2$ was the loading factor for $x_{1.1} \ x_2$ and $\epsilon_1$ was the error of measurement of manifest variable for exogenous variable of the interaction between green accounting and green culture. For variable of green reputation ($y_{1.1}$) the equation was $y_{1.1} = \lambda_{1.1} \ Y_{1} + \epsilon_1$; $y_{1.2} = \lambda_{1.2} \ Y_{1} + \epsilon_1$; $y_{1.3} = \lambda_{1.3} \ Y_{1} + \epsilon_1$ where $y_{1.1}, y_{1.2}, y_{1.3}$ were the indicators of Social Responsibility, Sustainability, and Environmental reports which were reflective toward green reputation variable (Maak, 2008; van den Brink & van der Woerd, 2004). The value of $\lambda_{1.1}, \lambda_{1.2}, \lambda_{1.3}$ was the loading factor for indicator $y_{1.1} \ x_2$ and $\epsilon_1$ was the error of measurement of manifest variable for exogenous variable of the interaction between green accounting and green culture.

Figure 1. Research Model

3. Results and Discussion

3.1. Descriptive Statistics

Descriptive statistics is aimed to give description on the characteristic of the research data. Descriptive statistics measurement in the research was in form of minimum and maximum values, average value and standard deviation. Green culture variable, for each indicator, had score in the range of 17 to 85.
with median value of (17+85)/2 = 51. The result of statistical analysis is presented in Table 1. The table indicates that the hotels had implemented the concept of harmonious relationship with the Creator (God) through a belief that all life, including business, is the gift of God; therefore, they should be thankful by implementing the attributes of God of filial, honest and respect other lives and through various activities based on the employees’ faith (Astawa & Sukawati, 2016). Another result indicates that the relationship between hotel and its employees (pawongan) and natural conservation (palemahan) had been well implemented with average of 67.26 and 69.22, which was above 51 (Median). The result explains that the integration of the three indicators of green culture had formed a hotel culture that aware to the natural condition that needed to be protected through business activities and local genius. At present, natural conservation through business activities is the main attention of the world including through an innovation (Herzig & Schaltegger, 2011); therefore, hotel could give contribution in accordance with WTO (World Travel Organization). The implementation of green culture at the star hotel in Indonesia could be a strategy in developing green competitive advantages (Christmann, 2004; King & Shaver, 2001; Beckmann et al., 2014).

The result of descriptive analysis in Table 1 shows that all indicators of green accounting had minimum value of equal to or above the median value of 45. Therefore, descriptively, the implementation of green culture at the hotels in Indonesia was above the average. Environmental awareness had the highest value among the indicators of green accounting, which was 70.23 percent. The high awareness strengthened the green culture at the hotels (Beckmann et al., 2014). The less convincing indicator of green accounting was reporting with minimum value of 45 or equal to the median value. The result illustrates that hotels needed to improve the detail report on environment. Most of the hotels were still in doubt to disclose the information due to confidentiality. Green reputation variable was divided into three indicators; responsibility, sustainability, and environmental reports. Each indicator was measured by five question items. The result of descriptive statistics in Table 1 indicates that the implementation of social responsibility program had a strong signal to build green reputation. It followed by economic development awareness in the neighbourhood communities and report on activities related to environment that needed to be improved to create green reputation for the hotels. Overall, the indicators of green reputation at the hotels in Indonesia could support the image of the hotels and it is in line with green culture, which is the organizational culture of the hotel. The concept is also supported by various studies, such as Kumarek et al. (2013) and Kuriand & Zell, (2011).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Average</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parahyangan</td>
<td>56</td>
<td>85</td>
<td>70.33</td>
<td>6.537</td>
</tr>
<tr>
<td>Pawongan</td>
<td>51</td>
<td>85</td>
<td>67.28</td>
<td>7.234</td>
</tr>
<tr>
<td>Palemahan</td>
<td>59</td>
<td>85</td>
<td>69.22</td>
<td>5.331</td>
</tr>
<tr>
<td>Awareness</td>
<td>47</td>
<td>75</td>
<td>70.23</td>
<td>6.234</td>
</tr>
<tr>
<td>Involvement</td>
<td>46</td>
<td>73</td>
<td>67.12</td>
<td>5.12</td>
</tr>
<tr>
<td>Reporting</td>
<td>46</td>
<td>70</td>
<td>64.69</td>
<td>5.07</td>
</tr>
<tr>
<td>social responsibility</td>
<td>19</td>
<td>25</td>
<td>23.04</td>
<td>6.18</td>
</tr>
<tr>
<td>Sustainability</td>
<td>16</td>
<td>25</td>
<td>20.03</td>
<td>6.23</td>
</tr>
<tr>
<td>environmental reports</td>
<td>15</td>
<td>25</td>
<td>21.22</td>
<td>7.58</td>
</tr>
</tbody>
</table>

Table 1. Descriptive Statistics
Source: Primary data (processed), 2017

3.2. Inner Model Test

Partial Least Square (PLS) method was used to analyze and evaluate the validity and causality between constructs of the research model. Result of the model test is explained in Table 2.

The research hypothesis formulated that green accounting has influence on green reputation and is moderated by green culture. According to Table 2 regression coefficient of green accounting to green reputation was 0.307 with t value = 4.028 (p-value = 0.000). It can be interpreted that the increase in the number of green accounting reporting will increase the green reputation. The influence of green culture on green reputation would be divided into two: the coefficient test result of green culture and the interaction between green accounting and green culture. The regression coefficient of green culture to green reputation was 0.095 with T value = 1.040 (p-value = 0.154). It explains the insignificant influence on green reputation. The coefficient test result for green culture was insignificant, whereas for the interaction part, the result was significant. The result gave decision that green culture value was pure moderation in nature to green reputation. Regression equation on green reputation was:

Green Reputations = 0.307 GA + 0.095 GC + 0.200 GAXGC

3.3. Outer Model Test

Outer model is aimed to test the relationship between each indicator and the existing latent construct in the structural model. In the relationship between the indicator and reflective constructs the factor weight was taken from the value of the result for outer weights, whereas the formative constructs the factor weight was taken from the value of the result for outer loadings. In the research, latent construct was only on the value of green accounting and it was formative. The result of analysis can be explained in Table 3.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Average</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parahyangan</td>
<td>0.07</td>
<td>0.59</td>
<td>0.402</td>
<td>0.147</td>
</tr>
<tr>
<td>Pawongan</td>
<td>0.087</td>
<td>0.095</td>
<td>0.431</td>
<td>0.203 ns</td>
</tr>
<tr>
<td>Palemahan</td>
<td>0.444</td>
<td>0.361</td>
<td>0.414</td>
<td>0.102 ns</td>
</tr>
</tbody>
</table>

Table 2. Result of Inner Model Test
Source: Processed data, 2017

<table>
<thead>
<tr>
<th>Indicator</th>
<th>original sample estimate</th>
<th>mean of subsamples</th>
<th>Standard deviation</th>
<th>T Statistic</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Accounting (GA) -&gt; Green Reputations (GR)</td>
<td>0.307</td>
<td>0.305</td>
<td>0.076</td>
<td>4.028 *</td>
<td>0.000</td>
</tr>
<tr>
<td>Green Culture (GC) -&gt; Green Reputations (GR)</td>
<td>0.095</td>
<td>0.153</td>
<td>0.092</td>
<td>1.040 ns</td>
<td>0.154</td>
</tr>
<tr>
<td>GA X GC -&gt; Green Reputations (GR)</td>
<td>0.200</td>
<td>0.192</td>
<td>0.086</td>
<td>2.325 *</td>
<td>0.014</td>
</tr>
</tbody>
</table>

Table 2: Result of Inner Model Test
Source: Processed data, 2017

Based on the statistical values for loading factors resulted from PLS analysis, as presented in Table 3, the test result of the relationship between variable and its indicator can be explained as follows. Indicator weight shows the influence of the indicator to predict latent construct. Based on the result of outer model in latent construct of formative green culture value, the following equation was resulted: X2 = 0.707 X21 + 0.087 X22 + 0.444 X33.

The main indicator in the construct of green culture value was palemahan with loading factor of 0.707. It means that the higher the relationship between an institution and the environment it can be predicted that the green culture value of the hotel will be increased. Palemahan indicator had significant influence on green culture. It can be proved from the T value of 1.759 and p-value = 0.045. On the contrary, two other indicators, parahyangan and pawongan, had no significant influence on
green culture. It can be proved from the T value = 0.203 (p-value = 0.420) for parahyangan and T value = 1.072 (p-value = 0.147) for pawongan. Pawongan had higher p-value than 0.05. However, although parahyangan and pawongan were not significant to harmonious value, these indicators were used due to their formative relationship nature that required all indicators that able to predict latent construct to be in the model.

3.4. Model Feasibility Test

The model feasibility of PLS was seen from R² model value, whereas composite reliability and average variance extracted (AVE) cannot be considered since latent construct is formative in nature and other constructs was measured only with one indicator. The model precision in a whole is as follow: R² model = 1 – (1 – 0.159)(1 – 0.188)(1 – 0.638) = 0.753

The model precision level to explain the latent constructs was 75.3% and the remaining was explained by other constructs excluded from the research. Green accounting reporting has important role (Marcus & Fremeth, 2009; Seary, 2012; Tang et al., 2012; Dangelico, 2015; Delmas et al., 2015) in creating environmental awareness image or green reputation. It was proven from the research result explained in Table 2 that there was positive influence of green accounting on green reputation. The result supported hypothesis 1 (H1) that hotel with strong incentive for environmental and social awareness is able to create green reputation of 30.7% of the regression equation with assumption other factors are considered to have no effect. The disclosure of green accounting reporting at star hotels in Indonesia gave strong opinion on tourism imaging (Behrend et al., 2008; Besley & Bringham, 2008; Myers & Majluf, 1984) that environmentally friendly or green reputation as well as gave positive impact on economic performance (Tuwaijri et al., 2004).

The implementation of green accounting at the hotels was strengthened by a good implementation of green culture; therefore, it encouraged the hotel management to be more aware on environmental issues. Interaction between green accounting and green culture created employees who are more active in the development of sustainability programs and conducted good reporting to the community. The result of the study was differed to studies conducted by Caliskan, (2014); Bell & Lehman, (1999); Dilling, (2009); Cohen & Robbin, 2011; and Jones; (2010a, 2010b), where green accounting was disclosed without green culture involvement implemented by the hotel. The result was a new finding in disclosing green accounting implemented by the hotel.

The research result also confirmed that through green accounting, the owners had no hesitation to do investment that environmentally friendly and have impact on the hotel positioning that is in line with legitimation theory (Deegan, 2004). Hotels in Indonesia, currently, rely on the natural panorama and services thus the research result gave an alternative to design business strategies (Barney & Hesterly, 2012) and benefited the employees and investors (Behrend et al., 2009; Fairchild, 2008). In addition to the natural panorama, Indonesia is also rich with culture and the research result indicates that green culture strengthen the relationship between green accounting reporting and green reputation, thus green culture was a good moderation. It means that hypothesis 2 (H2) is accepted. The green culture implemented becomes the company asset that can be used as hotel imaging (Astawa & Sukawati, 2016). A culture is a human behavior that continuously conducted and is consisted of value system, artifacts, and basic assumptions (Kotter & Heskett, 1997 and Denison & Mishra, 1992). The green culture had strong influence in shaping the green accounting and green reputation. It is new findings that support legitimation theory (Deegan, 2004) and signaling theory (Behrend et al., 2009; Besley & Bringham, 2008; Myers & Majluf, 1984) that has been focused on product and service.

Green culture activities always put forward harmonisation with God, human beings and the environment in business activities that conducted together so that it becomes the organisational culture. The cultural concept gives specific characteristic in disclosing green accounting reporting to be more honest, transparent, and accountable. Honesty is the characteristic of God that is believed to have impact on the human life if they are not honest in working. Through the belief, of all involved parties will implement the culture well and this condition has never been revealed by previous researches in conducting awareness, involvement, and reporting in order to explain green accounting to strengthen green reputation.

Hotel’s green reputation will be stronger in the eyes of the community through activities that environmentally aware, by involving more employees in the social actions as well as professionally reporting environmental-related activities periodically. The interesting matter is strengthening the employee behavior with green culture that containing the values of belief packaged with customary and religious activities. The concept will create a sustainable competitiveness for the hotel in current tight competition.

4. Conclusions

Green accounting reporting that regularly conducted by the hotel management brought impact on the green reputation and the assertiveness to stakeholders that environmental awareness was not a wasting money activity, instead, it able to influenced tourists to stay longer at the hotel. Tourists were more comfortable to stay at the hotel that has environmental awareness since they consider environment as very influential for human life (Massey, 2001; Dilling, 2009). Green culture implemented in the hospitality world is a new model to motivate the company to implement green accounting without any pressure from the consumers, government, and the stakeholders but it is the natural awareness that growth among the society so it will bring out the sustainable tourism. The research result has an update but additional study is still needed by considering the policies of the company and government regulation to be more comprehensive.

Acknowledgements

The success of the research is due to the help of various parties, such as the association of Indonesian Hotels that gave recommendation and the hotel managers that willing to give data.

References

The Effect Environmental Performance, Environmental Disclosure, Firm Size, and Return on Equity on Economic Performance

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Abstract
This research aimed to examine the effect of environmental performance, environmental disclosure, firm size, and return on equity to the economic performance. The population in this study is a 35 non financial company listed on the Indonesia Stock Exchange. These results indicate that environmental performance (X1), environmental performance (X2), firm size (X3) return on equity (X4) positively influence on economic performance (Y).

Keywords: economic performance; environmental performance; firm size; return on equity; environmental disclosure.

1. Introduction
Successfull business strategies depend on the quality and comprehensiveness of information available to decision-makers. The practice of generating management information such as cost of sales is well established, and the systems employed to produce conventional management reports generally ensure timely availability of high-quality data to management. However, competitive advantage is gained by generating and capitalizing on business information not generally investigated by one’s competitors. Comprehensive management information, including information on environmental costs and opportunities, can yield competitive advantage. Typically, environmental costs and associated opportunities are buried in various overhead accounts. By distorting costing and pricing across the business, this practice can result in poor investment and strategic decisions. The term "environmental accounting" is open to interpretation. In this guideline, environmental accounting is the identification, measurement and allocation of environmental costs, the integration of these environmental costs into business decisions, and the subsequent communication of the information to a company’s stakeholders (Institute of Management Accountants, 1996). Ikhsan (Ikhsan, 2009) said that environmental issues direct or not, has been included in the economic performance of a business/activity or organization. Environmental Accounting can support national income accounting, ecological accounting at local administration level and at micro level related to financial accounting, cost accounting or internal business managerial accounting. Ferreira (Ferreira, Erasmus, & Groenewald, 2009) stated that the issue of environmental conservation is the duty of every individual, government and company. The company has an important role in creating a good and healthy environment. Similarly, Djadjiningrat (Djadjiningrat, Hendriani, Famiola, & Wisesa, 2011) said that the world business (company) must play an active role in redefining its operations in a sustainable direction, because without the intervention of the world business, the world as a whole will not be able to succeed in creating sustainable conditions. Therefore, the emphasis of the company’s participation in realizing a healthy social and environmental conditions is good.

2. Overview Theory
2.1. The Effect of Environmental Performance on Economic Performance
The relationship between environmental and economic performance of firms is an important issue for environmental policy making. In the current discussion about this relationship, it is often argued that there is a conflict between competitiveness of firms and their environmental performance (Walley & Whitehead, 1994). For example, at the level of a specific industry, the share of environmental costs in total manufacturing costs might be considerably higher than average (Stavropoulos, Wall, & Xu, 2018). Particularly, this might be the case for industries upstream in the production chain (such as primary resource extraction or primary manufacturing), which have been shown to give rise to environmental impacts disproportionate to the value added associated with their production activities (Clift & Wright, 2000). Only recently, the notion emerged that improved environmental performance is a potential source for competitive advantage as it can lead to more efficient processes, improvements in productivity, lower costs of compliance and new market opportunities (Porter, 1991; Porter & Linde, 1995), although this often refers to other aspects of environmental performance than those addressed and measured traditionally (Wehmeyer & Tyteca, 1998). Therefore, the preceding arguments lead to the first hypothesis:
H1 = The environmental performance has influence on economic performance

2.2. The Effect of Environmental Disclosure on Economic Performance
Corporate Environmental Disclosure (CED) refers to "accountability to society as a whole with respect to matters of public interest such as community welfare, public safety, and the environment" (Mahmes, 2016; Radebaugh, Gray, & Black, 2006). To justify its continued existence, a company should be held accountable for its performance and actions that impact upon people, their communities and their environment (Arevalo & Aravind, 2011); to create a communication channel with
through intermediary media (Ikhsan & others, 2014). There are many advantages in using secondary data since the data gathered are less expensive, faster, and easier to obtain compared primary data.

To analyze the data, we use some technical in classical assumption such as test of normality, multicolinearity, autocorrelation and heteroskedasticity. The result shows that model is normal and free from multicolinearity, autocorrelation and heteroskedasticity. To test hypothesis from H1 to H4, we use statistical multiple regression analysis. The multiple regression analysis model used in this study is shown in the following equation:

\[
Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon
\]

### 4. Result and Discussion

#### 4.1. Descriptive Analysis

The purpose of the variable description is to provide a brief overview of the research variables. Description of research variables described using the minimum, maximum, and mode of each variable. The minimum, maximum, and mode values of each variable are based on data from companies listed on the ISE during 2012-2014. Some of the variables in this study were measured using more than one indicator based on previous research and other relevant referential. Table 1 presents the results of research data processing that results in minimal, maximum, and mode values of the research variables.

#### Table 1. Descriptive Analysis

<table>
<thead>
<tr>
<th>Source</th>
<th>Ouput SPSS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Descriptive Statistics</strong></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Minimum</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Esp (Y)</td>
<td>105</td>
</tr>
<tr>
<td>Emp (X1)</td>
<td>105</td>
</tr>
<tr>
<td>End (X2)</td>
<td>105</td>
</tr>
<tr>
<td>Size (X3)</td>
<td>105</td>
</tr>
<tr>
<td>Roe (X4)</td>
<td>105</td>
</tr>
</tbody>
</table>

#### 4.2. Multi Regression Analysis

The result of multiple regression analysis shows on the table 2.

#### Table 2. Multiple Regression Analysis Test

<table>
<thead>
<tr>
<th>Source</th>
<th>Ouput SPSS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coefficients</strong></td>
<td></td>
</tr>
<tr>
<td>Model</td>
<td>Unstandardized Coefficients</td>
</tr>
<tr>
<td></td>
<td>B</td>
</tr>
<tr>
<td>(Constant)</td>
<td>-560</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Emp (X1)</td>
<td>.004</td>
</tr>
<tr>
<td>End (X2)</td>
<td>-.094</td>
</tr>
<tr>
<td>Size (X3)</td>
<td>.020</td>
</tr>
<tr>
<td>Roe (X4)</td>
<td>.205</td>
</tr>
<tr>
<td>a. Dependent Variable: Esp (Y)</td>
<td></td>
</tr>
</tbody>
</table>

The result of the test multiple regression analysis in table 2 concludes accepted hypothesis 1 (H1). Therefore, we conclude that environmental performance (X1) positively influence on economic performance (Y). This is consistent with the result obtained (Al-Tuwaijri, Christensen, & Hughes, 2004), (Herningsih & Saputri, 2015) and not consistent with (Sarumpaet, 2006), (Almilia & Dwi, 2007) finding. The result of the hypothesis 2 (H2) in table 2 conclude accepted hypothesis 2 (H2). Therefore, we conclude that environmental performance (X2) positively influence on economic performance (Y). This is consistent with the result obtained (Lindrianasari, 2007) and not consistent with Almilia finding (Almilia & Dwi, 2007). The result of the hypothesis 3 (H3) in table 2 conclude accepted hypothesis 3 (H3). Therefore, we conclude that firm size (X3) positively influence on economic performance (Y). This is consistent with the result obtained Fachrudin (2011) and not

#### 3. Research Methods

Non financial Indonesian companies listed on the Indonesian Stock Exchange (ISE) are the sample population of this study. The sample companies are selected based on some selection criteria. First, company must listed on the Indonesian Stock Exchange after 1 January 2012. Second, company not delisting during research. Third, company must publish their financial report audited during 2012-2014. Secondary data chosen as the source data, whereas the sources of the data indirectly obtained...
consistent Sunarko result (Sunarko, Saptantinah, & Astuti, 2012) and also Hasnawati finding (Hasnawati & Sawir, 2015). The result of the hypothesis 4 (H4) in table 2 conclude accepted hypothesis 4 (H4). Therefore, we conclude that return on equity (X4) positively influence on economic performance (Y). This is consistent with the result obtained Herdiana (Herdiana, 2003) and not consistent with Hutami and Carlo finding (Carlo, n.d.; Hutami, 2012).

Table 3. F test
Source: Ouput SPSS

<table>
<thead>
<tr>
<th>Model Summary*</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.25</td>
<td>0.061</td>
<td>0.13</td>
<td>0.2883</td>
</tr>
<tr>
<td>a. Predictors: (Constant), Roe (X4), End (X2), Size (X3), Qap (X1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Dependent Variable: Exp (Y)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4. Coefficient Determination Test
Source: Ouput SPSS

In Table 4, the coefficient determination test indicates that adjusted R square values are 0.013, which means that the variation rate of the dependent variables can be explained by the independent variables are 1.3%. While the rest 98.7% is explained by other variables outside the proposed model.

5. Conclusion

With the general objective to identify characteristics related to economic performance. First, we conclude that environmental performance (X1) positively influence on economic performance (Y). Second, we conclude that environmental performance (X2) positively influence on economic performance (Y). Third, we conclude that firm size (X3) positively influence on economic performance (Y). Fourth, we conclude that return on equity (X4) positively influence on economic performance (Y).

References
The Affecting Factors of Greenhouse Gases Disclosure

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Abstract

The study aims to determine the impact of corporate governance (board of commissioners, directors and gender diversity) and environmental committees in greenhouse gas disclosure. The sampling method in this study using purposive sampling method with a total of 26 manufacturing companies listed in Indonesia Stock Exchange by using multiple regression analysis. The results show that the role of the board of commissioners has not been able to provide control over the reduction of greenhouse gases on the company, the board of directors has no effect on the disclosure of greenhouse gases refuse to make emission gas reduction due to litigation pressure and expenditure, gender diversity has not been able to control the role of women and men in decision-making and risk, and environmental committees have been little able to contribute to the disclosure of greenhouse gases as it is expected that the establishment of an environmental committee on the company.

Keywords: board of commissioners; directors; gender diversity; environmental committee; greenhouse gas disclosure.

1. Introduction

The issue of global warming is a problem that is being fought for in the world. One of the causes is greenhouse gas emissions. Indonesia is one of the most abundant greenhouse gas emitters in the world. According to data from REDD (Reduction Emissions from Deforestation and Forest Degradation) cooperation, in 2005 Indonesia contributed 2.05 gigatons of greenhouse gas emissions (Majid & Ghozali, 2015). This fact places Indonesia as the third largest contributor of carbon dioxide in the world after the United States (5.95 gigatons) and China (5.06 gigatons). Indonesia's carbon gas emissions are predicted to be 3 gigatonnes of CO2 by 2020. (Majid & Ghozali, 2015)

One of the main issues of concern is environmental pollution by industry. In April of 2009, there was a leak of H2S gas or ammonia in Aceh by PT. Arun which caused hundreds of residents suffered respiratory problems and dozens of hospitalized. Civil Society Communication Forum (FKMS) urges PT. Arun to be responsible for the problems faced by the community around the company due to toxic sulphur gas, in addition to causing health problems also cause environmental damage. This case occurs due to lack of awareness of the company to its environment.

