Kaunas University of Technology

School of Economics and Business

Performance Measurement in the Process of Innovation Implementation in the Healthcare Sector

Master's Final Degree Project

Kamilė Janušauskaitė

Project author

Assoc. prof. dr. Viktorija Varaniūtė

Supervisor

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Assoc. prof. dr. Viktorija Varaniūtė
Supervisor

prof. Rūta Gokienė
Reviewer

Kaunas, 2020

Kaunas University of Technology

School of Economics and Business

Kamilė Janušauskaitė

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Declaration of Academic Integrity

I confirm that the final project of mine, Kamilė Janušauskaitė, on the topic „Performance Measurement in the Process of Innovation Implementation in the Healthcare Sector“ is written completely by myself; all the provided data and research results are correct and have been obtained honestly. None of the parts of this thesis have been plagiarised from any printed, Internet-based or otherwise recorded sources. All direct and indirect quotations from external resources are indicated in the list of references. No monetary funds (unless required by Law) have been paid to anyone for any contribution to this project.

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SUMMARY

In the fast-changing world ideas are new key generators for all business types. Sustainability and long-term success are linked closely to innovation. In today's market it is not enough to have strong business model plan, the need for changes are seen in every sector. Companies are trying to implement as many novelties as possible, however quantity in innovations does not always mean quality. This is very applicable to healthcare sector, which is just catching with the new requirements. Healthcare sectors is very sensitive towards any changes due to its specificity of patients as the main customers. Thus, changes have to be very carefully measured and evaluated before they can be used successfully. Even though performance measurement is an old and widely used concept, in correlation to innovation it still struggles to deliver full evaluation needed for many sectors. With the lack of useful measures to apply to the process of implementing innovation, problems for companies' managements arise in control and review stages. Healthcare sector is no exception, having various types of performance measurement applied, yet lacking indicators directly used for innovation evaluation. **The aim of this thesis** is to develop a framework of the performance measurement of innovation implementation in healthcare. A case study as a research method was selected not only to test the practical applicability of the conceptual theoretical model, but also to address the lack of practical research by demonstrating how organizations can evaluate the implementation of innovation and compare their assessments with other organizations. For this researcher two pharmaceutical companies were selected, both global type and having branch offices that cover Baltic cluster. Responses from the companies' representatives allowed to draw conclusions that both companies have strong innovation polices globally and in turn locally, various measures are used for overall companies' performances, yet local measures are not cluster oriented. Going deeper into both cases revealed that innovation is reviewed only by the global team roles, thus providing no evidence of healthcare-oriented innovation implementation measures used for local branches. Due to research limitations innovation implementation level could not be tested on a global level. However, close connection between global teams and local branches would suggest similar approaches. Recommendation for the local branches are to include more patient oriented measures directly connected to new drugs and treatments. In addition, possible collaboration between all healthcare organizations could result in positive changes as well as cost saving for all-local and global entities.

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SANTRAUKA

Sparčiai kintančiame pasaulyje idėjos yra nauja pagrindinė varomoji jėga visų sektorių įmonėms. Tvarumas ir ilgalaikė verslo sėkmė yra glaudžiai susiję su visomis diegiamomis naujovėmis. Šiandieninėje rinkoje nepakanka turėti tvirtą verslo modelio planą, ženklių pokyčių poreikis pastebimas kiekviename sektoriuje. Įmonės stengiasi įdiegti kuo daugiau naujovių, tačiau inovacijų kiekis ne visada reiškia jų kokybę. Tai labai taikytina sveikatos priežiūros sektoriui, kuris ne taip seniai prisijungė prie spartaus inovacijų diegimo. Sveikatos priežiūros sektoriai yra jautrūs bet kokiems pokyčiams dėl pacientų, kaip pagrindinių klientų, specifiškumo. Taigi pokyčius reikia labai kruopščiai išmatuoti ir įvertinti, kad juos būtų galima sėkmingai įdiegti ir naudoti. Nors veiklos vertinimas yra senas ir plačiai naudojamas metodas, įsitraukus inovacijoms, matomas rodiklių trūkumas, vertinant šį procesą. Kadangi trūksta naudingų inovacijų diegimo procesų rodiklių, įmonių valdyboms kyla problemų kontrolės ir peržiūros etapuose. Ne išimtis ir sveikatos priežiūros sektorius, kuriame taikomi įvairūs veiklos vertinimo tipai, tačiau trūksta konkrečių rodiklių tiesioginiam inovacijų vertinimui. Šio **darbo tikslas** yra sukurti inovacijų diegimo efektyvumo vertinimo sistemą sveikatos priežiūros srityje. Naudojant literatūros analizę kaip įrankį atskleidžiamas inovacijų diegimas ir veiklos vertinimas sveikatos priežiūros srityje. Atvejų analizės tyrimo metodas buvo pasirinktas ne tik siekiant patikrinti praktinį konceptualaus teorinio modelio pritaikomumą, bet ir spręsti praktinių tyrimų klausimą: kaip organizacijos gali įvertinti inovacijų diegimą ir palyginti save su kitomis organizacijomis. Šiam tyrimui buvo pasirinktos dvi farmacijos kompanijos, priklausiančios pasauliniai rinkai, tačiau turinčios filialus Baltijos regione. Atsižvelgiant į organizacijų atstovų atsakymus buvo nustatyta, kad abi bendrovės vykdo stiprią inovacijų politiką globaliu mastu įtraukdamos ir regioninius filialus, taip pat bendrai įmonių veiklai valdyti naudojamos įvairios priemonės, tačiau veiklos vertinimo analizė nėra orientuotos į atskirus filialus. Detalesnė abiejų atvejų analizė atskleidė, kad už inovacijas yra atsakingi tik keli asmenys dirbantys pagrindiniuose įmonių biuruose, taigi nebuvo nustatyta jokių esminių rodiklių orientuotų į inovacijų diegimą farmacinėse įmonėse. Dėl tiriamojo darbo apribojimų inovacijų diegimo lygis negalėjo būti nustatytas pagrindiniuose įmonių biuruose. Vis dėlto glaudus ryšys tarp centrinio padalinio ir regioninių filialų rodo, kad įmonės turi vieningą požiūrį pokyčių ir kontrolės aspektais. Baltijos regiono atstovybėms rekomenduojama labiau atkreipti dėmesį į pacientų poreikius ir orientuotis į rodiklius, tiesiogiai susijusius su naujais vaistais ir gydymu. Taip pat svarbus visų sveikatos priežiūros organizacijų bendradarbiavimas, kuris turėtų tiesioginių teigiamų pokyčių bei padėtų sutaupyti išlaidų tiek Baltijos regioniniams filialams, tiek centriniams padaliniams.