Environmental Trends (Nainggolan & Rohnan, 2012; Smith, 1989), since the beginning of the industrial era, carbon dioxide levels have increased by 1.4% annually and are growing. The high concentrations of greenhouse gases cause the earth to warm up because this gas will reflect the sunlight was entering the earth. According to the Carbon Disclosure Project (2013), fifty of the 500 largest listed companies in the world account for nearly three-quarters of the 3.6 billion metric tons of greenhouse gases (Nainggolan & Rohnan, 2012).

Indonesia has made commitments to reduce greenhouse gas emissions. This commitment to reducing greenhouse gas emissions is demonstrated by ratifying the Kyoto Protocol on December 3, 2004, through law 17/2004. Besides, the president also issued Presidential Regulation no. 61 of 2011 on the National Action Plan for Greenhouse Gas Emission Reduction (RAN-GRK) which reveals that the industry is one of the contributors to greenhouse gas emissions (http://www.sekretariatrangrk.org/). Industries are expected to reduce their greenhouse gas emissions as the realization of CSR. (Pradini, 2013; Majid & Ghozali, 2015).

Indonesia, the disclosure of greenhouse gas emissions in companies, is voluntary disclosure, so not all companies disclose greenhouse gas-related information in their report. This makes research related to factors affecting greenhouse gas disclosure to be attractive. However, research on greenhouse gas emissions in companies in Indonesia is still minimal. Previous research is dominated by factors affecting social disclosure of the environment or disclosure of social responsibility, not specific to the disclosure of greenhouse gas emissions. Companies that disclose carbon emissions will benefit, such as, gain legitimacy from stakeholders, avoiding threats especially for companies that produce greenhouse gases such as increased operating costs, demand reduction, reputation risk, legal process, and penalties and penalties. (Berthelot & Robert, 2011).

The role of corporate governance in the management and achievement of objectives to provide value and image of the company is needed as the achievement of information both transparency and accountability as a form of corporate co-
commitment to the disclosure of the environment in terms of disclosure of carbon emissions as a form of greenhouse gases (Manurung, Kusumah, Hapsari, & Husnatarina, 2017). Companies are operating in intensive industries, carbon emissions levels, firm size, profitability, and corporate governance quality on Carbon Emission Disclosure (Choi, Lee, & Psaros, 2013). The results of the study show that companies operating in intensive industries, carbon emissions, firm size, and profitability have a significant effect on Carbon Emission Disclosure, while the quality of corporate governance has a significant but insignificant effect on Carbon Emission Disclosure. The results (Nainggolan, 2015) indicate that the proportion of independent board of governance that is the proportion of independent board and institutional ownership has a positive effect on environmental disclosure. While the gender diversity on the board of directors does not affect the disclosure of the environment. (Anwar, 2016) Conducted a study on the proxy of corporate governance namely institutional ownership positively affect carbon emission disclosure. While the proportion of female commissioners, the proportion of independent board of commissioners, and the size of the board of commissioners do not affect carbon emission disclosure. According to research (Majid & Ghozali, 2015), multivariate regression analysis results show that firm size, profitability, and media exposure have a positive and significant effect on the level of greenhouse gas emission disclosure.

Conversely, negative and significant leverage affects the level of disclosure. The analysis results also show that there is no significant effect of PROPER ratings on the extent of greenhouse gas emissions disclosure (Majid & Ghozali, 2015). According to (Sun, Salama, Hussainei, & Habbash, 2010) States that voluntary disclosure in an annual report such as corporate environmental disclosure or often called corporate environmental disclosure is deemed necessary to demonstrate to stakeholders the awareness of the company from more extensive interests and accountability by behaving social responsibility. The more form of accountability that companies do to their environment, then the image of the company in the eyes of the public to be increased or the image of the company to be good. According to (Effendi, Uzliawati, & Yulianto, 2012) environmental disclosure is a disclosure of information related to the environment in the company’s annual report. Environmental disclosure is also a form of corporate social responsibility. Through the environmental disclosure of the annual report, the public can monitor the activities undertaken by the company.

The purpose of the environmental committee is to systematically plan, implement and review sustainability policies and activities (Liao, Luo, & Tang, 2015). The ward committee can increase employees’ awareness of the environmental aspects of the work and their responsibility to mitigate negative impacts. The award committee has the authority to set ambitious targets and financial and non-financial rewards necessary to galvanize staff into action and inspire changes that enhance the adaptability of the organization (Liao et al., 2015). The presence of environmental committees aims to enhance the company’s environmental reputation, especially in the eyes of stakeholders (Annandale, Morrison-Saunders, & Bouna, 2004; Neu, Warsame, & Pedwell, 1998b; Yunus, Eljido-Ten, & Abhayawansa, 2016). The presence of an environmental committee enhances a firm’s environmental reputation, particularly in the eyes of powerful stakeholders (Annandale et al., 2004; Neu, Warsame, & Pedwell, 1998a; Yunus et al., 2016). Environmental committees are responsible for managing firms’ environmental risks, which include environmentally related reputational risk and threats to legitimacy (Yunus et al., 2016).

The importance of greenhouse gas disclosure is an impact on reducing the occurrence of global warming, environmental damage and the occurrence of damage to ozone coating on the surface of the earth. This study was conducted to determine the role of corporate governance (board of commissioners, the board of directors, gender diversity) and environmental committees in the form of supervision of industrial activities on greenhouse gas disclosure.

2. Literature Review

Indonesia, the disclosure of greenhouse gas emissions to companies is still voluntary, so not all companies disclose information related to greenhouse gases in their reports. This makes research related to the factors that influence disclosure of greenhouse gases to be interesting. However, research on greenhouse gas emissions in companies in Indonesia is still very limited. Previous research was dominated by factors that influence social disclosure or disclosure of social responsibility, not specific to disclosure of greenhouse gas emissions. Some of the benefits the company has in implementing carbon emissions disclosures such as gaining legitimacy from stakeholders, avoiding threats, especially for companies that produce greenhouse gases such as increased operating costs, reduced demand, reputation risk, legal processes, and fines and penalties (Berthelot & Robert, 2011).

In another study that focused on the attributes of corporate governance that influence firms to make GHG disclosures, (Peters & Romi, 2012) examined the determinants of GHG voluntary reporting in a sample of companies participating in CDP from 2002 to 2006 and found evidence that GHG dis-

---

| Climate Change | CC1 - Assessment/description of the risk (regulatory, physical or general) relating to climate change and actions were taken or to be taken to manage the risks (Choi et al., 2013). |
| GHG Emission | GHG1 – Description of the methodology used to calculate GHG Emissions (e.g. GHG Protocol or ISO) (Choi et al., 2013). |
| Energy Consumption | EC1 – Total energy consumed (e.g. tera-joules or pejoules) (Choi et al., 2013). |

---

Table 1. Carbon Emission Disclosure Checklist.
Disclosures are positively related to what they call 'sustainability-oriented corporate governance mechanisms', especially the presence of board-level environmental committees and management positions of corporate sustainability officers. The size of the board and the expertise of its members and sustainability officers are the dominant characteristics of companies that disclose more GHG information. Knowledge synergy between the environmental committee and the audit committee was also found to be an important element in increasing the possibility of voluntary GHG disclosure.

Disclosure of greenhouse gases was measured using a number of items adopted from the study (Choiet al., 2013; Majid & Ghozali, 2015) by determining five broad categories relevant to climate change and carbon emissions as follows: climate change risks and opportunities (CC / Climate Change), greenhouse gas emissions (GHG / Greenhouse Gas), energy consumption (EC / Energy Consumption), reduction of greenhouse gases and costs (RC / Reduction and Cost) and carbon emission accountability (AEC / Accountability of Emission Carbon). In these five categories, 18 items were identified.

<table>
<thead>
<tr>
<th>Table 1. Carbon Emission Disclosure Checklist</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Climate Change</strong></td>
</tr>
<tr>
<td>&quot;Risks and opportunities.&quot;</td>
</tr>
<tr>
<td>CC1 – Assessment/description of the risk (regulatory, physical or general) relating to climate change and actions were taken or to be taken to manage the risks (Choi et al., 2013).</td>
</tr>
<tr>
<td>CC2 – Assessment/description of current (and future) financial implications, business implications and opportunities of climate change (Choi et al., 2013; Majid &amp; Ghozali, 2015).</td>
</tr>
<tr>
<td><strong>GHG Emission</strong></td>
</tr>
<tr>
<td>GHG1 – Description of the methodology used to calculate GHG Emissions (e.g. GHG Protocol or ISO) (Choi et al., 2013).</td>
</tr>
<tr>
<td>GHG2 – Existence external verification or quantity of GHG emission – if so by whom and on what basis. (Choi et al., 2013).</td>
</tr>
<tr>
<td>GHG3 – Total GHG Emission-metric tonnes CO2e emitted. (Choi et al., 2013).</td>
</tr>
<tr>
<td>GHG4 – Disclosure of scopes 1 and 2, or scope direct GHG emissions (Choi et al., 2013).</td>
</tr>
<tr>
<td>GHG5 – Disclosure of GHG emission by sources (e.g. coal, electrical, etc.) (Choi et al., 2013).</td>
</tr>
<tr>
<td>GHG6 – Disclosure of GHG emissions by facility or segment level (Choi et al., 2013).</td>
</tr>
<tr>
<td>GHG7 – Comparison of GHG emissions in previous years. (Choi et al., 2013).</td>
</tr>
<tr>
<td><strong>Energy Consumption</strong></td>
</tr>
<tr>
<td>EC1 – Total energy consumed (e.g. tera-joules or petajoules) (Choi et al., 2013).</td>
</tr>
<tr>
<td>EC2 – Quantification of energy used from renewable sources. (Choi et al., 2013).</td>
</tr>
<tr>
<td>EC1 – Disclosure by type, facility or segment. (Choi et al., 2013).</td>
</tr>
<tr>
<td><strong>GHG Reduction and Cost</strong></td>
</tr>
<tr>
<td>RC1 – Detail of plans or strategies to reduce GHG emissions. (Choi et al., 2013).</td>
</tr>
<tr>
<td>RC2 – Specification of GHG emissions reduction target level and target year. (Choi et al., 2013).</td>
</tr>
<tr>
<td>RC3 – Emissions reductions and associated costs or savings. (Choi et al., 2013).</td>
</tr>
<tr>
<td>RC4 – Cost of future emissions factored into capital expenditure planning. (Choi et al., 2013).</td>
</tr>
<tr>
<td><strong>Carbon Emission Accountability</strong></td>
</tr>
<tr>
<td>AEC1 – Indication of which board committee (or other executive bodies) has overall responsibility for actions related to climate change (Pradini, 2013; Majid &amp; Ghozali, 2015).</td>
</tr>
<tr>
<td>AEC2 – Description of the mechanism by which the board (or another executive body) reviews the company’s progress regarding climate change.</td>
</tr>
</tbody>
</table>

The calculation of Carbon Emission Disclosure index is done by the following steps (Choi et al., 2013):

a) Scores on each disclosure item on a dichotomy scale.

b) The maximum score is 18, while the minimum score is 0.

each item is worth 1, so if the company discloses all items on the information in its Report, then the score of the company is 18.

c) Scores on each company then summed.

2.1. Development of the Research Hypothesis

2.1.1. Relationship commissioners with disclosure greenhouse gas disclosures

According to research (Liao et al., 2015) indicates a positive relationship between the board of independent commissioners on the disclosure of the environment. The higher the proportion of independent board of commissioners, the greater the company’s environmental disclosure. Thus, the presence of independent commissioners positively influences the disclosure of the environment. Similarly, research (Nainggolan & Rohman, 2012; Fidanoski, Simeonovski, & Mateska, 2014) shows that of the three factors studied (gender diversity, the proportion of independent board and institutional ownership), it is evident that the proportion of independent board and institutional ownership has a positive influence on environmental disclosure. While the gender diversity on the board of directors does not affect the disclosure of the environment. This is because the female board of directors is still a minority then has a minority right in decision making. The Board of Commissioners’ variables represents the proportion of independent board of commissioners within the company. The board variable is measured by calculating the number of independent board members divided by the total number of boards of commissioners which can be seen from the annual report of each company. (Liao et al., 2015; Nainggolan & Rohman, 2012; Yunus et al., 2016).

H1: The Board of Commissioners relating to Greenhouse Gas Disclosure

2.1.2. Relationship of the board of directors with the disclosure of greenhouse gases

Concerning the level of activity of the Board of Directors, (J. M. Prado-Lorenzo & García-Sánchez, 2010) asserted that the more frequent Board of Directors tends to be more diligent and to serve the public interest better. (J.-M. Prado-Lorenzo, Rodríguez-Domínguez, Gallego-Álvarez, & García-Sánchez, 2009; Tauringana & Chithambo, 2014; Liao et al., 2015) Their results partially indicate that although companies are under public pressure to disclose GHG information, the board sometimes refuses this disclosure if there is a long litigation likelihood, especially if the cost of disclosure is more significant than its benefits. The results also show that while the business environment has changed over time with the influence of other stakeholders increasing, as far as climate-related information is concerned, the board continues to maintain its tradition of prioritizing shareholder interests.

Board of directors as the highest element of management is responsible for the legitimacy of all stakeholders (Manurung et al., 2017). The board of directors, a dummy variable representing the size of the Board of Directors (Manurung et al., 2017), is measured regarding the number of board members (Nainggolan & Rohman, 2012; J. M. Prado-Lorenzo & García-Sánchez, 2010). H2: Board of Directors relating to the disclosure of Greenhouse Gases

2.1.3. Relationship of gender diversity with greenhouse gas disclosure

Women have a more caring attitude towards social and environmental circumstances than men. The large proportion of women in the board of directors encourages management to take responsibility actions that enhance the company’s relationship with stakeholders, through disclosure (Nainggolan & Rohman, 2012). In a study conducted by (Liao et al., 2015)
showed that the more significant proportion of women in the board of directors has a more transparent tendency regarding environmental disclosure. Even the number of women who are slightly in the sample which does have differences in the decision for the disclosure of greenhouse gases. While (Huse & Grethe Solberg, 2006) found that women were more committed and engaged, more prepared, more diligent, asked questions and eventually created a good atmosphere within the board of commissioners (Liao et al., 2015). Similarly, (Adams & Ferreira, 2009) found that more women in the board of commissioners improved the decision-making process, increased the effectiveness of the board and that women had better attendance or participation.

Gender diversity, (Brammer et al., 2007) reveals that two perspectives are explaining the existence of women on the company board, the argument from a business and moral perspective. The large proportion of women in the board of directors encourages management to take responsibility actions that enhance the company’s relationship with stakeholders, namely through disclosure. Gender diversity is measured by the proportion of female directors owned by the company (Huse & Grethe Solberg, 2006; Liao et al., 2015; Nainggolan & Rohman, 2012; Post, Rahman, & Rubow, 2011).

H3: Gender diversity relating to disclosure of Greenhouse Gases

2.1.4. Relationship of the environmental committee to the disclosure of greenhouse gases

Environment committee was responsible for managing the environmental risks of the company, which includes reputation risk and environmental threats to legitimacy (Yunus et al., 2016). Furthermore, it was found that the company's environmental committee motivated the company to implement strategies and practices for measuring and reporting Greenhouse Gas emission levels (Ashforth & Gibbs, 1990; Yunus et al., 2016). In a sense, an environmental committee tends to promote strategies to improve a company's carbon performance to ensure that the disclosed information has no negative impact on the company's legitimacy and reputation (Yunus et al., 2016). Likewise, according to the study (Liao et al., 2015), if the environmental committee is not large enough, independent or active, the effect appears to be insignificant. The results are consistent with stakeholder theory, indicating that a diversified and independent board and the existence of a board-level environmental committee can balance the financial and non-financial objectives of a company with limited resources and moderate the expectations of different possible stakeholders with different interests.

Environment committee was responsible for managing the environmental risks of the company, which includes reputation risk and environmental threats to legitimacy. Environment committees using dummy variables, value 1 if the company has a board-level environmental committee and 0 otherwise (Liao et al., 2015; Rankin, Windsor, & Wahyuni, 2011; Yunus et al., 2016).

H4: Environmental committee relating to disclosure of Greenhouse Gases

3. Methodology

A descriptive statistical analysis is a descriptive technique that provides information about the data that is owned and does not mean to test the hypothesis. This analysis is only used to present and analyze data accompanied by calculations to clarify the conditions or characteristics of the data in question. The sample in the study used a purposive method sample with 26 companies indexed on the Indonesia Stock Exchange. This study uses multiple linear regression by conducting assumption testing carried out in this study to test whether the data meets the classical assumptions. The tests performed are normality, multicollinearity, and heteroscedasticity. Hypothesis testing is done by regression analysis, in this study using the hypothesis test simultaneous analysis (F test), Determination Coefficient (R2) and Partial Test Analysis (t-test).

4. Results and Discussion

4.1. Normality Test

Normality assumption test states if the value of significance above 0.05 then the distribution of data otherwise meet the assumption of normality, and if the value of significance below 0.05 then the interpretation of data is not normal. The result of normality test with the number of research samples of 26 companies with a significance level of 0.862 greater than 0.05, it can be concluded that the data is normally distributed and the simultaneous influence between corporate governance and environmental committee variables on greenhouse gas disclosure.

<table>
<thead>
<tr>
<th>Normal Parameters</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>a,b</td>
<td>0.00</td>
<td>28468471</td>
<td>26</td>
</tr>
<tr>
<td>Most Extreme Differences</td>
<td>118</td>
<td>095</td>
<td>118</td>
</tr>
<tr>
<td>Asym. Sig. (2-tailed)</td>
<td>862</td>
<td>802</td>
<td>862</td>
</tr>
</tbody>
</table>

Table 2. Normality Test

4.2. Autocorrelation Test

The results of autocorrelation test with DW value of 1.875, significance table value of 5%, the number of samples of 26 and the number of independent variables of 4, then obtained DW value of 1.875, so that the test results Watson-Durbins, dL <DW <dU, 1.0616 <1.875 <1.7591. Based on Watson Durbin test table criterion, the test result showed no positive autocorrelation means that the regression model in this research is free from autocorrelation. The result of the autocorrelation test of the dependent variable and the independent variable is stated that there is no interference variable which can cause an error in testing.

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
<th>Durbin Watson</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>.527+</td>
<td>.278</td>
<td>.140</td>
<td>.31052</td>
<td>1.875</td>
</tr>
<tr>
<td></td>
<td>a. Predictors (Constant), BOC, BOD, Gender Diversity, Environ Committee</td>
<td>b. Dependent Variable GHG</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3. Autocorrelation Test

4.3. Multicollinearity Test

The value of variance inflation factor with tolerance value> 0.10 and VIF <10 can mean there is no multicollinearity whereas if tolerance value <0.10 and VIF > 10 then it can be interpreted there is multicollinearity. Multicollinearity test result based on tolerance value and variance inflation factor from independent variable shows tolerance value greater than 10 and variance inflation factor value less than 10, it is concluded in the regression model there is no multicollinearity in every test that has been done.

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Unstandardized Coefficients</th>
<th>Collinearity Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std Error</td>
<td>Beta</td>
</tr>
<tr>
<td></td>
<td>Constant</td>
<td>1.489</td>
<td>.219</td>
</tr>
<tr>
<td></td>
<td>BOC</td>
<td>103</td>
<td>177</td>
</tr>
<tr>
<td></td>
<td>BOC</td>
<td>-412</td>
<td>177</td>
</tr>
<tr>
<td></td>
<td>Gender Diversity</td>
<td>.016</td>
<td>.075</td>
</tr>
<tr>
<td></td>
<td>Environment Committee</td>
<td>-.014</td>
<td>.083</td>
</tr>
</tbody>
</table>

Table 4. Multicollinearity Test
4.4. Heteroscedasticity Test

The result of heteroscedasticity test by using gletjsertest with significance level of $\alpha = 5\%$, if the result is bigger than $t$-significance $\alpha = 5\%$, then there is no heteroscedasticity. Based on the result of the heteroscedasticity test on the independent variable model with the average of significance level above $5\%$, then for all independent variables that have been tested, there is no problem of heteroscedasticity.

4.5. Analysis of Multiple Hypotheses

4.5.1. Simultaneous Test

Simultaneous test results show $F$ arithmetic of 2020 is expressed with a positive sign then the direction of positive test relationship. The value statistically shows the results of significance at $\alpha = 0.05$ with a significance value of $0.128 > 0.50$ results obtained from $F$ Table with df1 = 4 and df2 = 21, then the magnitude of $F_{table} = 2.84$. Then the value of $F_{(2.020)} < F_{Table} (2.84)$, it can be concluded that the examination of Corporate Governance variables (board of commissioners, a board of directors, gender diversity) and an environmental committee on greenhouse gas disclosure have no effect simultaneously so that the variables in this research are accepted. (Manurung et al., 2017)

4.5.2. Coefficient of Determination

The result of determination coefficient test shows multiple correlations between two or more independent variables to a dependent variable. The greenhouse gas disclosure variable shows $R$-value is 0.527. This suggests a weak relationship between corporate governance variables (board of commissioners, boards of directors, gender diversity) and environmental committees on greenhouse gas disclosure. The value of $R$ square of 0.278 means the percentage of contribution of variables of greenhouse gas disclosure by 27% against other variables not included in this study. The adjusted $R$ square of 0.140 means that 14% of the greenhouse gas disclosure variables can be explained by the variables (board of commissioners, a board of directors, gender diversity) and environmental committees while other variables can explain the remaining 86%. While the value of the standard error of estimate of 0.31062 can be interpreted that the number of regression model error in predicting greenhouse gas disclosure. This reflects the still low or weak ability of independent variables in explaining the dependent variable. (Manurung et al., 2017)

4.6. Discussion

4.6.1. Hypothesis Test of Partial Analysis (t-test)

Test on corporate governance variables (board of commissioners, boards of directors, gender diversity) and environmental committees on greenhouse gas disclosure.

<table>
<thead>
<tr>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Unstandardized Coefficients</th>
<th>$t$-value</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>0.83</td>
<td>0.27</td>
<td>3.07</td>
<td>0.764</td>
</tr>
<tr>
<td>BOD</td>
<td>0.038</td>
<td>0.027</td>
<td>4.55</td>
<td>0.195</td>
</tr>
<tr>
<td>BOC</td>
<td>-0.017</td>
<td>0.10</td>
<td>-4.24</td>
<td>-1.608</td>
</tr>
<tr>
<td>Gender Diversity</td>
<td>0.057</td>
<td>0.054</td>
<td>0.266</td>
<td>1.070</td>
</tr>
<tr>
<td>Environ Committee</td>
<td>0.233</td>
<td>0.206</td>
<td>0.375</td>
<td>1.128</td>
</tr>
</tbody>
</table>

Table 5. Heteroscedasticity Test

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>780</td>
<td>4</td>
<td>195</td>
<td>2.020</td>
<td>1.28*</td>
</tr>
<tr>
<td>Residual</td>
<td>2.026</td>
<td>21</td>
<td>0.096</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2.806</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6. Simultaneous Test

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.527</td>
<td>0.278</td>
<td>0.140</td>
<td>0.31062</td>
</tr>
</tbody>
</table>

Table 7. Determination Test

Variable board of commissioners with the probability value of $0.349 > 0.05$, it can be concluded that $H_0$ accepted and $H_1$ rejected. The board variable does not influence the variable $Y$. It shows that the size of the board variable has no effect on the greenhouse gas disclosure, the research results are not in line with the research (Liao et al., 2015; Nainggolan & Rohman, 2012) say the board of commissioners have a positive relationship with the disclosure of the environment, the higher the proportion of the board of commissioners, the greater the company's environmental disclosure. In the research that has been done the disclosure environment using greenhouse gas emission disclosure variable.