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INTRODUCTION

Relevance of the topic. In the fast-changing world full of ideas, every aspect of the humankind is affected. To be successful in any sphere it is no longer enough to survive in the market. The idea is to be the market leader, content creator rather than the follower. Thus, to be first industries have to create something new. Innovation strives for a better solution. To reach the best outcome new requirements, unarticulated needs, and existing market needs have to be met. Innovation is at the heart of today's competitive economy and is the key element of every future-oriented business. However, innovation concept became one of the main topics only in last decade (Aloini, Lazzarotti, Manzini, Pellegrini, 2017; Anzola-Roman, Bayona-Saez, Garcia-Marco, 2018; Chua, 2018; Damanpour, Sanchez-Henriquez & Chiu, 2018). Most companies aim to implement as many novelties as possible, transforming and improving their products and processes without deeper analyses of the success rate of those innovations (Hinings, Gegenhuber & Greenwood, 2018). The main process of innovations occurs when idea or inventions are translated into actual good or service, which create value or sellable product. Innovations reach every aspect of one's life and in the recent year are expanding rapidly. In economy, new ideas are generated on daily passes, the speed of processing and applying these said ideas are increase each year. More and more industries develop systems to evaluate performance of the company, included the valuation of innovation. The performance measurement procedure in companies all over the country plays a crucial role in its economic development (Upadhaya, Munir & Blount, 2014; de Lancer Julnes & Holzer, 2014; Adomako, Opoku & Frimpong, 2018; Bedford, Bisbe & Sweeney, 2018) and having understood innovation, and its impacts are very important in the current turbulent economic environment (de Lancer Julnes & Holzer, 2014; Rossi & Aversano, 2015). Performance measurement field is no exception to innovations as well. The issue arises with the lack of useful measures to apply to entre process of implementing innovation. For smooth and transparent field, accounting has to be revised and structured and in line with laws. This slows the process of innovations. Therefore, choosing new ideas to implement must be evaluation based. Creating effective method to evaluate best, most accurate, least cost consuming innovations comes as a challenge. Lack of valuable system of measures appears in every sector, yet in the healthcare (Larisch, Amer-Wåhlin & Hidefjäll, 2016; Leotta & Ruggeri, 2017; Agarwal, Brem & Grottke, 2018) it is visible the most.

Regardless of the fact that many new creations have been implemented into various fields, one of the most rigid field in terms of any change is healthcare. As healthcare struggles for the need to adapt, learn, and develop to meet the demands of patients, providers, and payers, transformation becomes a leading point in the field's vision for the future. To meet these needs, innovation is increasingly seen as a critical capability for healthcare organizations (Clegg, MacBryde, Dey, Elg, Broryd & Kollberg, 2013; Larisch, Amer-Wåhlin & Hidefjäll, 2016). Implementing innovations in highly regulated healthcare and social service delivery systems requires bridging social and cognitive barriers of medical professions (Mosadeghrad, 2015). Innovation processes are complex and non-linear and require broader and subtle system transformations (Demirel & Mazzucato, 2012). New concepts keep changing medicine related field now more so than ever before. Rapid and vast implementation increases cost (Teoh & Cai, 2015; Rajapathirana & Hui, 2018), which in some cases do not add value, as many innovations are dropped in the long run. As innovation is inevitable driving force, wider social and economic contexts of innovation processes and conditions for implementing, and developing innovations in healthcare, need to be better detailed, reviewed and, if possible, changed.