4.6.2. Relationship of the board of commissioners to the disclosure of greenhouse gases

Variable board of directors with a probability value of $0.030 < 0.05$, it can be concluded that $H_0$ is rejected and $H_2$ accepted. The variables of the board of director influence greenhouse gas disclosure. The results of this study are parallel to (J. M. Prado-Lorenzo & Garcia-Sanchez, 2010). Their results partially indicate that although the company gets public pressure to disclose GHG information, the board sometimes refuses this disclosure if there is a high litigation likelihood, especially when the cost of disclosure is bigger than its benefits (Tauringana & Chithambo, 2014).

4.6.4. Relationship of Gender Diversity with greenhouse gas disclosure

Variable of gender diversity with probability value $0.833 > 0.05$, $H_0$ can be concluded accepted and $H_3$ rejected. Variables of gender diversity do not affect the disclosure of greenhouse gases on firms. This means that gender diversity variables do not significantly influence greenhouse gas disclosure, the result is evident from the small amount of gender diversity in the company so that the proportion of women on the board of directors is incapable of taking responsibility and improving relationships with stakeholders. The results of this study are in line with the study (Nainggolan & Rohman, 2012) say the amount of gender diversity has no significant effect on environmental disclosure using greenhouse gases and this study is not in line with the study (Liao et al., 2015) says the proportion of women in the council directors affect the disclosure of the environment and have a tendency to be more transparent.

4.6.5. Environmental Committee’s relationship with greenhouse gas disclosure

Environment committee variable with probability value $0.867 > 0.05$ can be concluded $H_0$ accepted and $H_3$ rejected.
The environmental committee variable has no effect on greenhouse gas emissions on the company. The result can be concluded that the existence of environmental committees in the company has not been able to provide improved carbon performance and negatively impacted while the importance of environmental committees will be more focused on improving performance, managing environmental risks, increasing reputation risk and environmental threats. The results of this study are inconsistent with the study (Ashforth & Gibbs, 1990; Liao et al., 2015; Yunus et al., 2016) say the existence of environmental committees is highly influential in improving corporate governance, climate change strategies, reducing carbon emissions and avoiding the occurrence of legitimacy in the company.

5. Conclusion

Environmental degradation that occurs almost all over the world including the country of Indonesia causes climate change, environmental ecosystems and the depletion of the ozone layer. Some companies that contribute carbon from 1.65% to 2.54 billion metric tons over the past four years. Indonesia committed to reducing greenhouse gas emissions by ratifying the Kyoto Protocol on 3 December 2004 through law 17/2004 concerning the national action plan for reducing greenhouse gas emissions. The need for government participation, especially corporate stakeholders, is active in reporting and oversight by accountability and transparency related to carbon emissions disclosure. The role of corporate governance and the company’s environmental committees in carbon emissions disclosure contributes to employees’ understanding of the impact of carbon emissions on the economy and surrounding communities. The latest technological advances as alternative energy for the company in the operational activities of the industry to reduce the emission of greenhouse gas emissions.

This research is intended to determine the role of corporate governance and environmental committees in greenhouse gas reduction. From the test results, it can be concluded:

a. The results of the research for the board of commissioner variables do not affect the disclosure of greenhouse gases. The results show that the size of the board of commissioners owned by the company has not been able to provide supervision on the reduction of greenhouse gases, this is because the occurrence of carbon pollution and environmental damage is part of the corporate social responsibility.

b. The results of the board of directors’ variables have a negative effect on greenhouse gas disclosure. The results show that the ability of the board of directors sometimes refuses to disclose greenhouse gases due to litigation pressure and cost more than its benefits.

c. The results of the gender diversity research do not affect greenhouse gas disclosure. The results show that gender diversity in companies has not been able to control the differences in roles between women and men in employment and has not been able to make decisions to risk aversion.

d. The results of the environmental committee’s research have a negative effect on greenhouse gas disclosure. The results show that the small environmental committees in the company have not been able to contribute to the disclosure of greenhouse gases so the need for the formation of environmental committees.

References


The Role of Technology Innovation in Food Systems Transformation

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Abstract

Development of new technologies in foodservice is considered a luxury as the sector is comprised predominantly by small and medium size businesses that may not be able to afford the heavy costs involved. However rapid advancements in information technology have allowed dedicated suppliers to foodservice businesses to develop such innovative products or services. Such hardware or software developments enable food and beverage outlets to increase quality of product, productivity and profitability. This review attempts to provide in-depth discussion and enhance understanding on technology transfer in foodservice enterprises. To research general macro-categories of linkages that exist between city and country areas where food is influencing the overall branding and positioning. To underline the role that food can play in influencing the overall branding and positioning of a destination. An article was conducted of a detailed analysis for EU countries food service industry. Analysis shows that international chains have a very strong position in the quick service segment. Technology is developing at an ever increasing pace and dramatically changes business models in the hospitality industry. The paper main purpose to study the role of the technology transfer in foodservice industry and what will be contributing to the economic development of the food systems transformation using a number of functions to help both restaurants and their customers.

Keywords: technology transfer; innovation; foodservice industry; branding and positioning; investment.

1. Introduction

The differences in political and economic scenario over the centuries have given rise to vast differences in technological capabilities among nations. These technological differences constitute a serious hurdle in the pursuit of globalization. The global production process is fast changing and is now being increasingly dispersed to make use of the efficient global resources.

As a part of globalization process, the world community has attempted in many ways to transfer better technologies and build the technological capabilities in resource poor nations. The decades of experience in providing for technology transfers has revealed many difficult situations. In response, many national, regional and international measures have been initiated.

In terms of food service technology, that it has come a long way since its beginnings. The dynamic nature of technology has contributed to the existence of various definitions and concepts of technology that are related to technology transfer. The discussion of the concept of technology transfer is crucial in getting a clear understanding of the nature of technology and examining what the technology consists of. The introduction of new packaging, sous-vide vacuum cooking and high tech or convenience food has allowed for the development of new highly effective business models in foodservice enterprises. This in turn created an increase in demand for better and more efficient technologies to cope with rising customer expectations and increasing competition. The need to constantly improve margins, and quality brought forth the need of advanced technologies.

Argue [Slack et al, 2007] that in operations management firms compete against five key areas namely quality, cost, speed, dependability and flexibility. They also do mention training but they do not expand on it as it only contributes to the five areas and cannot be measured directly. Researchers in hospitality and foodservice related research, have argued the positive effects of the utilisation of technology in areas such as quality [Lee et al, 2003; Woon & Sunny, 2006], cost control [Riley, 2005], speed [Prasad et al, 2005], dependability [Davis et al, 2008; Radosevic S. and Ciampi Stancova K., 2015], challenging the negative image [Pilato et al, 2017], flexibility and employee training [Alexandros G. Sahinidis and John Bouts, 2008].

Restaurants are possibly the main outlet type used by consumers in the food service industry, from full service “sit down” restaurants, to limited service and casual dining establishments. Restaurants and mobile food services in the European Union generated a total turnover of around 237 billion euros in 2015, with France and the UK leading the market once again. The highest number of restaurant enterprises can be found in France, although restaurant numbers in the UK have been steadily rising, reaching 72,794 enterprises in 2015 [Statista, 2017].

Quick service and fast food restaurants are a key segment of the restaurant industry. Fast food brands including Subway, McDonalds, Burger King and KFC dominate the landscape for restaurant franchises in Europe. The U.S. fast food giant McDonalds is present in most European countries. Also often incorporated into the quick service restaurant market are coffee shops and cafés, in which Costa, Starbucks and McCafé are the
leading players in Europe that used new technology and innovation.

The diffusion of technology to the process that involves does not only concern the transmission of knowledge but it is also related to a learning process where technological knowledge is continually accumulated into human resources that are engaged in production activities. A successful technology transfer will eventually lead to a deeper and wider accumulation of knowledge. The technology transfer concept is not only concerned about the transfer of technological knowledge or information but also the technology recipient’s capability to learn and absorb technology into the production function [Maskus, 2003].

Since technology transfer provides many dimensions, it has often been used to describe the process by which ideas and concepts are moved from the laboratory to marketplace [Phillips, 2002], the transfer and knowledge and concept from developed to less technologically developed countries [Putranto et al., 2003] and the transfer of inventive activities to secondary users. From this flows our main purpose to study the role of the technology transfer in foodservice enterprises and what will be contributing to the economic development of the food sector using a number of functions to help both restaurants and their customers.

2. Literature review

2.1. New technologies and innovation

A review of literature on technology transfer reveals that technology transfer is a complex, difficult process even when it occurs across different functions within a single product division of a single company [Tidd, J. et al., 2009; Kidder, 2000; Smith and Alexander, 1999]. Technology transfer is commonly acknowledged to be a complex process that needs time to evolve [Agmon and von Glinow, 1991]. Past literatures have referred technology transfer as the transmission of know-how to suit local conditions, with effective absorption and diffusion both within and across countries [Chung, 2001; Kanyak, 1999]. Other early researchers for example [Craft, 2015] defines technology transfer as transmission of know-how (knowledge) which enable the recipient enterprise to manufacture a particular product or provide a specific service.

In the context of developing countries, [Hofer, 2007] argue that technology transfer needs to be perceived in terms of achieving three core objectives: 1) the introduction of new techniques by means of investment of new plants; 2) the improvement of existing techniques; 3) the generation of new knowledge. A successful technology transfer will eventually lead to a deeper and wider accumulation of knowledge [Sazali Abdul Wahab, Raduan Che Rose, Suzana Idayu Wati Osman, 2011].

A conceptual model developed [Tanut Waroonkun, 2007] for technology transfer wherein he identifies four main categories of enablers that can affect the technology transfer process. These enabler factors are:

- Transfer environment: concerned with the impact of country and project related factors on technology transfer process. This factor includes four observed variables namely: Complexity; Mode of Transfer; Government policy; and Government enforcement.
- Learning environment: concerned with relationship and communication between the transferee and the transferee in the technology transfer process in terms of: Relationship; Mutual trust; Understanding; Communication; Management; Team working; Training; Transfer technology to local subcontractors; and Supervision.
- Transfer characteristics: concerned with origin/supplier characteristics in terms of: Willing to cooperate with local workers; Transferer’s degree of experience; Transferee’s Management; and Extensive knowledge base.

- Transfer characteristics: concerned with host characteristics in terms of: Willing to learn; Experience working with foreigners; Transferee’s Management; and Adequate knowledge base.

If talking about foodservice sector represents a breeding ground for stakeholders, business investments [Freeman, 2010] and technology transfer from country to country. It attracts large international investments from private financial actors, commercial banks, and private foundations that search continuously for new investment opportunities. Additionally, new actors are increasingly involved in emerging foodservice industry value chains: new farmers’ organizations, new co-operatives, start-up companies as well as multinational enterprises and state-owned companies [Caviechi, and Ciampi Stancova, 2018]. New business activities stimulate collaboration between foodservice industry and other sectors including tourism, hospitality, education, etc. In 2012, the European Economic and Social Committee of European Union contemplated that food value chains and cross-sectoral fertilization of productive processes have a strong impact on local development [EUR-Lex: EU law, 2017]. In 2014, the Committee on Culture and Education of the European Parliament approved a motion for European Parliament Resolution on the “European gastronomic heritage: cultural and educational aspects” [European Parliament, 2017]. It recognizes the importance of food and foodservice as artistic and cultural expression and fundamental pillars of family and social relationships [European Parliament, 2017].

In a recent report written by [Jennings et al., 2015] for Food and Agriculture Organisation of the United Nations (FAO) “Food in an Urbanised World”, the authors argue that while food system challenges have many global dimensions, a “city region food system” approach is reasonable to address challenges that are bound to specific places, in terms of causes, impacts, and governance. In fact, according to [Jennings et al., 2015], at least three macro-categories of linkages exist between regions and cities areas (fig. 1):

- ECOLOGICAL: connecting ecosystem, services and appropriate eco-foods planning
- SOCI-ECONOMIC: bringing together regions and cities governance structures in a democratic and participatory way
- GOVERNANCE: including shorter, more direct supply chain

Figure 1.
Macro-categories of linkages between regions and cities

Source:
Jennings S., Cottee J., Curtis T. and Miller S. [2015, p. 27-30]

2.2. Value the foodservice in influencing the overall branding and positioning

Foodservice consumption is integral to tourism and its economic impact can be important not only for immediate businesses that directly provide food for tourists (such as hotels, restaurants and attractions), it can also have significant economic impact throughout the food supply chain, especially if the food provided is supplied locally [Hall, 2012, p. 50]. The Organization for Economic Co-operation and Development [OECD, 2012] revealed that food plays an important role in the development of tourism services, since it often comprises 30%
or more of tourist expenditure and this money is regularly spent directly with local business. Food is a central element of the travel experience. A large part of the travel budget is spent on the day’s three meals (breakfast, lunch and dinner) and eating in general. People need to eat while travelling and this alone creates a close relationship between the tourism and gastronomy sector [Gheribi, 2017, p. 58].

Because food tells the narrative (social and economic) of a country and its people [Privitera & Nesci, 2015]; because food as a fashion aspect [Henderson, 2000]; because authenticity is considered as the most important criterion for the development of heritage tourism [Park, 2014]; and finally because events have the potential to develop social capital, that is to say the inclusion of an individual in a range of networks, structures or groups that allow them to develop and gain this capital [Miller, McTavish, 2013; Bladen, Kennel, Emma & Wide, 2012; Foley, McGillivray, McPherson, 2012], we are claiming that food and food events can contribute to improve the image of destination with a negative image. [Meier et al., 2015] affirm that consumer interest in organic products and healthier items is one of the major trends in the restaurant industry.

Underlines the role that food can play in influencing the overall branding and positioning of a destination [Richards, 2015] (fig. 2):

- **Food is a part of the destination marketing mix, because it helps to give a sense of place and allows tourists to literally taste the destination, coming directly into contact with local culture.**
- **Since we eat two or three times a day, foodservice is the aspect of culture that tourists most frequently come into contact. They literally ingest local culture.**
- **Eating habits are differences that immediately become obvious: the time people eat, the way they eat and what they eat all become immediate points of difference upon entering a new culture.**
- **Food provides a direct connection with landscape because tourists can recognise origins of food.**

![Figure 2](image.png)

**Figure 2. The role that food in influencing the overall branding and positioning**  
*Source: Richards G. [2015]*

Considering the new technologies and innovation that are used for ordering food and beverage from a supplier, restaurateurs can order when they need the products and as much as they need, eliminating the need for big storage areas. Became it is increasingly feasible to order new items and change menus to meet consumer needs, much faster than ever before. Cost comparison has been facilitated as prices are readily available on the internet and a manager can cut back on costs by choosing the most cost effective supplier. POS systems can be directly interfaced with the system of suppliers and pre-programmed to order directly once stock is depleted to certain levels [Richards, 2012]. Some operators and suppliers use the Electronic Data Interchange (EDI) where by restaurant computers or points of sale (POS) are directly networked with the supplier’s main computer. It provides better security than the Internet and is used in the industry to help distributors, buying groups and manufacturers reconcile the various streams of data. It also allows more accurate tracking of marketing allowance and promotional programs.

### 2.3. National and transnational consortia to enhance branding efforts and attract international visitors

The proliferation of city networks around the theme of food and gastronomy is an important. For this, national and transnational consortia have been created to enhance branding efforts and attract international visitors [Cavicchi, A. and K., Ciampi Stancova, 2016]. Many of them consider food as a vehicle not only to promote their towns but also to follow sustainable development paths in a holistic way, proposing new and innovative governance models and supporting healthy and active lifestyles. For foodservice, in long term, it is a cost-efficient opportunity to get the newest knowledge and the best solutions for their technological problems [Voytovich, 2017, p. 34].

The European Commission, Directorate General Joint Research Centre (DG JRC), Institute for Prospective Technological Studies (IPTS) and its Smart Specialization Platform (S3 Platform) specifically contributed to the discussions on food and smart growth in EU regions and on the role of public institutions in supporting research and innovation in the food sector [Smart Specialization Platform – Europa EU, 2017]. It aims specifically at discussing recent food innovation paths, EU policies and instruments in support of R&I activities in food-related areas as well as foodservice as a smart specialization domain.

Within this context, the Smart Specialization Platform (S3 Platform) organized a thematic workshop entitled “Smart specialization and food: food, gastronomy and bio-economy as elements of regional innovation strategies” at 2015 EXPO Milan in September 2015. The workshop focused on food, foodservice and bio-economy as domains of smart specialization in EU countries and regions. International experts discussed food as an element of smart specialization in EU countries and regions. Workshop participants reflected upon the issues of food innovation as a driver of smart growth, the role of public and private institutions in supporting foodservice priorities as well as differences in foodservice culture and approaches.

We should emphasise the fact that important for enhance branding efforts and attract international visitors is indicators which related with technology transfer:

- Technology transfer directly influences available resources;
- Additionally, it can also influence competitive instruments that can be used by a company while creating an offer. It also has an impact on company performance;
- Knowledge protection conditions can influence resources available to a company, competitive instruments that can be used by a company and, finally, its costs and financial results;
- Coordination and control responsibilities can influence activities that are conducted by a company. They also have their impact on financial results of a company.

### 3. Development of the concept

#### 3.1. Concept framework

The first Part of the paper attempts to trace the basis understanding on technology transfer in foodservice enterprises. To research general macro-categories of linkages that exist between city and country areas where food is influencing the overall branding and positioning.

The second part deals with technology transfers and the prevailing market environment in developed nations with the view of assessing the challenges faced and the costs added to the technology transfers. Single out main of functions, which using to help both restaurants and their customers:

1. **Improved customer experience**

Seamless mobile ordering transforms an “okay customer experience” into a great one. Customers are empowered to place orders remotely from the convenience of their mobile devices, which can bring about this exceptional experience.

2. **Increased operational efficiency**

Especially when it’s busy in a restaurant, it can be tricky for staff to take down orders correctly and make sure they all get through to the kitchen. Allowing this automation grounded in a mobile app can help a restaurant create that seamless experience, with efficient order taking and handling from start to finish.
3. Semi-automated customer engagement

Food service marketing used to rely heavily on physical media. With push notifications and mobile messages, the business can stay top of mind. This provides a direct (and open) line of communication between the restaurant and its patrons.

And, lastly some generalized conclusions are derived highlighting with an emphasis on the crucial factor helping the technology transfers to foodservice enterprises.

4. Methodology

4.1. Introduction to the research method

Reviewing of current new technology and innovation in food service industry. Research materials in this article comprise secondary sources of information such as data of Eurostat, Statist, EUR-Lex – Europa EU, Smart Specialization Platform, European Parliament business reports and industry newsletters and publications. The research period was in the years 2011-2015. The work used a qualitative method – observation in the field of new technologies and innovations in the food industry.

5. Analyses and results

Technology transfer is a complex type of communication. It requires skilled personnel, appropriate resources, organization structures and formal recognition (or even an incentivized reward system). For foodservice companies, the technology transfer process can provide a solution to a problem, exploit an opportunity, diffuse new knowledge and skills within the company, establish the feasibility of a technology and create the market for a new product or process. Understanding the needs of companies is vital to the technology transfer process [Food Technology & Knowledge, Transfer Strategy, 2012]. The most effective way to assess needs is through carefully planned direct contact with the companies at the appropriate level. It is important that the company is highly-motivated and ambitious. Trust and previous experience with the company is important in eliciting their needs. Other facets of information such as market knowledge, consumer trends and empathy for the challenges faced by the company are important to maintain credibility and respect.

Technology transfer tools are important in order to create awareness of The Food Technology. These include personal visits, presentations, newsletters, trade press articles, web-based material and brokerage events. Then delivering training courses, practical workshops, demonstration events, and transfer of personnel and by producing best practice guides. Networking is one of the most successful and cost-effective activities in facilitating technology transfer especially for SMEs and allows for increase to annual turnover foodservice enterprises.

To explore the restaurants and mobile food service activities industry we were selected data the past five years from 2011, considered on the fig. 3.

Annual turnover of the restaurants and mobile food service activities industry in 2011 – 216641,7, 2015 – 251438,9, it is 34797,2 million euros more compared to 2011 or 86%.

Next on fig. 4 presented, turnover of the restaurants and mobile food service activities industry in the European Union by country.

![Figure 3. Annual turnover of the restaurants and mobile food service activities industry in the European Union (EU-28) from 2011 to 2015 (in million euros)](Source: Author’s own research on based: [www 4])

![Figure 4. Turnover of the restaurants and mobile food service activities industry in the European Union (EU-28) in 2015, by country (in million euros)](Source: Author’s own research on based: [www 4])
Turnover of the restaurants and mobile food service activities industry is 248 298.50 million euros. Highlighted most 5 countries (EU-28) which turnover of the restaurants and mobile food service activities industry in 2015 made up:

- 47793.8 million euros – France (19.2%),
- 46163.5 million euros – United Kingdom (18.6%),
- 37452.1 million euros – Germany (15%),
- 29785.3 million euros – Italy (12%),
- 20203.5 million euros – Spain (8%).

They made up 73% market. Romania has a low turnover – 1638.4 million euros (0.65%). The other 10 countries (Croatia, Bulgaria, Slovenia, Slovakia, Luxembourg, Cyprus, Latvia, Estonia, Lithuania, Malta) have the lowest turnover.

Next figure shows number of enterprises in the restaurants and mobile food service activities industry in the European Union (EU-28) from 2011 to 2015.

**Source:** Author’s own research on based: [www4]

Note: excluding Belgium, Ireland, Spain, France, the Netherlands and the United Kingdom. The survey reference period was 2013-2015

**Figure 5.** Number of enterprises in the restaurants and mobile food service activities industry in the European Union (EU-28) from 2011 to 2015

The number of enterprises is increasing due to the growing competition and therefore the enterprises want to meet the requirements of the market, for this purpose it is necessary to use new and diverse technologies and innovations.

For 2013-2015 saw 52.7 % innovative enterprises that introduced innovations with environmental benefits within enterprises, for end-users – 30.3%. Reduced energy use or CO₂ footprint by innovating: within enterprises – 32.3%, for end-users – 24.5%. Reduced air, water, noise or soil pollution by innovating, within enterprises – 24.7%, for end-users – 17.6%.

The careful attention that our contemporary society pays to the process of technology transfer is caused by the fact that technologies are a deciding factor of economic, social and innovative development at both regional and global levels [Shugurov, 2015].

**Figure 6.** Share of innovative enterprises that introduced innovations with environmental benefits within enterprises, 2013-2015

**Source:** Author’s own research on based: [www5]
an idea, practice, process or product which puts into practice ideas that solve problems and are perceived as new by the consumers [Ottenbacher, Gnoth, 2005, p. 205; Gheribi, 2017, p. 155]. In the modern world beginning of implementation innovative technologies at the foodservice enterprises restaurants used mobile devices allowing staff to send orders straight through to the kitchen as soon as they were taken. If that wasn’t efficient enough some locations have further reduced the role of waiting staff, building ordering systems directly into tablet. These locations effectively operate in part on a self-service basis, with customers seating themselves, placing their own orders via a tablet or kiosk, connecting directly through to the kitchen with very little involvement from waiting staff. This is something that older diners seem to agree with, with figures from the US showing that 65% of those aged over 55 prefer a service with traditional waiting staff. However, a significant 71% of 18-34 year olds actually prefer to order from a table-side tablet, citing reasons like ease of ordering, knowing exactly which menu items are in stock, and convenience of splitting the bill as key advantages of self-service [New Technology in the Foodservice Industry, 2017].

Next is a Food Delivery Platforms. Driven by apps like Deliveroo, UberEATS and Amazon Restaurants, the out of home sector is now one of the fastest growing areas of the foodservice industry. The rise of food delivery platforms is a case of a simple idea taking the world by storm. By connecting customers to restaurants and restaurants to partner drivers via a simple to use app, these platforms allow traditionally brick and mortar locations to operate a takeaway service with relative ease. However, operators looking to branch into food delivery platforms do need to consider the impact that doing so may have on business. The process isn’t just as simple as uploading a menu and expecting profits to roll in, and to make the most out of delivery platforms most operators will need to make some adjustments to the way they work, and the menus they work. For example, a delivery menu needs to take into consideration the fact that items will need to be kept hot and retain texture whilst in transit.

Some companies are now creating fully integrated management systems, where data on everything from profits, stock levels, and even refrigerator temperature is available through the same piece of software. This removes the need to spend time monitoring numerous systems, and in theory gives operators the ability to better compare the data each device collects.

The end point of system is the “smart kitchen”; a kitchen that to a degree, runs itself. Although it’s perhaps a little further in the future at this point, one already visible aspect of the “smart kitchen” is automated stock taking systems, where data on everything from profits, stock levels and automatically order more items when levels are running low, relieving staff members of another time consuming job.

6. Conclusions

This review could shed some dynamic ideas for future researchers to further identify, conceptualize and understand the perspectives which strongly influence the previous, current, and future technology transfer in foodservice enterprises. Such understanding is necessary to enable the interested parties (such as private sectors, government enterprises, academics, researchers and students) to relate with the practical and empirical aspects of various relevant theories which explain technology transfer concept.

Here in this paper attempt was to consider both ecological and market aspects to trace the technology transfer EU countries food service industry.

In the process of globalization, developed markets are required to compete equally at global levels hence, there seems to be no option but to import technologies to meet the global standards. The claims for relaxation from the required competitive levels or global standards are seen as threat to the dominant position of market leaders. But international chains have a very strong position in the quick service segment.

Impediments to transfer of technologies are many. In this paper we have attempted to highlight better factors to transfer of technologies. This is restaurant technology that allows businesses to expedite the curb-side pickup process that can help to ensure that they’re prepared to handle the demand. For example, a new POS system may be able to give an edge with features that allow keeping track of inventory and updating menu on the fly to save time and prevent gaps in service.

More companies that offering delivery of customized meals to patrons at home and work can advantage of new online ordering platforms. It’s world helps enterprises to manage your restaurant patrons’ requests of delivering hot, fresh meals. With an online ordering solution, customers can specify exactly what they want in their meals. The information is then transferred to the team, and the ordering process is streamlined for efficiency and accuracy. In the end, this saves time, which can translate into faster deliveries and better customer service.

New technology trends in a restaurant have to do with new gadgets or cooking devices. However, could not be avoid frustations, such as unexpected breaks in internet connectivity, which can result in profit loss. By investing in a better network, a business-quality network can ensure that everything from your reservation platform to your POS system is always up and running.

Used to marketing of capabilities, expertise and technologies increases the possibility of formal company engagement. Systematic and regular forms of communication were recommend in many technology transfer strategies. These range from direct contact with CEOs and technical managers, industry workshops, newsletters, best practice guides and technology updates. Making companies aware of available technologies and knowledge as contained in the Food Technology Portfolio must be an interactive and frequent process. Need will implement a number of methodologies that will allow the organization to manage its relationships with clients, with respect to the technology and knowledge transfer process, in a systematic way. Customer relationship management will allow identifying and targeting food companies in order to form a more individualized relationship between the companies. Equally needed implement tools such as web-based applications that will organize and align information between research programs and specific food company requirements [Cavicchi and Ciampi Stancova, 2016].

In future studies could further investigate the effects of few of established moderating variables such as organizational culture, collaborative know-how, prior experience, and learning capacity on the above relationships to provide new technology transfer in foodservice industry.

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Model of Herbal Functional Food Adoption

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Abstract

This research aims to test the relationship between variables in a model that explains factors influencing functional food adoption. Factors influencing functional food adoption are explained by food label, knowledge, experience, trust, reference group, and persuasion. This research uses quantitative design in the form of survey. The population of this research is all consumers who adopt drinks that have a function of curing and preventing diseases originating from herbal. The sampling technique is using non-probability sampling approach with purposive sampling technique. The criteria set for the sample of this study are as follows: (1) consumers who have purchased drinks that have the function of curing and preventing disease originating from herbal with the frequency of 2-5, (2) consumers are the decision makers in purchasing family food or for themselves and their family. Based on the established criteria, it is obtained a sample of 200 respondents. In order to test the model and relationship that is developed in this study, Structural Equation Modeling (SEM) that is operated through AMOS program is used. This research result shows that the model has a good value of goodness of fit. This theory explains that individual will be easier to adopt innovation if he already has a prior experience with the product that is going to be adopted. Product knowledge and trust can also influence the innovation adoption. This research result also shows that food label has a positive influence toward knowledge.

Keywords: food adoption; label; knowledge; experience; trust; reference group; persuasion.

1. Introduction

The phenomenon that underlying this research is the increase of consumer’s quality needs in the field of healthy drink because of the change of food nutrition concept from satisfying thirst to achieving a healthy life. This increase in needs is formed because of the belief that dietary modification can reduce the risk of prevalence of various diseases. Demand and consumption of product related to maintaining body health are also increasing (Moorman and Matulich, 1993). Functional food has a market segment growth of 10% per year and this growth is higher than the growth of the global market segment of conventional food which is 2-3% per year. Some factors that have a role in the adoption of functional food are nutritional knowledge level, culture, technological acceptance of food development, expectation, sensory characteristic, and price (Frewer et al., 2003). This research explores some factors related to the adoption of herbal functional product. The factors proposed in this study are related to the information on the food label, knowledge, experience, trust, reference group, and persuasion.

The first factor in this research is related to the information on the food label. Over the past two decades, information on the food label is the communication tool that is used to provide information and health needs (Kim et al., 2001). Information on the food label becomes more useful especially in the condition where consumers do not have any access in evaluating the nutritional value of food product. The second factor is related to consumer knowledge of functional food product. Knowledge is a factor that is considered by consumers in evaluating a purchase. Knowledge becomes a rational indicator of purchase. Knowledge is an important preparation stage in understanding consumers’ behavior because of its role in determining information seeking behavior including studying new products (Wood and Lynch, 2002; Sugandini et al., 2018a).

The third factor is related to consumer experience of functional food product. Sugandini et al. (2018b) put experience as moderating variables, which will strengthen or weaken the influence of attitude toward intention. In this research, the influence of consumer experience of product performance will be tested directly toward consumer persuasion of functional food product. The fourth factor that is explored in this research is related to consumer trust of functional food product. The important reason why trust in the adoption of new product needs to be examined extensively is because trust arises as a key element in the success of receiving new products (Kracher et al., 2005). Zeithaml, Parasuraman, and Malhotra (2002), Chen and Dhillon (2003) stated that trust is an important dimension in the adoption of new product. Trust also can influence the intention and adoption of a new product.

The sixth factor is related to reference group (Merton, 1968). The reference group that is proposed in this research is related to the advice based on customs that have been passed down for generations. The results of preliminary studies shows that in some villages in Indonesia, elders who have strong influence on the group will provide herbs as an encouragement and health for the mother and baby when a woman gives birth. The suggestion to consume herbal medicine will continue when the mother has stopped giving milk to the baby by consuming herbs. This behavior is even sustainable and will be passed down from generation to generation. The advices that require someone to consume herbs are not written. This research is different from
the research that conducted by Lascu and Zinkhan (1999), which stated that the influence of reference group is only limited as informant, but does not have a primary position. The seventh factor is related to persuasion. Persuasion is an important aspect that influences the purchase behavior (Ajzen, 2015). Persuasion places consumers’ frame of mind to like or dislike the product (Sugandini et al., 2018b). This research was carried out comprehensively to analyze functional food adoption so that it became a more comprehensive study. The model test that is developed is based on the role-independent variables of information on the food labels, consumer knowledge of functional food, consumer experience, consumers’ trust in functional food, reference group, and persuasion.

2. Literature Review

2.1. Information on the Food Label and Knowledge

Information on the food label is a communication tool that is used to provide information need and increase consumer knowledge about functional food product (Kim et al., 2001). Information on the food product becomes more useful especially in the condition where consumers do not have any access in evaluating the nutritional value of food product. In general, the information provided includes brands, contents, ingredients, logos to indicate certain claims, health claims, recommended usage, and educative information about healthy eating patterns (Higginson et al., 2002). Information on the food label can reduce the uncertainty faced by consumers (Zarkin and Anderson, 1992); influence perception, preference, expectation before purchase, and evaluation after purchase (Ford et al., 1990) change the attributes that are believed to have vitamin content and benefit in the product to be a search attribute; ensure that consumers get enough information and education about the quality and benefits of a product so that the direction selection of food product can be done appropriately direct consumers to the right choice, and encourage healthy consumption and food production (Chen and Zang, 2016). The propositions proposed in this research are:

Hypothesis 1: Information on the food label has a positive influence toward persuasion.

2.2. Knowledge and Persuasion

Knowledge is an important construct for consumer behavior because it plays a role in information seeking including in learning new products (Wood and Lynch, 2002), and the process of innovation adoption (Moreau et al., 2001). Knowledge or cognitive is a very important field to persuade someone. Knowledge is an understanding accepted by someone of a product, so that product knowledge is believed to be an important factor that determines consumer attitude and decision (Raju, Lonialand Mangold, 1995). Chen and Zang (2016) showed that there is a positive influence of knowledge toward behavior. The study conducted by Alba and Hutchinson (1987) on electronic product also concluded that there is a positive relationship of knowledge toward persuasion and consumer decision.

Hypothesis 2: Knowledge has a positive relationship toward functional food adoption

2.3. Trust and Persuasion

Trust toward functional food product becomes a factor that can influence the formation of attitude on innovative product Zhao et al., (2010). Chen and Zang (2016) stated that trust caused risk reduction from the uncertainty of a behavior. Thatcher et al., (2007) and Alalwan et al., (2015) stated that trust is at risk and uncertainty of a transaction. The important reason why trust in technology is not widely examined is because many researchers assumed that trusted parties have a willingness to control their behavior. Another important reason why trust is considered important in product adoption is because according to Kracher et al., (2005); Alalwan et al., (2015), trust arises as the key element in the successful use of new product. Zeithaml, Parasuraman, and Malhotra (2002) Chen and Dhillon (2003) stated that trust is an important dimension in the use of new products.

Hypothesis 3: Trust has a positive influence toward functional food adoption

2.4. Experience and Persuasion

This concept of experience shows that the level of product usage will be high if consumers have experience and trust in the product (Gahtani, 2003). If consumers feel a product does not create confidence in consumer memory, then consumers will not like the new product (Sugandini et al., 2018b). The research conducted by Gahtani (2003), shows that the experience of the use of product has a stronger influence on knowledge, and through consumption experience, consumers build cognitive structures, therefore consumer confidence will increase and the attitude in product acceptance will also increase. Directly, experience influences intention through the desire for consistency and self-perception. Indirectly, experience influences intention through its influence on attitude. Experience can be an input for someone to behave (Bagoszzi et al., 1992; Alalwan et al., 2015).

Hypothesis 4: Experience has a positive influence toward persuasion.

2.5. Persuasion and Functional Food Adoption

Persuasion is one of the internal factors that have a strong enough influence on behavior. In general, persuasion and behavior will be aligned, although other psychological factors that bridge are needed (Fishbein and Ajzen, 1975). Ajzen (1991) argued that persuasion is one of the internal factor that is quite strong in its influence on behavior. It also stated that attitude is a tendency to accept or reject something based on the experience and norms it has (evaluative predisposition). Sugandini et al., (2018a) in his study of innovative product placed persuasion as individual variable that is related to intention to behave. Perceptual persuasion for functional food product has an influence toward the innovation adoption of functional food.

Hypothesis 5: Persuasion has a positive influence toward functional food adoption

2.6 Reference Group and Innovation Adoption of Functional Food

Assael (1998) argued that reference group is a strong reason for reference for individuals and it has a high level of interaction. The function of value depicture is rooted in psychoanalytical thinking. According to Greenleaf and Lehmann, (1995), decision making of someone requires advice and input from others (Ajzen, 2015). Consumers rely on input from family members, friends who have bought the product, and salesperson (Sugandini et al., 2018a). The proposition that is proposed in this study is:

Hypothesis 6: Reference group has a positive influence toward the innovation adoption of functional food.

3. Research Method

This research uses quantitative design in the form of survey. The population of this research is all consumers who adopt drinks that have a function of curing and preventing diseases originating from herbas. The sampling technique is using non-probability sampling approach with purposive sampling technique. The criteria set for the sample of this study are as follows: (1) consumers who have purchased drinks that have the function of curing and preventing disease originating from
herbals with the frequency of 2-5; (2) consumers are the decision makers in purchasing family food or for themselves and their family. Based on the established criteria, it is obtained a sample of 200 respondents. In order to test the model and relationship that is developed in this study, Structural Equation Modeling (SEM) that is operated through AMOS program is used (Hair et al., 1998).

4. Research Result
4.1. Test Result of Model using SEM

This research uses two step approaches to SEM. The SEM analysis in this research uses Amos Basic. A low chi-square value with the significance level that is less than 0.05 or 0.01 shows the actual input matrix is different with the predicted input matrix. The chi-square value in this research is 21.559 and the significance level is 0.01. The high value of goodness of fit shows that the ability of model to extract empirical data variance is high. The value of GFI = 0.969; CFI = 0.963; RMSEA = 0.084; CMIN/DF = 3.593. This research result shows that functional food adoption model that is developed to explain functional food adoption behavior is already as expected. functional food adoption is significantly influenced by persuasion and reference group. Persuasion influence functional food adoption for 34 percent. It shows that the innovation adoption theory (Rogers, 1995) and Theory of Planned Behavior that become the basis of this study can be supported. According to the innovation adoption theory, innovation adoption is influenced by persuasion. Figure 1 shows the research model after the measurement model analysis that includes validity and reliability for each research variable.

![Figure 1. Functional Food Adoption Model (*significance level at (α) is 10%)](image)

5. Discussion

Hypothesis 1 that stated that there is an influence of information on the food label toward persuasion is accepted. It shows that if the information on the herbal functional beverage label is accurate, and the contents of the message in the food label and the recommendations for the use of products that are on the label of herbal functional beverage products are getting better, the consumer knowledge of herbal drinks as functional foods will also be better (Kim et al., 2001). Information on the food label is the communication tool to provide information needs and increase consumer knowledge of functional food product. Information on the food label is a useful way to help consumer to decide product choice that align with health purpose. Zarkin and Anderson (1992) showed that food label can reduce the uncertainty faced by consumer, while Ford et al. (1990) also argued that information on the food label can influence perception, preference, and expectation before purchase and evaluation after purchase.

Hypothesis 2 which stated that there is an influence of knowledge about functional food toward consumer persuasion is accepted. This research also support the research from Fiske and Jennifer (1994), which stated that knowledge about product attribute is related to demotivating effect, for example someone who already know the brand of a product category will reduce his external information search, because he only needs a little additional information for decision making. Wood and Lynch (2002) showed that knowledge is the most important construct for consumer behavior because it has a role in information search including learning about new product. Experience-based knowledge refers to the awareness of how the product can be used, and how someone introduces it to consumers (Moreau et al., 2001). Hypothesis 3 which stated that there is an influence of trust of functional food product toward consumer persuasion is accepted. This research finding aligns with the research conducted by Zhao et al., (2010) who stated that trust cause risk reduction and uncertainty of a behavior. Thatcher et al., (2007) also showed that trust is at risk and uncertainty of a transaction. Trust is considered important in the product adoption because according to Kracher et al., (2005), trust arises as the key element of the successful use of new product. Zeithaml et al., (2002); Chen and Dhillon (2003) also stated that trust is an important dimension in the use of new product.

Hypothesis 4 which stated that there is an influence of experience toward consumer persuasion is accepted. This research result support Gahtani, (2003) who stated that the concept of experience shows that a level of product usage will be high if consumer has an experience and trust toward the product. In general, this research result supports the research from Fishbein and Ajzen, (1975) who stated that persuasion is one of the internal factors that have a quite strong influence toward behavior. In general, persuasion and behavior will be aligned, although other psychological factors that bridge are needed which is behavior intention. It shows that when consumer has a positive trust about the consequences of a choice, they will decide to behave according to their belief. Hypothesis 6 which stated that there is an influence of reference group toward functional food adoption is accepted. This research result supports Sugandini et al., (2018b) who stated that consumers seek, express, and confirm themselves through what they have. Here, there is a process of social comparison to understand what is happening in the surrounding environment (Burns and Warren, 1995). This research result also supports the argument from Assael (1998) which stated that reference group is a strong reason for reference for individuals and it has a high level of interaction.

6. Limitation and Future Research Directions

This research only explains the innovation adoption with the setting of herbal drink product. The research result can be generalized in the products that have the same criteria with herbal drink product and the same respondent criteria that become the sample of this research, which is consumers who have purchased drinks that have the function of curing and preventing diseases originating from herbals both for their families or for themselves. For the future research that is related to the herbal drink product can add some variables that have not been analyzed in this research that are considered to be able to strongly explain about this herbal drink adoption model. Another variable that is need to be added in future research is persuasion (Rogers, 1995). An observe about innovation adoption of herbal functional food that have been done by researcher which found that reference or advice can be a variable that has an influence toward the adoption of herbal functional food is need to be followed up. It is because Indonesia with its culture and customs that prioritize the existence of ancestral advice is highly respected by most of its people and it needs to be considered in consuming products. Persuasion is an important aspect that influence purchase behavior. Consumer trust and evaluation is a picture of the thoughts that consumers adhere to about a product.

Future research also needs to adopt Technology Acceptance Model (TAM) in the functional food adoption. TAM, which is firstly introduced by Davis in (1989), is an adaptation of the Theory of Reasoned Action that is specifically made for modeling user acceptance of information system. According to Davis (1989), the main purpose of TAM is to provide a basis for tracing...
the influence of external factors on user beliefs, attitudes, and goals. TAM considers that two individual beliefs, which are perceived usefulness and perceived ease of use, are the main reasons for the adoption behavior of information technology. Thus, it can be understood that the reaction and perception of innovation user will influence their attitude in adoption acceptance. A factor that can influence is user perception of the benefits and ease of use of the innovation as a reasonable action in the context of the use of innovation, so that someone’s reason in seeing the benefit and ease of use of the innovation makes the action of this people to adopt innovation.

References


1. Introduction

Within the ergonomics of thermal working environments, the assessment of metabolic activity is an aspect of increasing interest. This is particularly relevant to agriculture, where workers are exposed to a greater risk of occupational illnesses, by virtue of the heterogeneity, as well as the multiplicity of the tasks to be performed, which are mainly carried out in the open field (Ventura & D’Auria, 2014).

In fact, through the assessment of energy metabolism it is possible to measure the muscle load energy consumption, and thus to determine the effort resulting from exposure to a specific thermal environment during the performance of a specific activity.

For example, with reference to weeding control, workers have to cyclically carry out several repetitive physical activities. Quantifying the risks they are exposed to (Iofrida et al., 2018) such as, among others, vibrations (Bernardi et al., 2018, Aiello et al., 2012) and postural problems (Gómez-Galán et al., 2017; Gómez-Galán et al., 2018) becomes crucial. Furthermore, brush cutters are among the most used devices to perform this operation. If on the one hand they have been widely employed because of their affordable prices and ease of use, on the other hand they are often the cause of both direct and indirect accidents (Okubo et al., 2013), which can generate symptoms appearing even after several years.

The knowledge of these critical issues is therefore essential to intervene, in order to increase and ensure the operators’ wellbeing, and a growing attention must be given to the systems used for their correct assessment.

The UNI EN ISO 8996:2005 standard establishes that total energy consumption while performing an activity, i.e., energy metabolism, is assumed to equal thermal energy production, and provides four different levels for its determination (screening, observation, analysis, expertise), each corresponding to a different degree of accuracy (Del Ferraro & Molinaro, 2010).

In the first and second level, the determination is carried out through a classification by type of occupation or activity, or by including other factors such as duration, climbs exceeded, distances travelled, number of actions performed and weights manipulated during operations. Error probability is high for both levels. The third level is based on heart rate recordings over a representative period and under defined conditions; it allows to obtain an indirect determination of metabolic rate and is more precise than the previous ones. Instead, the fourth level, expertise, consists of three methods: measurement of oxygen consumption, which is still divided into partial method (to be used for light and moderately heavy work) and integral method (for heavy and short-term work), doubly labelled water method and direct calorimetry method.

The following study was carried out with the aim of determining the extent of metabolic consumption, assessing it through the expertise level, based on the oxygen consumption instrumental measurement (partial method) of two operators during ordinary weeding activities in a kiwi plant, performed by using a brush cutter.

2. Materials and Methods

Energy metabolism was calculated by applying the following equations reported in the UNI EN ISO 8996:2005 standard.

Abstract

Green area management, as well as any other agricultural activity in general, is one of the working sectors where professional accident and disease occurrence is considerably high. The existing regulatory obligations take into account the worker’s welfare in a wide sense. However, a new attention is paid towards the ergonomic aspects beside the traditional risk agents. Among the factors affecting the worker’s psychophysical wellbeing, the aerobic metabolism engendered when carrying out specific duties in agriculture and the stress that goes with it constitute an important aspect. Through the evaluation of some functional parameters of the human body and by analysing the breathing values, heart rate and the amount of oxygen consumed during an activity, it is possible to determine the physical stress it is subjected to. Indeed, the present work focuses on this issue, and aims to evaluate the energy consumption of workers during a green area maintenance using a brush cutter, in order to assess whether the work carried out complies with the parameters set according to UNI EN ISO 8996. The experimental trial was made up of two men, whose average age was 30 years, with a body weight of 78 ± 2.00 kg, a height of 1.71 ± 0.15 m. The results of operators’ metabolic parameters recorded by the portable metabolimeter, while performing the green area management using a brush cutter, corresponded to a VO₂ of 48.04 lO₂ h⁻¹, a VCO₂ of 43.32 lCO₂ h⁻¹, and a heart rate of 98 ± 17 beats per minute. The average operators’ metabolic rate (M) corresponding to 143 W m⁻² was in line with the tabulated values of energy metabolism at level 1 ‘screening’.

Keywords: metabolic rate, oxygen consumption, heart rate, occupational illness, agriculture.
OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT

\[ RQ = \frac{VCO_2}{VO_2} \]
\[ EE = (0.23 RQ + 0.77) \times 5.88 \]
\[ M = EE \times VO_2 \times \frac{1}{AD_U} \]

Where: \( RQ \) – respiratory quotient; \( VO_2 \) – hourly oxygen consumption, in litres of oxygen per hour; \( VCO_2 \) – hourly consumption of carbon dioxide, in litres of carbon dioxide per hour; \( EE \) – Energetic Equivalent, in watt-hour per litre of oxygen \( Wh(VO_2)^{-1} \); \( M \) – energy metabolism, in watts per square metre; \( AD_U \) – Area of body surface, in square metres; provided by the DuBois formula:

\[ AD_U = 0.202 \times H_b^{1.425} \times W_b^{0.425} \]

Where: \( W_b \) – body mass, in kilograms; \( H_b \) – body height, in meters.

As explained in the aforementioned standard, both the stationary regime, achieved after a period of 5 minutes (preliminary period), during which the work is carried out at low intensity, and the main period (of full activity) for a period of 10 minutes, were monitored using regular, seamless samples.

The Cosmed K4b² portable metabolimeter was used as shown in Fig. 1. After appropriate calibration (Parr et al., 2001), it was fixed to the operator’s body through a special harness that favours freedom of movement. The portable unit consists of a display allowing a real-time monitoring of the following parameters: ventilation per minute (VE), oxygen intake (VO₂), carbon dioxide production (VCO₂), difference between oxygen and carbon dioxide (RQ), heartbeat (HR), ambient temperature and atmospheric pressure.

The experimental trial, carried out by two men whose average age was 30 years, with a body weight of 78 ± 2.00 kg, a height of 1.71 ± 0.15 m, was carried out during the mowing operations to remove the turf grass of the sub-row in a kiwi plant. Recorded weather conditions showed an average temperature of 30°C, with relative humidity of 60% and barometric pressure of 790 mmHg. During the tests a STIHL brush cutter (model FS87R) was used.

3. Results and Discussion

Data analysis showed that the volume of oxygen consumed (VO₂) during the entire time span of the tests was on average 48.04 lO₂ h⁻¹. Considering separately the planned monitoring phases, this value is on average equal to 43.38 lO₂ h⁻¹ during the stationary phase i.e. that of low initial activity, and reaches the average value of 54.18 lO₂ h⁻¹ during the main period.

With reference to the average volume of carbon dioxide produced (VCO₂), this was equal to 43.32 lCO₂ h⁻¹. During the stationary phase it assumes the value of 39.62 lCO₂ h⁻¹, while during the main period it is 48.36 lCO₂ h⁻¹.

As regards the heart rate, this was on average 98 ± 17 beats per minute (bpm), while the maximum recorded was 150 bpm. Fig. 2 separately shows the values of VO₂ and VCO₂ for the two operators, during the entire sampling period. Different performances have been recorded, since operator A registered the highest values.

Regarding the energy metabolism (M), calculated as shown in equation [3], it is equal to 159 Wm⁻² for operator A and 118 Wm⁻² for operator B, respectively equivalent to 136 and 101 kcal h⁻¹ m⁻².

Considering an average working day of 8 hours, the final energy consumption will therefore be 1088 kcal h⁻¹ m⁻² for operator A and 808 kcal h⁻¹ m⁻² for operator B.

As a comparison, and with reference to agricultural works, Callea et al. (2014) found that the values of energy metabolism were 200–260 Wm⁻² for apple harvesting operations. Yadav et al. (2010) highlighted that the physiological cost for a male engaged in weeding by-sickle operations was an average 15.92 kJ min⁻¹; while it was 14.14 kJ min⁻¹ for a female employed in manual weeder operations. It can be stated that weeding by sickle and weeding by weeder respectively come under moderately light and moderately heavy work.

Comparing the analysed data with the tabular data reported in the UNI EN ISO 8996:2005 standard (Table 1), which at level 1 performs a classification of energy metabolism subdividing it into ‘categories’ (method 1B), energy consumption related to the type of tests carried out fully comes under the ‘moderate’ class.

These values are also confirmed by the further classification ‘by type of occupation’ (method 1A), according to which this comes under the ‘agriculture’ sector and ‘gardener’ field (115 to 190 Wm⁻²).

![Figure 1](image1.png)
Operator equipped with Cosmed K4b² portable metabolimeter

![Figure 2](image2.png)
Figure 2. Average volume of oxygen consumed (VO₂) and carbon dioxide produced (VCO₂). Different letters indicate significant differences at the t-test (P> 0.05).
4. Conclusions

The management of green areas and weeding in particular is today a topic of great interest, and it is often more addressed to assessing the effectiveness of the treatment than to quantifying the risks the operators can incur.

Among these risks, which are rarely adequately evaluated, there are the kinetics of energy consumption, which take particular interest especially during open field work, when operators are subjected to a sometimes excessive energy consumption in relation to the type of performed work.

The agricultural branch in general is in fact one of the working sectors in which the probability of accidents, as well as the onset of occupational diseases, is higher. The current regulatory obligations provide for the protection of worker’s wellbeing in an overall sense: alongside traditional risk agents, a new attention is paid on the so-called ‘ergonomic’ aspects, which affect the worker’s psychophysical wellbeing (Tuure, 1992).

The present study was carried out from this point of view. It assessed a standard working condition (acceptable temperature, flat terrain, etc.), performed by workers in full strength. However, if the tests had been carried out, for example, in severe environmental situations (hot and cold), the climatic conditions could have compromised, even heavily, the operators’ health. In such environments, for instance, the thermoregulation system of human organism is subjected to a heavy effort in order to maintain the necessary thermal equilibrium.

In order to better protect operators in the agricultural sector, by virtue of the several inherent risks, it is essential to increasingly tend towards a multidisciplinary vision, focusing on aspects which are often considered secondary. Nevertheless, in recent years the steps forward made by research in this field are noteworthy; they have had the advantage of encouraging also manufacturers to search for more and more valid and rational solutions, aimed at ensuring greater safety of workers, a goal that must increasingly be a priority for all.

### Table 1. Classification of metabolic rate by category at level 1, screening (method 1B)

<table>
<thead>
<tr>
<th>Class</th>
<th>Average metabolic rate (with range in bracket) Wm⁻²</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Resting</td>
<td>65 (55 to 70)</td>
</tr>
<tr>
<td>1 Low metabolic rate</td>
<td>100 (70 to 130)</td>
</tr>
<tr>
<td>2 Moderate metabolic rate</td>
<td>165 (130 to 200)</td>
</tr>
<tr>
<td>3 High metabolic rate</td>
<td>230 (200 to 260)</td>
</tr>
<tr>
<td>4 Very high metabolic rate</td>
<td>290 (&gt;260)</td>
</tr>
</tbody>
</table>

References


1. Introduction

The current challenges of the world (climate change, economic crisis, migration, deviations from traditional moral values, etc.) create the need to behave socially responsibly.

Although economic theory claims that the goal of companies is not maximizing profit at present but maximizing the market value of a firm while respecting stakeholders' interests and achieving a reasonable profit is just one of the corporate goals, the reality is usually different and maximizing profits is the dominant target of most companies.

It is logical, therefore, that corporate managers, when deciding on socially responsible activities, must assess their economic, non-economic consequences mainly from the point of view of the company itself.

One of the areas outside the economic, environmental and philanthropic areas, including the social area. Social area as a part of corporate social responsibility (CSR) refers to employees. It is related to their care, and also to the working environment and the working conditions they create for them. It is certain that a satisfied and motivated employee in today’s knowledge society is a key factor in the success of each company.

The main aim of the paper is finding inequalities in social responsibility across Europe focused on work-life balance according to selected indicators.

2. Literature review

Bratu and Cioca (2018) came to the conclusion, that social approach to increasing the quality of work and the quality of life of employees lead to the shaping of human behaviour at the workplace. A study by Denisov et al. (2018) investigated the considerable lack of development of social audit as the connecting link between Corporate Social Responsibility management in companies and stakeholders (including the employees) with identification of the key questions. Ethics, in relation to stakeholders, was also involved in paper by Popescu (2017).

Social part of CSR is getting more attention than it has previously has. In this area the company could do these CSR activities (Caroll, 1991; Huda et al., 2018; Albuquerque et al., 2018; Haynes et al., 2012; Kunz, 2012):

- to create the conditions for employees to reconcile their work-life balance (WLB) – to allow for more leisure time or work from home if needed, to keep in touch with people who are on parental leave and share important information, to make it easier for those who return after a longer period of time to make it easier for them to run, to provide advice and legal services in crisis situations, company kindergartens;
- to develop human capital (continuing education, training, courses) – to enable all employees to increase their qualifications and promote permanent education, not only in their field of competence, to allow career advancement;
- to provide employees an adequate wages and social and other employee benefits – to motivate employees properly, to provide benefits such as corporate phone, car, several days off holiday, holiday allowance, boarding, supplementary pension insurance, to provide a so-called cafeteria system where employees can choose from their own benefits;
- to respect equal employment opportunities – the employer treats all employees with the same respect, does not distinguish gender, age, ethnic origin, belief, sexual orientation (so-called diversity management – the effort to promote the diversity of employees in the organization);
to ensure an open and friendly business climate, a healthy corporate culture;

to give to employees the opportunity to express their opinion without any worries – to support team work, to promote the democratic style of managing managers;

to take the responsibility of occupational safety and health (OSH) at work, regular medical check-ups;

to employ minority and vulnerable population groups such as disabled, graduates, mothers with children, elderly people.

We can identify benefits and negatives resulting from the implementing of CSR into an enterprise by individual stakeholder groups. The social pillar focused on employees could be monitored and measured by indicators, for example (Epstein, 2018; Kunz, 2012; Turker, 2009; Rupp et al., 2018; Ong et al., 2018):

- employee structure (gender, age, ethnicity);
- results of employee survey;
- the number of employees’ absences and their fluctuations,
- occupational diseases and injuries (in %);
- the number of trained employees;
- the number of training hours per employee;
- the number of flexible jobs;
- salaries and benefits;
- expenditure on OSH.

3. Research methodology

According to the aim of the paper, identifying the inequalities in social responsibility across Europe focused on work-life balance, the database of Eurostat (Eurostat, 2019) was used. The author chose for the 28 countries’ comparison several indicators. The selection of indicators was held to be not distorted subjective opinion of the author. Indicators were consulted with employees of several companies in various sectors and were inspired by similar studies in different industries. In the end, such indicators were selected for which data were sufficient and could have an impact on work-life balance (see Figure 1 with countries and indicators).

The indicator Working hours is an average number of usual weekly hours of work in main job. Good relationships means a percentage of employed people having a good relationship with their colleagues, Commuting time describes a mean duration of commuting time one-way between work and home, GPG (gender pay gap) is a percentage of differences between earnings of men and women, Training describes a percentage of employed people participating in job-related non-formal education and training in the past 12 months and finally Feedback from supervisor means a percentage of employees receiving regular feedback from their supervisor.

Then the cluster analysis was made. Cluster analysis is a grouping a set of data objects. This means that the objects in the same cluster (group) are more alike to each other than to that in other clusters (groups). Similar countries will be sought from the point of view of the relationship with minorities. According to Pallant (2011), Mareš (2015) and Rezanková (2005) clustering can be done in two ways – hierarchical grouping, or K-means procedure in programme IBM SPSS Statistics. The aim is to aggregate individual cases, respectively, aggregate individual cases (countries) into certain groups that are most similar in terms of measured indicators related to work-life balance. The hierarchical clustering analysis groups the countries into clusters that will be further joined in larger and larger clusters. We want the countries that are most similar to the indicators in the group.

The distance between countries in a multidimensional space must be measured. Cardinal variables can be measured by Euclidean, Hamming or Minkovian methods. The Euclidean distance is the most common, so it was used. At the beginning it was necessary to standardize the data, which was conducted in SPSS by Z-score. It means (Mareš, 2015), that a random variable X is standardized by subtracting its expected value \( E(X) \) and dividing the difference by its standard deviation

\[
\sigma(X) = \sqrt{\text{Var}(X)} \\
Z = \frac{X - E(X)}{\sigma(X)}
\]  

Hierarchical clustering analysis was performed using the method Between groups linkage, because it is one of the most
reliable method (Mareš, 2015).

The second approach to grouping is the K-means method. The disadvantage of this method is that we need to know the number of clusters in advance. Four clusters were established, based on a previous analysis. Cases are randomly divided into groups and then moved to units that are closer to the foreign gravity than to their own (Pallant, 2011).

4. Results and discussion

In icicle graph and dendrogram (Figures 2 and 3) we can see countries Belgium and Luxembourg; Czechia and Slovakia are the most similar. It may be because they are neighbouring states. But also distant states like Latvia and France; Romania and Croatia seem to be very similar in work-life balance. The...
most remote countries, which are connected at the end to the rest of the Europe, are Italy and Poland.

In this case, it is appropriate to divide the countries into 4 clusters. The averages of the individual variables in each of the four groups are calculated (see Figure 4). It is not possible to say in which cluster the conditions for the work-life balance are the worst (where the values are highest), because it is different for different indicators. For example, there are bad relationships in cluster 4 – countries Italy and Poland. But in these countries, there is the smallest gender pay gap. In cluster 3 (southern countries Bulgaria, Cyprus, Greece and Portugal) there is a great feedback form the supervisor, the best relationships between employees, a little commuting time to work, but there are higher working hours.

The second approach to grouping used is the K-means method. In Figure 5 it could be seen the clustering into individual clusters according to the two methods used.

By comparing clusters created by both methods, it is clear that they do not differ significantly in the classification of states. In cluster 1 and cluster 2 there are countries with the similar economic situation, so the similar conditions for employees and their work-life balance. Cluster 3 represents countries lying in southern Europe with higher indicator working hours, but Romania is also included in K-mean clustering. These southern countries are typical by its similar culture life (for example daytime siestas with closed shops but being awake at night with open shops). Not only cultural life connects these countries, but also the economic crisis that has accompanied them in recent years. The finding that conditions for work-life balance are similar in Italy and Poland is very surprising, because these states differ from one another. First and foremost, Poland is significantly different from its neighbouring countries – the Czech Republic and Slovakia, which are in cluster 1. However, Poland entered the European Union in the same year.

The results vary across studies by various authors. Crompton and Lyonette (2006) found that there is a lower level of work-life conflict (not balance) in Norway and Finland. They explained the higher level of work-life conflict in France according to a support for childcare. Abendroth and Den Dulk (2011) mapped available state, workplace and family support through the satisfaction rate of employees and came to conclusion that southern countries like Portugal and Bulgaria seem to have similar results. Then Scandinavian countries report alike outcomes. This paper shows the same results by hierarchical clustering (between groups linkage) – Sweden and Finland are in the cluster 1 and southern countries are in the cluster 3.

5. Conclusions

Organizations that respect the needs of employees and implement WLB policies are perceived very positively by the general public. Such companies are desirable in the labour market, carry the label of a friendly employer and have a good name in the eyes of customers. Thanks to WLB, they are building not only their image, but they are also proud of better work results.

The main aim of the paper was finding inequalities in social responsibility across Europe focused on work-life balance according to selected indicators. It was made by clustering through two methods. The proposed techniques can serve the similar results. Created clusters show compliance based on country’s economic conditions as well as geographic location.

The paper extends and complements findings various studies in this field. This topic deserves a future research and there is a great field for potential researchers. The reason is that the WLB could be measured by different indicators and proceeded by various statistical methods.

References


Safety Behavior of Manufacturing Companies in Indonesia

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Abstract

Employee safety in the workplace should be a priority. This is because work safety is closely related to employee survival. This study aims to analyze the safety behavior of employees in manufacturing companies by looking at the influence of safety climate, job satisfaction, and safety motivation. This study was carried out on the manufacturing companies in Indonesia that produce musical instruments and furniture. There were 300 respondents who participated in this study, but only 190 questionnaires that were feasible to be processed and analyzed. Structural equation modeling (SEM) was employed to analyze the data. The results found that safety climate and job satisfaction have a direct effect on safety motivation, which in turn, improves safety behavior. Based on these findings, the company needs to consider taking a policy in implementing safety climate and increasing employee job satisfaction, in order to improve safety motivation and behavior within the company.

Keywords: safety climate; job satisfaction; safety motivation; safety behavior.

1. Introduction

Accidents that occurred in the industrial companies in Indonesia showed a high rate. Although there has been a decline since 2014, the number of accidents that occur are still quite large at over 100 thousand cases. Based on data from Badan Penyelenggara Jaminan Sosial (BPJS) Ketenagakerjaan, the number of accidents in 2016 still reached 101,367 cases. The high number of accidents that surely must be a concern of all parties to find a solution.

Safety is a very important thing to be a major concern of companies, especially manufacturing companies and high-risk enterprise. This is because safety is directly related to the survival of the worker or employee. Quoted from Prihatining Sih (2010), Labor Law No. 13/2003 article 86 and 87 explain the importance of workplace safety. Generally, work accidents occurred due to a weak system of corporate work (O'Toole, 2002), Various attempts were made to reduce the number of accidents at the company, such as creating technical solutions, human factors, and regulation. However, those solutions will be meaningless if it is not followed by employee feedback. So it becomes important to analyze the behavior of the safety of employees.

To produce employees with good performance, including how to work with a good safety standard would require a stage that is not easy, in addition to motivation, knowledge, competence, organizational culture must be built on safety-oriented behavior in order to avoid safety problems. Employee performance is influenced by two factors, namely factor in job satisfaction and organizational commitment as well as external factors, namely leadership, security, safety, and organizational culture. Safety motivation mediates the relationship between safety climate and safety behavior (Neal & Griffin, 2006), Probst and Brubaker (2001) in Huda, Sukmawati, and Sumertajaya (2016) found that safety motivation has an effect on adherence to safety procedures until 6 months later.

Based on the theory of needs Maslow, people are motivated to meet and satisfy a number of needs that exist in every human being. Employees will feel satisfied if they received feedback and the company in excess of what they expected (Robbins & Judge, 2013), Employees will be motivated to do anything, including in terms of the behavior of the working salvation (Huda et al., 2016).

This research was conducted at a manufacturing company located in the city of Semarang where one company performance target is to make safety a top priority. Management companies should have demonstrated a commitment to fully support all efforts related to anticipation of a safety issue, but even if the company and the management has implemented a safety management system with a good, tight, and disciplines including forming department Health Safety and Environment (HSE), but still only in case of accident work according to the data shown in the figure below:

![Figure 1. Serious Accidents of Manufacturing Company in Semarang](image)

From Figure 1, it can be seen that the target of the first strategy of Indonesian Manufacturing in 2016 is zero occupational accidents with the data safety performance in 2016, that there is a severe increase in cases of work accidents.
2. Theoretical Framework and Hypotheses

2.1. Safety Climate

Schneider (1975) in Seo, Torabi, Blair, and Ellis (2004) mention that the organizational climate is an overall perception that a person has about the settings in their workplace. Climate often referred to as something temporary and subjectively. While the safety climate is a picture of perceptions related to policies, procedures and safety practices (Prihatiningisih, 2010). Meanwhile, according to Quick and Tetrick (2003), safety climate is defined as the perception of the safety of employees who describe their confidence in the safety priorities. That perception reflects the expectation of the results of their work behavior.

Social perceptions of safety will give description against employees how management commitment to the health and safety of their work. Perception of safety appears with a variety of experiences on the extent to which the management employees to invest in protecting them. A positive safety climate can improve the safety behavior of employees working in a hazardous working environment and vice versa.

2.2. Job Satisfaction

Job satisfaction is not a single concept whereby one can be satisfied with some aspects and feel not satisfied with other aspects (Kreitner & Kinicki, 2010). Job satisfaction is an attitude or behavior which is owned by the individual common to the work that he did (Robbins & Judge, 2013). When an individual has a high satisfaction with the job then he is likely to display behaviors or attitudes are positive, and vice versa.

Luthans, Luthans, and Luthans (2015) define job satisfaction as a result of a person’s perception of how good a job they give things a person is considered important. It can be concluded that job satisfaction is a feeling that arises as a result of the perception of their work shown in attitude or behavior towards the work itself.

2.3. Safety Motivation

Safety motivation refers to individual’s willingness to make an effort to enforce safe behavior and valence associated with these behaviors (Neil & Griffin, 2006). Individuals have to be motivated to comply with safe work practices and participate in safety activities if they feel that there is a positive safety climate in the workplace. According to Griffin (2000) in Huda et al. (2016), motivation can be divided into two dimensions, which will boost safety behavior and willingness to conduct workplace safety.

2.4. Safety Behavior

Hsu, Lee, Wu, and Takano (2008) state employee safety is always abode by the rules and safety procedures. Employees can play it safe or unsafe when they do their job. Therefore, the behavior of employees in the workplace is very important to minimize safety concerns. In addition, the safety behavior was found to prevent accidents from happening Martínez-Córcoles, Gracia, Tomás, and Peiró (2011), the results showed that the safety behavior is the right approach in reducing accidents in the workplace. To determine the safety behavior, there are two dimensions of behavior that safety compliance and safety participation.

According IOHS (Institution of Occupational Safety and Health), safe behavior is part of the development of the safety management of the approach is very prescriptive, through systems engineering or procedural mostly at progressive companies that are long established, with a system that recognizes the workers as human beings adult with a genuine interest in their welfare, which contributes the best when they can see that they themselves can have an influence on their own safety. To accomplish this transition is done to change the culture of the working group involved so that this approach does not give instant results.

Human behavior is often categorized as a reflex/automatic, which can be considered as a habit. The behavioral approach focuses on custom category and not for the purposes of blame or punish workers, such action is largely counterproductive in any case, some of the behaviors associated with the incident as allowed by the system management. An effective approach is to identify and measure the behavior of secure and non-secure (risky) that happens in the workplace and manage it. Measuring behavior provides a health and safety system with tools for proactive management. This is for the safety of a stable level.

According to Neil and Griffin (2006), the behavioral safety of employees can be divided into two dimensions, namely safety compliance and safety participation. Safety compliance refers to the core activities of the individual to be done to maintain safety in the workplace. This behavior includes following standard operating procedure and wear personal protective equipment. Safety participation describes the behavior that does not directly contribute to an individual's personal safety but helps develop an environment that supports safety. This behavior includes activities such as participating in a voluntary safety activity, help colleagues with the issues related to safety, and attend safety meetings. Based on the given explanation, the hypotheses proposed:

H1: Safety climate has a positive and significant effect on safety motivation.
H2: Job satisfaction has a positive and significant effect on safety motivation.
H3: Safety climate has a positive and significant effect on safety behavior.
H4: Job satisfaction has a positive and significant effect on safety behavior.
H5: Safety motivation has a positive and significant effect on safety behavior.

Figure 2. Research Framework

3. Research Method

The population is the entire group of people, events, or things to be investigated by researchers (Sekaran, 2006). Population is a generalization region consisting of the objects/subjects that have certain qualities and characteristics defined by the researchers to be learned and conclusions drawn (Sugiyono, 2008). The population used in this study were employees of manufacturing companies in Indonesia.

The sample is a fraction of the number and characteristics of a population (Sugiyono, 2008). Samples are some members of the population. A researcher can analyze samples when the population is too large for the overall study and constrained limitations of time, effort, and funds. The sampling design used in this research is to nonprobability (nonprobability sampling). Nonprobability sampling is a sampling technique that does not give the same opportunity or chance on every member of the population to be used as a sample (Sugiyono, 2008).

Nonprobability sampling is used when the amount of elements in the population is unknown. There are several techniques of sampling by means of nonprobability sampling, but were used in this study is a sampling intended or purposive sampling, where researchers have understood that the required information can be obtained from a particular group that is able.
to provide the desired information and they have fulfilled criteria determined (Ferdinand, 2014). The tools used to process the data in this study is structural equation modeling (SEM) which is supported by AMOS 18.

4. Data Analysis and Discussion

4.1. Overview of Respondents

The number of respondents who filled out questionnaires is 300, yet only 190 eligible questionnaires were analyzed. Of the total number of 190 respondents, 49 percent (n = 93) were women, and the remaining 51 percent (n = 97) were male. In terms of employment, employees with longer than two years to dominate 53 percent, n = 101), followed by employees with a working time of 6 months - 1 year (27 percent, n = 51), employees with long work for more than 6 months (10 percent, n = 19), and employees with long working 1-2 years (10 percent, n = 19).

<table>
<thead>
<tr>
<th>The goodness of fit index</th>
<th>Cut-off value</th>
<th>Results</th>
<th>Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chi-Square</td>
<td>&lt;147.010</td>
<td>df = 98</td>
<td>189.113</td>
</tr>
<tr>
<td>Probability</td>
<td>≥ 0.05</td>
<td>0.087</td>
<td>Good</td>
</tr>
<tr>
<td>GFI</td>
<td>≥ 0.90</td>
<td>0.911</td>
<td>Good</td>
</tr>
<tr>
<td>AGFI</td>
<td>≥ 0.90</td>
<td>0.886</td>
<td>Good</td>
</tr>
<tr>
<td>CFI</td>
<td>≥ 0.95</td>
<td>0.990</td>
<td>Good</td>
</tr>
<tr>
<td>TLI</td>
<td>≥ 0.90</td>
<td>0.989</td>
<td>Good</td>
</tr>
<tr>
<td>RMSEA</td>
<td>≤ 0.08</td>
<td>0.028</td>
<td>Good</td>
</tr>
</tbody>
</table>

Table 1. Results of Structural Equation Modeling

4.2. Measurement Model

Chi-square is the most fundamental measure that indicates the conformity of the overall model. If the value of Chi-Square it will produce a small probability of large, it indicates that the sample covariance matrix of the covariance matrix of the model did not differ significantly (Ghozali, 2016), fit structural equation model Chi-Square if the value is small and the probability of > 0.05. The use of Chi-Square is only suitable for use in the study sample totaled 100-200 and if the sample size is outside the range of the sample size, the significance tests become less reliable (Ferdinand, 2014). In this study, Chi-Square values obtained at 189.113 with a probability of 0.087, so it can be said that the structural equation model developed well.

Level of significance probability is a statistical measure that is fundamental in determining whether H 0 (null hypothesis) can be rejected. In the analysis using structural equation modeling approach (SEM) is expected H 0 is not rejected, it is different with hypothesis testing in general. The good model should not reject H 0. Thus the significance of the expected probability is greater than 0.05 or 0.10 in order not to reject H 0. If the results of this research data generating significance probability of 0.887. While the implied value for the level of significance probability is ≥ 0.05. It can be concluded that there is sufficient evidence to negate H 0, it means that the alternative hypothesis cannot be accepted. So, it can be concluded that there is no difference between the matrix of variance/covariance matrix samples of the population.

The goodness of Fit Index (GFI) is a non-statistical measure which reflects the level of accuracy of the model obtained from the predicted residual quadratic models compared to the actual data, which has a range from 0 to 1 and getting closer to 1 indicates the model is getting better. In this study, the limit values for states GFI fit model is ≥ 0.90 and GFI value between 0.8 to 0.9 is said to be marginal fit. GFI value in this research is 0.911, so the model can be considered good.

Adjusted Goodness of Fit Index (AGFI) is a development of GFI adjusted for the degree of freedom for the proposed model. A model is said to be fit when the value AGFI ≥ 0.90 and AGFI value between 0.8 - 0.9 is said to be marginal fit. In this study, the value of AGFI amounted to 0.896, so that the structural equation model we tested is said to be marginal fit.

CFI value of 0.990 above the value of 0.95 which is a CFI value required, so it can be stated that the condition of good standard CFI value. Furthermore, the TLI value of 0.989 is more than 0.90, which is the value TLI required, meaning that the value of a good standard TLI. Then, for a value of 0.028 RMSEA below 0.08 which is an RMSEA value required, so that the value of a good standard RMSEA.

4.3. Hypotheses Testing

Once the model has been declared fit then it will be followed by hypothesis testing, done by looking at the significance of the estimated value, the critical ratio, and probability (Table 2). Table 2 shows that all the significant value of parameter estimation of each relationship has a value of <0.05 unless the value of the estimated parameter significance workplace safety climate on the behavior of worker safety and job satisfaction on behavioral safety (0.012 and 0.039). The results of data analysis known that the climate effects on motivation Safety have CR = 2.613 and p = 0.005 (<0.05), so it can be said to be significant. This indicates a safety climate can increase the motivation of the perceived safety of employees. Therefore, Safety climate positive and significant impact on the safety of employees motivation manufacturing companies in Indonesia. Thus, it can be concluded that H 1 is accepted.

<table>
<thead>
<tr>
<th>Estimate</th>
<th>CR</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MKK</td>
<td>0.215</td>
<td>2.613</td>
</tr>
<tr>
<td>MKK</td>
<td>0.229</td>
<td>3.005</td>
</tr>
<tr>
<td>PKK</td>
<td>0.183</td>
<td>-2.431</td>
</tr>
<tr>
<td>PKK</td>
<td>0.237</td>
<td>3.201</td>
</tr>
<tr>
<td>PKK</td>
<td>0.152</td>
<td>2.173</td>
</tr>
</tbody>
</table>

Table 2. Regression Weight Structural Equation Modeling

The results of data analysis known that the effect of job satisfaction on motivation safety has CR = 3.005 and p = 0.005 (<0.05), so it can be said to be significant. This indicates that job satisfaction can increase the motivation of the perceived safety of employees. Thus, job satisfaction and a significant positive effect on the safety of employees motivation manufacturing companies in Indonesia. Therefore, it can be deduced that H 2 is accepted.

The results of data analysis known that climate influences on Behavioral Safety have CR = -2.431 and p = 0.012 (> 0.05), so it can be said that not significant. This indicates a safety climate have not been able to increase the perceived safety behavior of employees. Thus, the safety climate and no significant negative effect on the behavior of the safety of employees of companies manufacturing in Indonesia. Therefore, it can be deduced that the H 3 is rejected.

The results of data analysis known that the effect of job satisfaction on safety behaviors have CR = 2.713 and p = 0.039 (> 0.05). This indicates that job satisfaction has a positive effect but not significant on the safety behavior. Therefore, job satisfaction has a positive effect but not significant on the safety behavior of employees in manufacturing companies in Indonesia. Thus, it can be concluded that the H 4 is rejected.

The results of data analysis known that the effect of occupational safety motivation towards work safety behaviors has CR = 3.201 and p = 0.005 (<0.05), so it can be said to be significant. This indicates the safety motivation can improve the perceived safety behavior of employees. Thus, safety motivation has a positive and significant effect on the safety behavior of employees of companies manufacturing in Indonesia. Thus, it can be concluded that the H 5 is accepted.

5. Conclusions and Implications

The main objective of this study is to look at the role of occupational safety climate and job satisfaction to employees’
safety behavior. In addition, this study also wants to determine the effect of occupational safety motivation in mediating the safety of the working climate on employee safety behavior. The research conducted at one of the manufacturing companies in Indonesia.

Based on the hypothesis that had been developed in the beginning, the results showed that there are two hypotheses that contradicts the results of the study. From H1 to H5, third and fourth hypothesis (H3 and H4) contrary to the findings of the research. The findings show that the hypothesis which is the correlation between safety climate with occupational safety behavior and H4 which is the correlation between job satisfaction and work safety behavior. It means climate safety and job satisfaction have no connection to occupational safety behavior. Moreover, the causal relationship between safety climate and job satisfaction on employee safety behavior has a negative impact and insignificant.

The findings of the research for the H1, H2, and H3 consistent with the hypothesis drawn up at the beginning. The results showed that the climate of industrial safety and job satisfaction positive and significant impact on the motivation of safety (H1 and H2). Then, occupational safety motivation is also a positive and significant effect on the behavior of safety (H3). The findings indicate that the climate of safety and job satisfaction can increase motivation safety of employees. Vice versa, if a safety climate and poor job satisfaction will decrease the motivation of workplace safety. In addition, the findings also indicate if the motivation safety can improve the safety behavior of employees.

The results of the indicator index analysis of each variable shows which indicators are perceived to be the highest and lowest. Safety climate: competency level is an indicator that has the highest index and the lowest index is safety support from the supervisors. Therefore, it is necessary to increase the intensity of providing support from supervisors to their subordinates. Job satisfaction: working conditions have the highest index and the lowest index is about wages. That indicates that employees are satisfied with their working conditions, but still need attention about wages.

Then, safety motivation: the highest index is about the importance of helping co-workers when in the danger and the lowest index is about safety behavior willingness. That means that attention is still needed to increase the willingness of employees to their safety while working. Safety behavior: indicators that have the highest index is about safety participation and the lowest index is about safety rules. This indicates that companies need to improve the safety rules applied to employees. Based on the lowest index, it can be seen safety behavior willingness, things that need to be considered are safety support from supervisors, wages, safety behavior willingness, and safety rules.

Direct and indirect relationships between variables using path analysis indicate that the variables safety climate and job satisfaction directly influence safety motivation. Then, safety motivation has a direct effect on safety behavior. Safety climate on the safety behavior directly has a negative effect, but if through the safety motivation on the safety behavior becomes positive. The results of the Sobel Test show that safety motivation can mediate the safety climate and job satisfaction on the safety behavior.

The results showed a positive correlation between safety climate, job satisfaction, motivation safety against employee safety behavior of manufacturing companies in Indonesia. Given there is still potential work accidents whether mild or severe, should the company pursue policies on a regular basis by conducting a survey measuring the behavior of the employees by a factor measured is the level of compliance of safety (safety compliance) and participation in anticipating danger, considering the frequent turnover for system contract. The survey followed up with a policy in anticipation of declining employee safety behavior including improving the quality of safety motivation.

The limitation in this study is the reduction of indicators in research in order to get the model fit in quantitative data processing, there is still goodnes of fit criteria which do not meet that standard with marginal results Probability. In addition, the least scientific references that discuss the topics covered in this study. then, Sources of respondents still limited that only 300 respondents and the number of questionnaires that can be analyzed only amounted to 190. This study does not play in spite of the limitations so that more attention to research that will come. The first suggestion for further research is in order to explore the relationship between safety climate on the behavior of safety. This is due to very limited literature related to the discussion. Secondly, it is necessary to do research again about how it relates to climate safety with the safety of employees’ behavior because there is still a gap between the research results with one another. Thus, the results of these studies were able to enrich the literature already exists. Third, needed to do research on the positive side and negative on the safety of employees’ behavior in addressing the climate of safety in an organization. It is able to provide solutions to organizations in taking climate policy in applying safety and increase employee job satisfaction in order to increase the motivation of safety, so as to create a good safety behavior within the organization. Then, there is the limited number of respondents in this study is a limitation, expected in future studies added the number of respondents that meet the test of goodness of fit chi-square. It is able to provide solutions to organizations in taking climate policy in applying safety and increase employee job satisfaction in order to increase the motivation of safety, so as to create a good safety behavior within the organization. Then, there is the limited number of respondents in this study is a limitation, expected in future studies added the number of respondents that meet the test of goodness of fit chi-square.

References


The Role of Job Support as a Target for the Management of Work-Related Stress: The State of Art

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Abstract

Work related stress represents one of the most important emerging risks in occupational health and management. The implementation of targeted strategies to manage stress antecedents and outcomes represents a global challenge with relevant implications for workers well-being and business success. Despite the direct and indirect costs of work-related stress are well established, companies often fail to find adequate strategies to manage stress and the use of large sums of money not always reach the goal of improving a conflictual environment. One of the most important determinants of work-related stress onset is the lack of a supportive work climate, in terms of poor support provided by colleagues, supervisors or organizations. Improving organizational support can represent a target for both managers and workers who want to mitigate the negative consequences of stress, both in economic and health terms. The aim of this study was to investigate, through a narrative literature review, how a poor organizational support can affect a work organization, and which strategies are now available to improve a supportive climate. Focusing on the last five years of publication, pertinent scientific articles are critically checked and discussed. The results of this narrative review could represent a useful tool for supervisors and leaders, providing evidence on successful strategies to improve workers’ well-being and consequently business success.

Keywords: organizational support; job support; psychological well-being; supportive work climate; management strategies.

1. Introduction

In the last twenty years work-related stress has had a deep impact on organizations and workplaces. The direct and indirect costs of mental issues, including work related-stress, account for 240 billion per year (EU-OSHA, 2014). Such costs could affect business and organizations both directly and indirectly. In particular, the indirect economic consequences on the organizations are represent by absences due to illness, loss of productivity, increasing turnover and increasing number of accidents and injuries. It is undeniable that work-related stress represents one of the most relevant emerging risks, which can have a deep effect on the health and well-being of workers, and on the success in achieving goals for organizations, in a global scenario of deep changes of the world of work (Giorgi et al., 2019a).

Scientific literature has tried to establish a set of theoretical methods to assess work-related stress in organizations, focusing also on the antecedents and the consequences of stress at work. One of the most cited theories on this topic is the Job Demand Control model, proposed by Karasek in 1979 (Karasek, 1979). In this model, job demands refer to aspects such as workload and time pressure, while job control, also called “decision latitude”, refers to the workers’ ability to control their work activities. The combination of these two dimensions allows to classify different jobs in four categories, also known as belonging to the Karasek’s taxonomy: high strain jobs (high job demands and low job control), low strain jobs (low job demands and high job control), passive jobs (low job demands and low job control), and active jobs (high job demands and high job control) (Karasek, 1979). A third component, the Job support, was added to the JDC model, obtaining an extended theoretical framework called Job demand control support model (JDCS) (Karasek and Theorell, 1990).

Since the JDCS model was theorized, numerous scientific reports have investigated the role of job support in increasing or moderating the risk of stress, whether job support provided by supervisors or colleagues was low or high, respectively. In particular, work tasks characterized by high job demands, a low degree of decision latitude and low job support are known to be more harmful (Häusser et al., 2010).

Considering the advanced knowledge about the importance of social support in the onset of work related stress, nowadays it can be considered as a target for interventions aimed at managing stress and improving workers well-being and consequently, reducing the associated costs for companies and organizations.

The aim of this study was to investigate, through a narrative review, how poor organizational support can contribute to affect work organization, in terms of health consequences for the workforce and organizational consequences for companies, and which targeted strategies are suggested to foster a supportive work climate.

2. Materials and methods

The purpose of this literature review is to describe the evidence about the moderating role of job support on the
The literature search was conducted during September 2019 using the scientific databases PubMed (Medline) and Scopus. We considered articles published in the last five years, from 1 January 2014 to 30 September 2019. We selected articles published in English language, including only studies performed on humans. Several search strings were used, including the following keywords and their combinations: organization, workplace, workforce, workers, occupational group, working population, work, job, job task; organizational support, job support, supportive climate, organizational intervention, organizational strategies, stress, work related stress, high support, low support; well-being, psychological well-being, psychological health, economic consequences, productivity, absence. We considered only research articles and excluded previous review articles. By means of a title-abstract screening, articles were selected and then integrally read if they fully met the inclusion criteria.

3. Results

3.1. Job support as a moderator for health consequences

Job support has been reported as a possible moderating variable on the health consequences of occupational stress in numerous studies that have involved workers belonging to various sectors. A study performed in 2017 in a sample of 738 health care workers nested within 67 teams of three Italian hospitals (Portoghese et al., 2017), showed that after controlling for the cross level effect of supportive climate, the negative relationship between role clarity and emotional exhaustion was stronger when the supportive climate was higher. These results highlighted the importance of a supportive climate in the workplace to improve working conditions and to protect workers from a typical burnout manifestation such as emotional exhaustion. Another relevant finding of this study was that when a supportive climate occurs, even high job demands are not perceived as a crucial problem, confirming a buffer role of job support in moderating the relationship between workload and burnout symptoms. Following these findings, several authors suggest that organizational strategies aimed at building a supportive climate may reduce psychosocial risks and improve the collaboration of organizational strategies, work related stress, high support, low support; well-being, psychological well-being, psychological health, economic consequences, productivity, absence. We considered only research articles and excluded previous review articles. By means of a title-abstract screening, articles were selected and then integrally read if they fully met the inclusion criteria.

Maintaining mental and physical health of the workforce through specific programs aimed at improving a supportive climate and reducing work related stress could represent a goal for organizations and business that face problems such as a rapidly aging workforce and a rapidly changing world of work. Similar results about the role of social support on influencing well-being were found in a study conducted in a sample of 1405 workers of operating theaters of six Swedish hospitals. Also in this study, the psychosocial work environment was assessed using the JDCS model, considering the well-being, the zest for work and the thoughts about leaving work as stress outcomes. Authors found that lower social support scores and high job demands together with low job control (high-strain jobs) scores were related to lower well-being and job satisfaction. These results raise concerns about leaving the position (Wålinder et al., 2018). On the contrary, the lack of social support, violence and discrimination at work were significantly associated with a worker's low well-being (Lee et al., 2016).

The JDCS model represents the framework through which the relationship between work characteristics and occupational health was evaluated in a cross-sectional study conducted in a sample of 739 accountant workers. The results highlight the moderating effect of professional development and support of superiors on job demands (Del Pozo-Antúnez, Ariza-Montes, Fernández-Navarro, and Molina-Sánchez, 2018). On the other hand, job support, as assessed by the JDCS model, was significantly associated with health status, mental-wellbeing and efficacy, as shown in the results of a cross sectional study conducted in sample of 879 health and safety practitioners (Leitão, McCarthy, and Greiner, 2018).

A cross sectional study conducted in a sample of 1595 employees in 21 retail stores of one national retail organization, investigated the moderation role of job support on the relationship between work related stress and the risk of developing diabetes (Wolf et al., 2018). Self-reported organizational and coworker support along with the diabetes risk were calculated. The results show that, job support from supervisors correlated with job support from peers, while a negative correlation was found between job support and work-related stress. When analyzing the relationship between work-related stress and diabetes risk, organizational support, but not the colleagues’ support showed a moderating effect between stress and diabetes risk. Moreover, the subgroup of subjects experiencing higher levels of organizational support, showed a lower risk of diabetes with respect to those with lower levels of perceived organizational support. Despite some limitations such as the cross-sectional study design that does not allow causal inferences about the relationships, the results suggested a possible buffer effect of organizational support on the effects of work-related stress. A poor organizational support, along with communication issues, and existing social norms were identified as work organizational barriers to improve health status in a sample of Australian train drivers (Naweed et al., 2017).

In a study involving 447 unmarried employees, perceived organizational support, self-esteem and suicidal ideation were significantly correlated with each other. In particular, the effect of perceived organizational support on suicidal ideation was found to be partially mediated by self-esteem (Sang et al., 2017). A study conducted in China involving 931 doctors, also found that organizational support plays a mediating role on the associations of work-family conflict with depressive symptoms (Hao et al., 2016). Similarly, the results of a study performed in Japan and involving 494 physicians found that support from coworkers had a buffering effect on depressive symptoms and burnout (Saio et al., 2014). On the other hand, low social support was associated with depressive symptoms as shown in the result of a longitudinal study performed in a sample of 336 male employees during an economic recession (Nagae, Sakamoto and Horikawa, 2017); as well as it has been highlighted in a large sample of 1046 bank employees (Valente et al., 2016).
When analyzing more deeply the effects of social support, the result of a study conducted in a sample of 957 Norwegian employees suggested the importance to distinguish directive and nondirective social support, where the former refers to a situation in which the provider resumes responsibility, while in the second case the receiver has control. The results showed different effects of these two dimensions: nondirective support was related to fewer musculoskeletal and pseudoneurological complaints, higher job satisfaction, and the perception of lower job demands and higher job control. On the other hand, directive social support had the opposite relationship, without reaching a statistical significance for pseudoneurological complaints (Johnsen et al., 2018).

3.2. Job support as a moderator for organizational consequences

Focusing on the organizational consequences of work related stress, organizational support, along with other factors such as ethical work climate, organizational commitment and job satisfaction were significant predictors of turnover intention, as emerged from a study conducted in 500 nurses working in Egyptian hospitals (Abou Hashish, 2017). Moreover, these variables independently influenced turnover intention, suggesting to set up strategies to enhance ethnocentric behavior and supportive work climates to increase nurses’ commitment and satisfaction and decreasing their turnover intention. In other terms, a supportive climate may have a positive influence on a negative organizational outcome such as the turnover intention. Similarly, the results of some other studies involving health workers showed that organizational support reduces the likelihood of turnover intention (Lee and Jang, 2016), and exerts its influence on work-related outcomes such as work engagement and organizational citizenship behavior (Gupta, Agarwal, and Khatri, 2016), as well as social support significantly influences job satisfaction and intention to leave job (Han, Trnkoff and Guerces, 2015). Furthermore, a study involving 400 nurses suggested that perceived organizational support could develop a sense of belonging, and this, in turn, will help improve nurses’ job satisfaction and organizational commitment (Chang, 2015). This relationship could have relevant practical implications for managers who have to manage staff at high risk of stress such as nurses. Social support, both from co-workers and supervisors, was also significantly associated with work engagement, as shown in a study conducted in a cancer care unit (Poulsen et al., 2016). This was also confirmed in a longitudinal study involving 170 nurses that highlighted how changes in job demands, job control and social support predicted job satisfaction, work engagement and emotional exhaustion (Adriaenssens et al., 2017). A study conducted in a sample of 384 doctors in Bangladesh found that organizational support was the strongest predictor for outcomes such as job satisfaction, turnover intention and burnout (Roy, Van Der Weijden, and De Vries, 2017). Considering as outcome the Work Ability Index (WAI), a cross-sectional study conducted in a sample of 280 workers demonstrated that WAI scores were strongly associated with supervisor support, skill discretion, occupational training, sleep quality, work nature and educational level (Mokarami et al., 2017).

Productivity has been considered as an outcome of perceived support in a cross-sectional study involving 3528 employees. Results showed that higher perceived workplace support is independently associated with higher work productivity (Chen et al., 2015).

Another study involving 481 nurses found that social support from management was predictive of turnover intention (Adriaenssens et al., 2017). On the other hand, a cross-sectional study conducted in a sample of 610 nurses in China showed that perceived organizational support was positively associated with intention to remain and career success (Liu and Liu, 2016). Moreover, a study conducted in nursing staff belonging to two Italian large size public hospitals, found that the effect of perceived organizational support on job burnout factors was mediated by trust levels (Bobbio and Manganeli, 2015). Therefore, perceived organizational support confirmed its relevance in the nursing setting, with possible practical implications both for recruitment and training of nurse managers and for hospital management.

A study conducted in a sample of 204 workers with disabilities employed in ordinary firms investigated the relationships between organizational support and family support with job satisfaction and intention to quit the organization. The results showed that organizational support is a significant explanatory factor in the levels of job satisfaction (Pérez et al., 2015). These results also suggest that perceived support can facilitate the conciliation of work and family life. Following these findings, improving strategies aimed to solve a work-family conflict in fragile workers may take into consideration both organizational and family support improvement.

A study conducted in a sample of workers of chemical and petroleum process plants demonstrated that the support from organizations, supervisors and co-workers was significantly related to employees’ safety and health compliance. Moreover the findings reveal that perceived supervisor support has the strongest influence in ensuring employees’ safety and health compliance behavior (Rah et al., 2016). A relationship between job support and the compliance of health and safety behaviors is interesting considering the possible negative impact of unsafety behaviors for workers and collectivity. The importance of supervisors support was also found in a study involving over 6000 bankers in Italy (Giorgi, Dubin and Perez, 2016). In another study autonomy and social support together seemed to determine a small decrease in the relationship between psychosocial safety climate and stress in health care workers (Havermans et al., 2017).

Recent literature focused on the determinants of work-related stress in migrant workers, considering them as a more susceptible subgroup at higher risk of developing stress. A cross-sectional study conducted in 2016 aimed to investigate the relationship between occupational stress and job burnout among migrant workers moving from rural to urban areas of China (Luo et al., 2016). The study involved 1330 female nurses who were given specific questionnaires to investigate extrinsic effort, reward, and over commitment as a dimension of occupational stress, perceived organizational support, and psychological capital with its components (self-efficacy, hope, resilience, and optimism). The perceived organizational support was associated with positive attitudes such as psychological capital, self-efficacy, hope, resilience, and optimism. On the other hand, psychological capital seems to mediate the associations of occupational stressors and perceived organizational support with work engagement. Taken together, these results suggest that establishing a supportive organizational climate and controlling occupational stressors could represent an efficient strategy for hospital managers to enhance the psychological capital and consequently work engagement.

Another study involving expatriate workers aimed to investigate the relationship among perception of organizational support, cross-cultural adjustment, work-related stress and innovativeness, considering these factors as a part of a unique innovative framework. The results of the structural equation model analysis showed both a significant direct effect of perceived organizational support on work-related stress, and a mediating effect of perceived organizational support on the relationship between cross-cultural adjustment and work-related stress (Giorgi et al., 2019b). These findings may have relevant practical implications for addressing managerial strategies aimed at improving expatriates’ well-being, enhancing organizational support and cross-cultural adaptation.

A study conducted using a sample of immigrant women aimed to investigate the associations of work organization with physical health, mental health, and health-related quality of life.
What emerged from this study was an association between greater support (supervisor's power and safety climate) with fewer depressive symptoms and better mental well-being, along with associations between greater job demands (heavy load, awkward posture, greater psychological demand) with more musculoskeletal and depressive symptoms and a worse score of mental component of the quality of life, and between less decision latitude (lower skill variety, job control) with more musculoskeletal and depressive symptoms (Arcury et al., 2014). Another study aimed to investigate concerns about mental health and well-being was conducted in a sample of fly-in fly-out workers, a particular professional group. Results showed that workers and their partners attempted to maintain mental health and (Arcury, Kummerow Brown and Treiber, 2017).support networks, although many felt organizational support was tokenistic, stigmatized or lacking (Gardner et al., 2018). These results are interesting to address management strategies aimed at improving mental health of migrant or travelling workers.

Another interesting and relatively unexplored consequence of occupational stress is workplace bullying seen as a form of social strain. A cross sectional study conducted in 2019 using a sample of 400 blue-collars investigated the relationship between work-related stress, framed in the JDCS model and workplace bullying (Finstad et al., 2019). The results of the structural equation model analysis showed that the JDCS components (workload, lack of control, lack of support) are useful predictors for workplace bullying. The perspective that considers work related stress and its component as predictors of workplace bullying suggests that improving job control and social support may have positive consequences on workers' psychological health and conflict prevention. Further research in this direction could confirm this hypothesis.

Moreover, social support from supervisors moderated the relationship between authentic leadership and workplace bullying, while social support from co-workers moderated the relationship between workplace bullying and mental health, as shown by a study conducted in a population of 820 office workers (Warszewska-Makuch et al., 2015). Similarly, the results of a study involving 434 workers in France argued that supervisor support can be a protective resources against bullying and exhaustion (Desrumaux et al., 2018). The results of a two field studies involving 478 and 395 participants, respectively, confirmed the hypothesis that perceived organizational support moderate the bullying behavior at work (Naseer et al., 2018), while another study based on a sample of 2292 subjects indicated that coworker support exert a protective role against workplace bullying, although the buffering effect is relatively small (Hill-Briggs, Kummerow Brown and Treiber, 2017). Moreover, a study conducted in 20 neonatal intensive care unit which involved 398 health care workers, found that psychological support at work had a positive effect on victims of bullying (Chatziioannidis et al., 2018). Finally, social support was found as a partial mediator between workplace violence and job satisfaction, as well as burnout and turnover intention (Duan et al., 2019).

Organizational support also showed a mediating role in the relationship between work-family conflict and job burnout in a sample of 373 construction professionals in China (Wu et al., 2018), thus representing a possible target of intervention. Similar findings on the importance of social support in balancing work and family were highlighted in a study conducted using a sample of project professional (Zheng and Wu, 2018), and in another study involving 453 Belgian nurses (Lembrechts et al., 2015). On the other hand, the results of a study conducted in a group of 1382 medical workers suggest that work-family conflict and self-reported social support affect the level of burnout syndrome (Yang et al., 2017). A more complex scenario was proposed in a study involving employed caregivers, which showed how high levels of family-to-work conflict were subsequently associated with decreases in life satisfaction and increases in depression, but only when perceived supervisor support was low. Therefore, perceived supervisor support seems to exert a conditional effect on the indirect relationship between care giving demands and psychological well-being mediated by family-to-work conflict (Li, Shaffer and Bagger, 2015).

A study conducted in a sample of 2481 police-service workers, found that the stressor-coping-strain process is simultaneously moderated by job support or job control (Brough, Drummond and Biggs, 2018). Another study involving 827 Indian police officer found that perceptions of organizational support had a positive association with job satisfaction and organizational commitment (Lambert et al., 2017).

A cross sectional study involving 345 nurses suggests that organizational support for nursing practice can contribute to caring behaviour of nurses and their job satisfaction (Pahlevan Sharif et al., 2018). This finding highlights the importance of organizational support both for the well-being of workers and for the quality of care provided. Consequently, it seems important to establish a supportive nurse practice environment and pay attention to the psychological well-being of nurses in healthcare sectors, also in order to obtain positive consequences on the quality of work performance. Similarly, in a study conducted in a sample of pharmacists a feeling of higher levels of support from the organizations was associated with better reported work performance, in terms of providing more consistent medication information to patients (Urbonas et al., 2015). Organizational support and co-workers support also had a relevant effect on the successful implementation of an improvement program, as shown by a cross-sectional study conducted in a sample of 67 nurse managers in U.S. (Fryer, Tucker and Singer, 2018). As highlighted in a study conducted in a sample of 618 employees of four organizations, leadership support can exert its influence for health promotion, increasing levels of wellness activity participation, and levels of health behavior, and decreasing job stress (Hoert, Herd and Hambrick, 2018).

The lack of social of support has also been associated with mental health-related long-term sickness absence in a large study population of 2059 nurses enrolled in a 2 years follow-up study (Roelen et al., 2018), as well as in a case-control study involving 385 workers (Da Silva-Junior and Fischer, 2014). On the contrary, higher levels of perceived support from their organizations were associated with lower reported levels of work and life stress. In addition perceiving support from the supervisor was associated with lower work stress, as shown by a cross sectional study conducted in 1543 personal support workers (Zeytinoglu et al., 2017).

Finally, the findings of a study involving 1649 workers suggest that presenteeism is reduced by increased respect and concern for employee stress at the workplace, by necessary support at work from colleagues and employers, and by the presence of comfortable interpersonal relationships among colleagues and between employers and employees (Yang et al., 2015).

3.3. Supportive intervention on the workplace

A supportive supervision intervention was performed, and its impact was measured on health workers using a controlled trial design with a three-arm pre- and post-study in Mozambique. Results showed that while the quantitative measurements of job satisfaction, emotional exhaustion and work engagement showed no statistically significant differences between baseline and end-line, the qualitative data collected from health workers post intervention showed many positive impacts on health workers, who perceived an improvement in their performance and attributed this to the supportive supervision they had received from their supervisors following the intervention (Madede et al., 2017).

Two studies aimed to evaluate the efficacy of a combined improvement program that integrates work-directed interventions and components from psychological therapies. A
randomized controlled multicenter trial evaluated the effectiveness of work-focused cognitive-behavioral therapy (CBT) and individual job support for people struggling with work participation due to common mental diseases, in a large sample of 1193 participants (Remé et al., 2015). The results suggested that work-focused CBT and individual job support have a significant long-term effect in increasing or maintaining work participation for people with common mental diseases.

A multisite randomized controlled trial conducted using a sample of 1193 participants evaluated a combined intervention with components from cognitive behavioral therapy and principles from supported employment and compared its efficacy with usual care. Despite the differences between the two treatment groups did not reach statistical significance, the intervention group showed a higher income, higher work participation and more months without receiving benefits over the long-term follow-up period after end of treatment (Överland et al., 2018).

A longitudinal study with 2 years of follow up was performed to evaluate the efficacy of a well-being improvement strategy. Well-being, productivity (presenteeism, absenteeism, and job performance), health risk, and employer support were measured as outcomes. Results suggest that an employer’s well-being strategy, including a culture supporting well-being, could be associated with improved health and productivity (Hammar et al., 2015). Furthermore providing supportive intervention supervision showed an improvement in community health workers motivation, as emerged from a study conducted in four African countries (Kok et al., 2018).

A randomized control trial study conducted in a sample of workers affected by rheumatoid arthritis, aimed to evaluate the effectiveness of an intervention program consisting of integrated care and a participatory workplace intervention on supervisor support, work instability and work productivity. The results are mixed: despite a beneficial effect of the intervention program was found on supervisor support, no effects were found on work instability and at-work productivity (van Vliester et al., 2017).

4. Conclusion

Nowadays there is a consistent scientific literature that demonstrate the moderating role of job support on work-related stress both at a social and organizational level. Several scientific papers found a significant association between a supportive work climate and several health and organizational consequences. Focusing on mental and physical health, the lack of a supportive work climate may have a role in the risk of cardiovascular diseases and diabetes, along with depressive symptoms, suicidal thoughts and general psychological well-being. At the organizational level, job support may exert its effect on influencing some outcomes such as absenteeism/presenteeism, turnover, quality of performances provided and safety behaviors, as well as job satisfaction and job commitment. An overall shortage of studies about the efficacy of improvement strategies resulted from this review, with mixed results. Despite the majority of the analyzed study were performed through a cross sectional study design, without the possibility to identify a causality between the investigated variables, the results suggest that the improvement of a supportive work climate may represent a strategic target for the management in order to improve workers well-being, general health and organizations’ success in the world of work. Further efforts to evaluate the effectiveness of such improvement strategies are warranted.

References


Digital Systems and New Challenges of Financial Management – FinTech, XBRL, Blockchain and Cryptocurrencies

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Management of public finance and economic development is the art by which a nation improves the economic, political and social well-being of its people. The research paper starts from the reality that finance plays an important role in each economy. Nowadays, finance has to manage and adapt to Digital Era. The purpose of this paper is an attempt to identify and encourage managing financial statements through artificial intelligence using XBRL and Blockchain. In many countries, financial and tax authorities encourage the adoption of eXtensible Business Reporting Language (XBRL) and Blockchain. XBRL enable business to generate their required reporting information directly from their financial data. Blockchain technology continues to grow and it is being used in more and more business sectors. Finance, accounting and auditing has been identified as areas that could greatly benefit the distributed registry and other features of Blockchain. The main benefits generated by these innovative tools include reducing the risk of error (especially human error); low risk of fraud; system automation, big data analysis, huge cost savings (by increasing the efficiency and decreasing in errors), increased reliability in financial reports, and reduced workflow. The research paper comes to present how artificial intelligence combine financial information with tech capabilities, accelerate digital transformation of finance and accounting, and may create a more safety business and economic environment, reducing human error. We have to manage our work and time differently. We are living in a digital and intelligent era, where machines take over repetitive, time-consuming and redundant tasks, giving finance professionals more time to approach higher level and more lucrative analysis and research.

Keywords: management of finance; artificial intelligence; XBRL, Blockchain; digital finance; error reduction.

1. Introduction

The internationalization of financial markets is having profound effects on all countries. Foreign investors and international bodies provide funds to corporations in certain countries, helping finance existing businesses, open new ones or helping the government (by investing in Treasury or municipality bonds). Without these foreign flows of funds, the economies would have grown far less rapidly in the past 20 years. The internationalization of financial markets is also leading the way to a more integrated world economy in which flows of goods and technology between countries are more commonplace (Greenbaum, et al., 2016). Internationalization of financial markets brought many benefit to investors and countries in the same time. International financial facilitates trade, risk management improvement, mobilizes resources, and acquires and processes information that helps in the allocation of capital.

Informatization and computerization of society is one of the most important processes of present, everywhere around the world. Opportunities for new activities open up, while the information and technological environment as such contains the potential danger of deformations in the structure of personality and the ways of its social integration. In this regard, there is reason to assume that the development of information technologies in our modern age has both constructive and deconstructive consequences for a person or for a business (Lokova, et al., 2018). Management of finance faces new risks coming from implementation of artificial intelligence or digital systems.

The changing world affects the economic development, taking different meanings and techniques. We are hearing about the presence of artificial intelligence in all economic sectors, and it already part of our day-to-day life, in one way or another. The research paper comes to present how artificial intelligence combine financial information with tech capabilities, it accelerates digital transformation of finance and accounting, and it may create a safer business and economic environment, reducing human error. Artificial intelligence is an aptitude demonstrated by machines, in contrast to the natural intelligence displayed by humans and other animals. Using the most innovative technologies, we can find new business solutions and solve problems that until now seem hard to fix. Artificial intelligence, through knowledge management, links machines, IT, new technologies and businesses. No matter the economic sector, the size and the geographical location, all business are still facing the same issue: preparation of financial statement, accounting bookkeeping compliance with international GAAPs, human error, and an accurate comparison financial analyse. Artificial intelligence comes to bring digital solutions: eXtensible Business Reporting Language (XBRL) and Blockchain. Investments through financial capital infusion, lead to increase of production, consumption, and income in private, and public sector (Moşteanu, AlGhaddaf, 2019). Therefore, according to the Government’s requirements, we need a standardized tool to submit all the financial accounting reports required by law –
XBRL. The most developed countries (from Europe, Middle East and USA) are already using XBRL in their financial statements.

2. Literature review – Digital finance – the base for XBRL and Blockchain

2.1. Digital-Financial Markets – FinTech

The most valuable derivative of digitization is the rich pool of gathered data, which is growing very fast. Advanced computing capability has paved the way for big data analytics. Social media, mobile, analytics and cloud (SMAC) and application program interface (API) technologies have allowed different data streams to talk to each other in a highly efficient manner. This has led to the integration of multiple services into a single platform, thus creating a plethora of cases for digital financial services – fueling the app economy (Economic Corporate Network, 2016).

To remain competitive and achieve longevity in the market, financial services have to keep up with digital transformation. The survival of financial institutions is connected with the adoption of innovation, and embracing digital changes, to improve the efficiency and the performance within the organization (Scardovi, 2017). Digital transformation and new technology adoption have changed the way of doing business and channels that offer banking and financial products and services are more intuitive and trustworthy (Mohamed, Ail, 2019).

Digital systems are becoming more and more used, representing a much faster, cheaper and safer way when it comes to financial transactions. Access to modern telecommunications systems is a priority in all countries around the world, as in their evolution, financial and banking systems implement, use and encourage online services for domestic and international financial transfers. Digitalization and digital transformation have become the most commonly used words in the last decade, but especially in recent years. There is an excess of definitions of this term, used to describe the offline-to-online migration of commercial operations and businesses, including those found in many published research works. Contemporaneous economists defined digitalization as the realignment of, or new investment in, advanced technology and business models to more effectively engage digital customers at every touchpoint in the customer experience lifecycle (Solis, Littlet, 2017).

Financial technology – FinTech refers to an emerging financial services sector that is becoming increasingly indispensable to financial institutions and has a steady impact on how technology supports or allows banking and financial services. Fintech, Financial Technology targets construction systems that model, value and process financial products, such as shares, bonds, money and contracts. Contemporary economists define Fintech as a new financial industry that applies technology to improve financial activities (Schueffel, 2016). Currently financial technologies are used by all types of business, from start-up to large corporations, in all economic sectors.

2.2. Artificial Intelligence

The digital revolution is changing the way of living, working and communicating. The transformation, that takes place within the telecommunications industry, it has a great impact on the surrounding world with the emergence and continued improvement of digital technologies (Zhao, 2018). Artificial Intelligence is one of them. It is a recent technological breakthrough, which, combined with industrial technology, helps overcoming many human errors, exceeding human performance in different areas. IT programs are becoming more accurate, detecting and scaling objects better than human performance. Speech recognition systems can now identify the language of telephone calls and voice recordings with levels of accuracy that match human abilities. Translating from one language into another is now done in real time, using a simple application on the phone. Glasses can be connected directly to google map or other search program. All of these are already part of our lives. Artificial Intelligence solutions have the potential to transform such diverse and critical areas as education, research, healthcare, finance, accounting, auditing, transport and energy. It is not a single technology but a family of technologies. In addition, Artificial Intelligence solutions can help sustainable, rapid and viable regional development. The regional economic disparities that exist in different areas of the world can be diminished considerably. Therefore, Artificial Intelligence can help to successfully implement regional development policy objectives (Moşteanu, 2019), regarding the geographical area, the spoken language or the sectors of predominant activity. In many countries/regions public authorities require the application of the XBRL to enhance business operations and transparency, with the aim to advance their market’s standing in the eyes of investors.

The history of Artificial Intelligence started around 100 years ago. In 1920, when Czech writer Karel Capek published a science-fiction piece called Rossumovi Universal Robots, which introduced the word robot, a humanoid machine which work for people (Turing, 1950). In 1950, Alan Turing (mathematician, computer scientist, logician and cryptanalyst) asked himself (publically) Can machines think? (Koistinen, 2016), and from this question the Artificial Intelligence started its journey. Turing continued to develop three distinct strategies that might be considered capable of reaching a thinking machine: through programming; ab initio of machine learning (Koistinen, 2016); and, knowledge management (using logic, probabilities, learning skills). As a result of discoveries in neurology, information theory and cybernetics in the same time, researches, and with them Alan Turing, created the idea that it is possible to build an electronic brain. Turing introduced his widely known Turing Test, which was an attempt to define machines’ intelligence. The idea behind the test was to call machines (e.g. a computer) intelligent if a machine (A) and a person (B) communicate through natural language and a second person (C), a so-called evaluator, cannot detect which communicator (A or B) is the machine (Schultebraucks, 2018). And the research continued. On 11 May 1997 IBM’s chess computer defeated Garry Kasparov after six games. In the last two decades, Artificial intelligence has grown heavily. The Artificial Intelligent market (hardware and software) has reached $9 billion in 2018 and the research firm IDC (International Data Corporation) predicts that the market will be $47 billion by 2020. This all is possible through knowledge management to explore Big Data, and take advantage of faster computers and advancements in machine learning techniques (Schultebraucks, 2018).

2.3. eXtensible Business Reporting Language (XBRL)

eXtensible Business Reporting Language – XBRL – is a language used for electronic communication of business and financial data, which is revolutionizing business reporting around the world. XBRL enable business to generate their required reporting information directly from their financial data. It is a consistent tool also useful for comparability and overall business evaluation.

The birth of modern accounting had its origins in the Italian Renaissance where the favorable climate existed for double entry bookkeeping to be developed. In 1458, Luca Pacioli wrote his fifth book, Summa de Arithmetica, Geometria, Proportioni et Proportionalita (Everything about Arithmetic, Geometry and Proportions). This was the first book on Algebra and it is the first systematic documented source of double entry bookkeeping method. Its basics are familiar and similar in the modern accounting system, but the rules of accounting have been developed over the years, especially in the last 40 years. Now the accounting rulebook has expanded to over 4,000 pages, and is perpetually changing to accommodate new business
practices. The use of a standardized coding structure, such as XBRL would help to reduce these wage expenses by removing the replication of data-entry over many channels, and reducing lost data costs. In 2000, an accounting industry specific language was released, this was version 1.0 and it was renamed the eXtensible Business Reporting Language, what we called now XBRL (Kloeden, 2006). In 1999, the American Institute of Certified Public Accountants, six information technology companies, and experts reported that they had joined forces in an attempt to develop an XML-based Financial Reporting Language and extend XBRL internationally for use in business reporting. If the father of accounting is Luca Pacioli, the fathers of XBRL are Charles Hoffman and Wayne Harding (Hoffman, Strand, 2001). The American Institute of Certified Public Accountants was receptive to this idea and funded the creation of a prototype, once a plan was presented. When the prototype was finished, the AICPA created and promoted XBRL International. The group was formed as a not-for-profit global consortium of companies and agencies with one common goal, the development of XBRL and the widespread acceptance and use of the new global coding standardization process for financial information (Tie, 2005). Currently, XBRL is used by more than 100 regulators in over 60 countries (Europe, Middle East and Asia, North and South of America), supported by over 200 software packages and a growing number of companies, to facilitate structured data reporting across millions of companies (Nitchman, 2016).

2.4. Blockchain

Blockchain is another newest technology, which enable businesses to generate their required reporting information directly from their financial data. Blockchain technology continues to grow and it is being used in more and more business, finance, accounting and auditing has been identified as areas that could greatly benefit the distributed registry and other features of this one. Blockchain is a new technology that was introduced a decade ago, after financial crisis of 2008 (Nakamoto, 2008), and there is still a long way to be accepted and adopted by everyone. Blockchain can be described as the chronological record of block transactions. To ensure transactions, the cryptography is used, based on a chain of digital signatures. Each block is a group of transactions that are added to the last block by reaching a consensus on its authenticity among users, which is then passed to each network user to update their data. The system records all transactions ever made, shared by consensus distributed and shared among each participant’s users, and it is very difficult to force it. Since every two-key sign-in and any transactions are cryptographed and simultaneously maintained in distributed ledgers of each Node, which make this almost impossible to be hacked. Nowadays double-entry bookkeeping it is not an absolute system but it is logically extendible to triple-bookkeeping by including a set of force in its third axis (Yui, 1982, 1986). In the accounting industry, Blockchain helps the companies to write their transactions directly into a join bookkeeping, creating an interlocking system of enduring accounting records. Double entry accounting has been used for a very long time now. Triple entry accounting adds a level of clarity and honesty to bookkeeping that double-entry accounting cannot offer (Faccia, Moşteanu, 2019).

2.5. Cryptocurrencies

As digital finance and artificial intelligence occupy an increasingly important place in the financial services market over the last decade, cryptocurrencies appear too. Cryptocurrencies are virtual digital currencies and named as such because cryptographic techniques lie at the heart of their implementation (He et al., 2016). Historically, the idea and concept of storing important information by using cryptographic techniques is considered older, as the term crypto is taken from an ancient Greek word Kryptos, which means hidden. World Bank classified cryptocurrencies as a subset of digital currencies, which it defines as digital representations of value that are denominated in their own unit of account, distinct from e-money, which is simply a digital payment mechanism, representing and denominated in fiat money. In contrast to most other policy makers, the World Bank has also defined cryptocurrencies itself as digital currencies that rely on cryptographic techniques to achieve consensus. Today, the advent of cryptocurrencies is traced to the emergence of the first cryptocurrency, that is, bitcoin in 2009. After the emergence of bitcoin in 2009, the experiments in cryptocurrencies started happening in 2011 with the release of SolidCoin, iXcoin, Namecoin, and others. As of August 1, 2018, there are more than 1,737 different cryptocurrencies in the market. This number of cryptocurrencies breaks down into 819 coins and 918 tokens. According to CoinMarketCap data, the combined market of overall cryptocurrencies to date is valued at $269 billion (Mohamed, Ali, 2019).

Central banks have started to consider whether they might issue digital currencies of their own. Due to the advent of cryptocurrencies and blockchain technology, the central banks of major economies started to think and work on their own version of a Central Bank’s Digital Currency (CBDC) (Mohamed, Ali, 2019). A fundamental matter raised by CBDC issuance relates to the appropriate roles – in financial intermediation and the economy at large – of private financial market participants, governments and central banks. With CBDCs, there could be a larger role for central banks in financial intermediation. As the demand for CBDC grows, and if holdings of cash do not decline in lockstep, central banks might need to acquire (or accept as collateral) additional sovereign claims and, depending on size, private assets (e.g. securitized mortgages, exchange-traded funds and others). If demand becomes very large, central banks may need to hold less liquid and riskier securities, thereby influencing the prices of such securities and potentially affecting market functioning. Central banks may also need to provide substantial maturity, liquidity and credit risk transformation at times to both banks and markets. Since central banks could assume more important roles, they could have a larger impact on lending and financial conditions (Committee on Payments and Market Infrastructures, 2018).

3. Research Methodology

The present work paper is an exploratory research, based on investigative techniques. It is a fundamental and qualitative research, which aims to identify and encourage managing new financial methods through artificial intelligence and digital systems to achieve an efficient sustainable economic development. The paper presents the new approach of finance and the necessity to review and adapt the management and supervision of financial institutions, markets and their services provided. The research paper comes to present how artificial intelligence combine financial information with tech capabilities, accelerate digital transformation of finance to create a more safety business and economic environment, reducing human error.

4. Findings and Conclusions

4.1. New compulsory financial statements submission forms

The convergence of the IFRSs and US GAAPs accounting standards allows a uniformity in the presentation of the financial statements in every part of the world. The business strongly requires that information to be relevant, reliable, comparable and timely. These essentials appear even more evident if we
take into account the increasing complexity and details required by the accounting principles themselves. Implementation of accounting principles and of knowledge management to perform it, is changing the accounting practices. In the twentieth century the accountants’ salary was considered as the main cost of an accounting department. Accountants had to spend a lot of time entering an ever-increasing amount of data in the accounting books (journal and ledger), initially papery, then computerized, since the 90s.

Since the end of the 1990s, accounting information systems (Amat, Amat, 2019) are becoming increasingly used in accounting departments, favoring time-loss-free data entry, reducing errors, improving the statement-processing time (almost immediate) and procedures (adjusting entries), allowing an integration with cost accounting (Astuty, 2019), and thus, obtaining a high degree of detail (previously unthinkable). The skills requirements in accounting departments are rapidly changing, moving towards information technology rather than accounting. However, the costs of keeping the accounts have not decreased. New costs occurs: accounting software licenses (in particular ERP software), which have become essential, and it is increasing exponentially. In the present time, the number of accountants is being reduced, companies are looking now for fewer but more qualified employees (Richards et al., 2019). Accountants must be able to use accounting information systems perfectly and must also be able to customize them. IT knowledge is therefore now undoubtedly essential. Knowledge management (O’Leary, 2018) in accounting departments is increasingly oriented towards the integration of IT systems with financial, accounting and legal skills. The main challenge is to create teams of people able to understand and apply transversal knowledge, capable to reason in terms of flow chart, in order to communicate with a single common denominator and expressing each other’s work needs. The positive combination between IT and accounting is allowing an increasingly timely and reliable disclosure, which is leading to a uniformity of exposure. It is better that, standard setters, tax authorities and legislators should constantly interact with the software houses. This will the coordination between practice and laws, to face accounting systems challenging. Financial statements represent a crucial disclosure of the synthesis, not only among accounting, legal and fiscal rules, but also among these rules and the constraints and opportunities of information technology. This challenge is faced not only by standard setters, tax authorities and legislators, but also by accounting practitioners, developers of business reporting, IT professionals, auditors, executives, bureaucrats, academicians, standard setters, policy-minded government officials and IT professionals.

The information summarized by the financial statement (as this is a document on which all stakeholders rely), is better to be collected, synthesized, transmitted and analyzed with incredible rapidity and accuracy (Ramin, Reiman, 2013). Since XBRL is a language that can be used by companies to fulfill legal and accounting obligations, this is an open source technology that contains standard tags, but it allows the tracking of objects in order to perform different types of analysis.

XBRL is not a software itself, it is a standardized language program, usable by software houses to create and customize specific software for its customers. In general, free user-friendly versions are also available and provided by governments, to allow all companies, in any case, to prepare and send financial statements. Even if there is a need and a tendency towards uniformity, in particular to comply with the requirements of the most widespread international accounting standards, IFRS and US GAAP, there are various XBRL taxonomies, which are constantly updated and released on an annual basis. Each country is better to try to customize taxonomies to take into consideration the translation in different languages. Initially the XBRL taxonomy included only the numerical schemes of the financial statement: statement of financial position (balance sheet), statement of comprehensive income (income statement or profit and loss statement), statement of cash flows (funds flow statement), and statement of changes in equity. Furthermore, XBRL language now also concerns the descriptive notes of the financial statements, limiting the freedom of company directors in drafting this annex. However, the taxonomy as regards the notes of the financial statement, provides a rigidity only in relation to the list of paragraphs to be included. The editor of the financial statement is then free to add comments, to include further detail in each paragraphs or to specify within the mandatory paragraphs that some paragraphs are not inherent and should not be drafted. The accounting and financial systems are continuously updated. Here is how, in 2019 there is another update in the US GAAP Financial Reporting Taxonomy. This one contains mainly updates for country standards. It includes amendments to the SEC’s authoritative literature in which the underlying recognition and measurement are not specified by GAAP, but implemented by XBRL codification anyway (https://xbrl.us/home/filers/sec-reporting/taxonomies/). The latest update for IFRS (International Financial Reporting Standards) Taxonomy it was in 2018. It was required to markup electronic IFRS financial statements. By providing the IFRS Taxonomy, the International Accounting Standards Board can ensure that the taxonomy used is an accurate representation of International Financial Reporting Standards (IFRS Standards) (https://xbrl.us/home/filers/sec-reporting/taxonomies/).

4.2. Impact of XBRL on financial analysis and audit effectiveness

XBRL is a technology that allows object tracking. It is based on XML (Extensible Markup Language), that is a metatag, or a marker language based on a syntactic mechanism that allows to define and control the meaning of the elements contained in a document or in a text. The World Wide Web Consortium (W3C) (Clark, deRose, 2017; Cole et al., 2016), following the browser war (the situation occurred in the nineties in which Microsoft and Netscape introduced, with each new version of their browser, an extension that is proprietary to the official HTML), was forced to follow the individual extensions to the HTML language. The W3C had to choose which features to standardize and which to leave out of official HTML specifications. It was in this context that the need for a markup language that gave more freedom in tagging, while remaining in a standard, began to emerge. The “XML project”, which began at the end of the nineties in the SGML Activity of W3C, aroused so much interest that W3C created a working group, called the XML Working Group, composed of world experts in SGML technologies, and, in general, hypertexts, these second is a metalinguage used to create new languages, suitable for describing structured documents. While HTML has a well-defined and restricted set of tags, with XML it is instead possible to define its own according to the needs. XML is nowadays also widely used as a means of exporting data between different DBMSs (Database Management Systems). The use in the configuration files of applications and operating systems is widespread. XML, like HTML, uses markers in its programming. These markers are called tags (labels), to assign a semantics to the text. Tags can contain information in two ways: through parameters or by enclosing text or other types of information. It follows that they can be opening tags, necessarily followed by closing tags (among which you can
have a content) or tags that open and close, and can therefore provide information only through their parameters. Each label starts and ends with angle brackets <> (which in other contexts would be the minor and major signs), while the closing of the tag or the closing tag is represented by the / bar. The advantages of XML can be summarized in one word: SPEED. Speed is above all the main reason that drives many companies to switch to e-commerce; faster response to customer needs, faster publishing of direct information to customers and supply chain partners; faster processing of orders received via the internet. SPEED is also an acronym that lists the main advantages of XML: Storing, Publishing and Exchanging Electronic Documents. XBRL, in particular, is the language based on XML programming used for the communication of financial and accounting data in electronic format (Radu, 2016; Santos, et al., 2016; Wang, Wang, 2018; Blakensnap, 2019).

The legislation on auditing and the auditing standards do not provide for the auditor new controls with reference to the codification of the financial statements compliant with XBRL format. Therefore, the auditor must not carry out specific checks on the XBRL format and on submitting the financial statements in the XBRL format.

In this regard, it is worth pointing out by the Auditing and Assurance Standards Board (IAASB – an international body responsible for ruling the principles and rules of the revision), in the document entitled IAA SB Staff questions and answers – XBRL: The emerging landscape (IAASB, 2010), that the auditor is not required to implement verification procedures on the conversion of the financial statements in XBRL format. A role cannot be assigned to the auditor with reference to the new discipline concerning the XBRL format also in consideration of the fact that the XBRL format is not included in the other information required by the auditor according to the ISA 720 international audit principle. Therefore, the auditor is not required to assess any inconsistencies between the financial statements on which he has made a judgment and the one submitted in the XBRL format. The foregoing does not exclude, however, that the company may instruct the auditor to perform these audits, but the same would not be included in the task of revision. It would be just the subject of a separate remark. In this case, the engagement letter and the letter of attestation should explicitly contain the identification of this additional task compared to the ordinary audit (Abdolmohammadi et al., 2017; Hoitash, Hoitash, 2017; Mao, Zhang, 2017).

Since it is a standardized language, XBRL provides a efficient and consistent system to define the data model of an application for analyzing financial documents. This is useful for the application of standard methods for the classification of financial statements, and invoices), could be performed inside the Blockchain. Therefore, it would no longer be necessary to issue the documents (they are already produced in the system and therefore accessible by the parties), to store them (because already stored in the system), and to show them (they are accessible by anyone authorized and therefore distributable). Since the Blockchain technology can be also be applied to electronic invoicing, it has the potential to transform the process of validation of transactions, and the way invoices issued and payments are made. Combining decentralization and electronic bills, the system will benefit from a tamper-proof and transparent structure, also minimizing the risk of human error and frauds (Fischer, 2018; Hambiralovic, and Karlsson, 2018). Each record or block, linked and secured using cryptography, is also visible to all parties, therefore removing the need for an intermediary (Dwyer, 2017; Hays, 2018; Mishra, 2018).
technology and accounting, it manages to solve long-standing challenges. Some problems, such as the reliability of the information indicated and the lack of cross-comparison, have always existed, others have arisen recently, such as those related to globalization, the need for standardization, comparability, rapidity of registration (due to the immense amount of data to be recorded) and, last but not least, the big data analysis.

The convergence towards the integrated use of new digital technologies is now an inescapable process. There are too many advantages and opportunities arising from the integrated use of all these advanced tools. The challenges that accounting is facing in the contemporary world are mainly determined by globalization, which exponentially increases competitiveness in every sector, and the lack of trust, due to the depersonalization of every relationship.

The Figure 1 displays a comprehensive representation of all the challenges that accounting knowledge management is facing in the digital era. As can be easily observed, reasoning on the opportunities and advantages offered by each technology, each tool, integrated with the others, will provide a complete shield against all these problems, providing an immediate and effective solution.

Positive answers to challenges are often found through the combination of different technologies (for example, the reduction of human error can occur with the use, at the same time, of electronic invoicing, Accounting Information Systems (Zaki et al., 2019), Artificial Intelligence, and Blockchain), in other cases a single digital tool can solve problems that afflicted the accounting system since its creation (for example, the Blockchain solves the problem of reliability and trust as an expression of the triple entry bookkeeping system).

4.5. Necessity of new approach of Management and Supervision of Financial Institutions and Services

The global financial and economic crisis has done a lot of harm to public trust and confidence in governing and financial institutions, as well as the principles and the concept itself of the market economy. It has also eroded a lot of public trust in corporations. The climate of global financial uneasiness can partly be attributed to the global meltdown of 2008 where governments and other regulatory agents failed in their responsibility to monitor and steer unrestrained speculative and damaging financial activities (Scardovi, 2017). Financial crises often lead to the emergence of new national and international institutions. Financial digitalization lead to new responsibilities of financial supervisor. The recent global financial crisis has provided a unique opportunity to go beyond economic data and to capture cross border financial data and other information that could assist international and national institutions (Moshirian, 2011), to measure and manage financial risk more effectively, and to prepare for challenges raised by new financial technologies. Only an internationally integrated financial system will make large banks global.

FinTech has revolutionized the entire financial services industry by using innovative and advanced technologies such as Blockchain, cryptocurrencies, XBRL, Artificial Intelligence and robot-advisors. These innovative financial technologies come to realign and boost the efficiency and quality of financial services by cutting the human errors and time processing.

Central banks are the lead authority for macro prudential policy in most jurisdictions. Macro prudential responsibilities are more likely to be given to the central bank when the central bank is also the micro prudential supervisor for banking and financial institutions. Dedicated committees are also responsible for macro prudential policy in a number of jurisdictions and typically include government representatives, central bankers and supervisory officials. More generally, most jurisdictions have strengthened their frameworks for monitoring financial stability (Calvo et al., 2018), typically by setting up public authorities.

The involvement of central banks is a key feature of any financial supervisory architecture. This is also a source of synergies and conflicts of interest. Synergies stem from the links between financial and economic stability and from the connection between monitoring the overall liquidity of the system – the role of central banks – and the oversight of financial system solvency, which is the role of the prudential supervisory function. On the other hand, conflicts of interest may emerge as monetary policy decisions concerning the setting of interest rates can affect banks’ profitability and solvency. The assignment of prudential responsibilities to the central bank also raises concerns of a political economy nature including reputational risk and
excessive concentration of authority. In the United States, different functions are typically assigned to several agencies at the federal or state level. In the European Union, member states and those on the accession process share a single prudential supervisory authority (the European Central Bank’s Single Supervisory Mechanism) for significant banks (Calvo et al., 2018). However, Member States do keep responsibility for the prudential oversight of smaller institutions and for other supervisory functions, through their central banks or dedicated supervision public authorities (for other institutions than bank, such: insurance companies and private pension funds). Currently there are 268 financial supervisors (around the world).

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Quality Management of Information Systems

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Abstract

Quality is a decisive influence on any production activity. Appropriate deployment of quality management affects not only commercial success in the market, but also the company’s prosperity. Nowadays, it is one of the basic tools to push ahead in a competitive environment. Quality is a summary of the features and characteristics of a product through which an object acquires the ability to meet the intended and expected needs. Quality does not happen somewhere at the end of production of the product, but it is continuously formed in pre-production, production stages also.

Keywords: quality; information system; evaluation; criteria.

1. Introduction

Quality management is an activity that helps deliver the end user service or goods in the expected state. Quality management is a set of multiple activities within an organization, focusing on qualitative indicators within production processes or service delivery processes. It includes interconnected business, technical, economic, personnel, information, tools to ensure a defined quality of the final product (Shamsuddin, Hassan, 2003). Quality must be managed throughout the reproductive process, through company processes and functions that affect the product or service at the end. This fact is suitably shown in the so-called Juran’s spiral of quality (Figure 1). The pre-production stages, which are at the very beginning, occupy an important place in this quality spiral. In the past, the emphasis was mainly on the production phase, but current findings confirm the importance of pre-production stages in the quality building – approx. 80 % quality activities in pre-production stages have an influence on final products.

Figure 1. Juran quality helix (Gramblíčková, 2000)

Successful implementation of quality management should bring the following advantages:

- It helps improve customer satisfaction;
- It increases efficiency in processes with better resource utilization;
- It enables a business to continuously improve their products, processes, and systems;
- It helps an organization achieve greater consistency in tasks and activities that are involved in the production of products.

2. Architecture of information system

The information system is a system consisting of technical, program and people resources and ensures the processing, transmission and collection of information for planning, managing or controlling purposes. The architecture of information systems consists of several subsystems like (Kováč, Šebo, 2013):

- Functional subsystem – Specifies usage of information system. It may be for example data transformation processing, preparation of information for subsequent processing, information archiving, and so on;
- Technology subsystem – It is a technical solution for the information system like a hardware type, its configuration, computing power... etc.;
- Data subsystem – This subsystem act as a data storage device. These can be local disks or network drives depending on the system requirements;
- Network subsystem – A subsystem of network devices to the fulfilling function of connecting the appropriate network components to provide data exchange inside information system or between information systems;
- Software subsystem – It is a program (defined instruction) based on which information system processing information from input to output.
One of the main roles of quality management is quality planning. The target of quality planning is to define the quality of standards and how to reach them. Implementation of management quality is covered by ISO 9000 standards. This issue is standardized under ISO 9000 standards, as shown in Figure 2.

![Figure 2. Quality management related to ISO(s)](image)

### 3. Basic approaches to evaluation of information system quality

When we want to aim at evaluating the quality of information systems that are composed of all of the above-mentioned components, we need to explain two basics quality views on them. Statically view for an understanding of quality based on information system evaluation through a set of quality characteristics. Dynamical view at the quality of information system based on the management of their development processes, because of the essential properties (affect its final quality). Information system quality management including both these concepts and perceives them as a whole (DeLone, McLean, 2016).

The basic ISO standards dealing with quality are (Seddon, Graeser, Willcocks, 2002):
- ISO/IEC 9126-1 – defines the quality of a software product as a set of product characteristics;
- Quality Management (ISO/IEC 2500x);
- Quality Model (ISO/IEC 2501x);
- Quality measurement (ISO/IEC 2502x);
- Quality requirements (ISO/IEC 2503x);
- Quality assessment (ISO/IEC 2504x);

The ISO 9126-1 software quality model identifies six major quality characteristics (it is an extension of McCall’s, Boehm & FURPS model) (Seddon, Graeser, Willcocks, 2002):
- Functionality;
- Availability;
- Reliability;
- Portability;
- Efficiency;
- Sustainability.

One of the commonly used methods of quality assessment is the PDCA model, as one of the most widely used approaches focused on the process of continually improving and streamlining the functioning of the system. This model is applicable at all levels and in all areas of business and everyday life (Figure 3).

![Figure 3. PDCA model](image)

The main advantages of improving processes within a company are (Margarido and colleges, 2012):
- Improving planning;
- Increased budget predictability;
- Shortening the development cycle;
- Increase productivity;
- Improved quality as measured by errors;
- Increase customer satisfaction;
- Increase return on investment;
- Lowering the price to achieve the required level of quality.

Another reliable method of evaluating information system is performing an audit which represents the highest level of control. The audit is a complex activity, which includes several independent control mechanisms (formality, complexity, objectivity, independence) with respect to existing standards. The formality of audit means that the audit process must follow the methodology and existing standards. Complex models are indispensable, avoiding possible conflicts of interest, therefore the auditor may not have any connection with the sponsors or the auditing objects (Petkov, 2002).

The most common quality assessment objects in information systems are (Petkov, 2002):
- basic and application software;
- technical equipment;
- telecommunications systems;
- systems development, testing and maintenance processes;
- protection and security of systems;
- data and databases.

Quality and efficiency are interacting and closely related categories, where quality represents a state, while efficiency represents the cycle for dynamics improvements of the system. The quality model represents the product and the goods while the efficiency model represents the paradigm (García and colleges, 2003). At the same time we can include CMMI, COBIT, and ITIL models.

The CMMI model is owned by the Software Engineering Institute (SEI) at Carnegie Mellon University in Pittsburgh and was first published in 1991 as Capability Maturity Model Integration (CMMI). Initially, the usage of this model was evaluating the effectiveness of software development processes, and the idea was to believe that better development processes have a direct impact on better software producing. Nowadays, CMM is seen as a widespread standard for measuring the maturity of all processes in the organization, not only in the area of information and communication technologies (ICT) (TNgai, Chau, Poon, 2013).

COBIT is an abbreviation of Control Objectives for Information and Related Technology and is a framework created by the ISACA International IT Governance Association. It divides IT into four domains:
1. planning and organization;
2. acquisition and implementation;
3. delivery and support;
4. monitoring and evaluation.

In total 34 processes are written within these domains. It is a set of practices that should enable the strategic goals of the organization to be achieved through the efficient usage of available resources and minimization of IT risks. It was first published in 1996 and has since been gradually expanded to include audit procedures, implementation tools, detailed goals or management approaches. COBIT 4.1 was published in 2007 and the latest version of COBIT 5 was released in 2012 and is still in use today. It is mainly intended for top managers to assess ICT and for auditors to audit an ICT management system. Unlike the ITIL methodology, which is designed for IT vice-messenger referred to as CIO (De Haes, Van Grembergen, Debreceny, 2013).
ITIL was created as an abbreviation of the Information Technology Infrastructure Library and is a set of proven concepts and practices in practice that enable IT to better plan, use and improve both IT service providers and customers. The project was created in Great Britain in 1985-1995. In the years 2000-2004 it was redesigned to a new version of ITIL V2, which has been used by companies in many countries as a standard for IT service delivery. In 2007 an expanded version of ITIL V3 was created and written into five central books. ITIL V3 describes up to 26 processes. It is a methodology based on the process management of the organization and is intended mainly for middle and senior management as previously mentioned. Today we have available ITIL v5.

At the beginning of selecting an information system, the company management should answer questions about its quality expectations. These expectations should take into account the impact of a possible error on the end users of the system and meet legislative requirements. Important is understanding differences between deploying a non-integration package solution (such as Microsoft Office) and a development customized solution that is integrated with different systems, sometimes outside the organization's infrastructure. Such a system in case of failure should have a fatal impact on human lives (for example air traffic management system). The required characteristics, criteria and cost of quality control for such systems are diagnostically different.

4. Criteria for selection of information systems

Selection criteria for current information systems are (Cragg, Caldeira, Ward, 2011):

- Functional – it means that it must serve everything for what was designed.
- Powerful – The system must have a good response, work quickly and display outputs in quality.
- Reliable – must be able to deliver the same results in repeated situations and based on the same inputs.
- Economic – benefit from the system must exceed TCO (total cost of ownership).
- Ergonomic – the system must be user-friendly and as intuitive as possible to operate by user.
- Stable – in critical situations the system must respond appropriately, and data must not be compromised.
- Independent – changes around the system cannot have significant influence or affect its operation.
- Scalable – system architecture must be designed to be easily expanded with additional components in the future.
- Safe – security of the system must be ensured in all respects to avoid leakage of sensitive data.
- Operable – the system must be operable in a simple way (managed by the internal user without needs to contact an external partner).
- Properly documented – good technical and user documentation is essential for any system.

At the same time, it is necessary to define how all of these defined attributes will be validated and verified. As part of the validation, we find out whether the information system meets users and management needs. Verification process verifies whether the information system corresponds to the design according to the specification, or that the current legislative requirements are fullfilled (Kapsodorforova, 2014).

5. Evaluation of information system quality

Information system quality evaluation process can be measured by the number of reported incidents and problems, after a defined time period (for example daily, monthly, quarterly). The evaluation includes also production operation of the information system and quality of the testing process itself. It can also be a summary of feedback from users, administrators and everyone they serve and who work with the system. This feedback not only serves to identify deficiencies, eliminate them but is also linked to the process of continually improving the quality management of information systems within the organization throughout the System Development Life Cycle. The team makes a substantial contribution to providing better IT services within the organization as a whole. When a company is concerned not only about doing savings, inspections, audits, and putting the methodology into practice, but it will also ensure that corrective measures are taken as soon as will be recognized.

TQM system is a different approach than "just" implementing ISO standards. "T" means that the entire organization, all departments and workers must be involved in quality improvement without exception. This is applying to all products and activities of the organization. This is an open system that meets the following features (Lleshi, Lan, 2017):

- Orientation to the wishes, opinions and requirements of the customer;
- Involvement of all business units and all staff;
- Creating a system of "internal" customers;
- Continuous efforts to optimally, efficiently and economically perform all activities comparable to the most advanced competitors – the zero defects principle.

Comprehensive quality management has several accompanying features such as customer satisfaction, improved work results, improved economic results, motivation through qualitative indicators, and everything based on four core pillars (Lleshi, S., Lan, L. (2017):

1) Customer orientation;
2) Planning and leadership;
3) Continuous improvement;
4) Teamwork.

6. Conclusion

Latest management systems such as Total Quality Management and Total Prevention Maintenance, where quality and overall product reliability required minimal maintenance by the user in the future. All quality system is defined as the organizational structure, responsibilities, processes, procedures and resources for implementing quality management.

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