The problem - How does the performance measures differ while implement innovations in the healthcare?

The purpose of this work is to develop a framework of the performance measurement of innovation implementation in healthcare. This area of research is new and relatively unstudied in the context of accounting. However, this study begins to scratch the surface of a large area of research that can act as the first step toward more reliable evaluation of innovation in accounting fields.

The object of this work – healthcare sector companies, who have implemented innovations.

Objectives:

1. To define current problems arising in the field of performance measurement while implementing innovations in healthcare.
2. To reveal theoretical aspects of innovation and performance measurement and to develop the framework of performance measurement of innovations implementation in healthcare.
3. To prepare the research methodology for the framework of performance measurement of innovations implementation in healthcare.
4. To present the main results of performance measurement of innovation implementation in healthcare industry's pharmaceutical area.

Research methods of this work: literature analysis, primary document analysis, case study.

Research limitations. Several factors make measuring healthcare productivity challenging. Reacher in the healthcare industry include only pharmaceutical sector, healthcare organizations such as hospitals or healthcare related associations do not fall under this research. In addition, this research covers only Baltic cluster branch offices, for full company overview main head office division needs to be researched.

1. PROBLEM ANALYSIS OF THE PERFORMANCE MEASUREMENT IN THE PROCESS OF INNOVATION IMPLEMENTATION IN THE HEALTHCARE SECTOR

The first part of the thesis provides the main issues related to the performance measurement of innovation implementation in healthcare. The following part aims to reveal actual situation of performance measurement, innovation and healthcare. Reviewing real cases for relevance, findings, and suggestions for performance measurement in healthcare and main innovations implemented in healthcare entities.

1.1. Analysis of the research relevance of the innovation implementation in healthcare in the aspect of accounting

Various forms of innovation implementation have been studied in the past decade. As business became multinational corporates expanding over continents, changes where introduced into every region. In 2008 Abdullah and Abdul Razak, researchers from University of Teknologi MARA, provided paper with empirical evidence about the scope of the adoption of different management accounting and technological innovations in the Klang Valley industrial area of Malaysia. Authors reviewed correlation between levels of automation and accounting in order to review the changes this new innovation brought. the changes started, the levels of automation were low and labor-based production processes were predominating. Similarly, levels of adoption for management accounting innovation remain low, with most companies using traditional and quantitative management accounting practices. Of traditional methods, budgeting was the most employed, while standard costing was the predominant costing method in use. For "new" methods, only total quality management (TQM) had had a significant impact. Tucker and Parker (2015) analysis backed up these results for Malaysia, which used Australia's field as a case. Innovation levels for "new" tools were at low levels; the major adoptions taking place were of "traditional" tools – budgeting and ratio analysis. Both cases provided the thought that innovation is more complementary part of the business change, rather than radical new wave, removing everything used before. Abdullah and Abdul Razak (2008) paper supports the suggestion that "relative advantage" is the major attribute grouping in determining the adoption of both technological and accounting changes. A significant positive relationship was found, supporting the association of technological innovation with both organization size and the current level of accounting practice; corresponding relationships with management accounting innovation were not apparent. As the study was conducted, Abdullah and Abdul Razak (2008) ran into a few limitations to these research findings, including the common problems associated with the conduct of mail questionnaire studies. Despite the time and effort devoted to the data collection stage of the study, the response rate remained disappointingly low. Since the study is confined only to industrial companies in the Klang Valley region, inferences from this study could not be generalized to other regions or to countries other than Malaysia. Abdullah and Abdul Razak (2008) advised to investigating other attributes deemed to be appropriate for specific administrative innovations.

As previous cases ran into shortages of administrative innovation areas Zawawi, Zahirul and Hoque took different approach in 2010 explaining how management accounting change could also draw on theories of innovation diffusion. The innovation diffusion approach itself provides a different view of management accounting studies, taking the perspective of the potential adopter to show that firms will not always attempt to imitate resources that produce a competitive advantage. In this case, Zawawi, Zahirul and Hoque (2010) took specific aspects such as efficiency, the characteristics of

innovation, and the role of users. However, in the management accounting field, this approach is relatively lacking, with only a brief discussion on the process of adoption and diffusion. Authors conducted literature review, generalizing already overseen empirical and field studies as Zawawi, Zahirul and Hoque (2010) explain various factors associated with the implementation and the outcome of innovation diffusion. Zawawi, Zahirul and Hoque (2010) mentioned that background for future research could involve Birkinshaw framework as there has been some similarities of invention to the implementation of novel management activities and termed management innovation. This area was studied from an institutional perspective, fashion perspective, cultural perspective, and rational perspective, which are dominant in the literature. Suggestions for a study using triangulation of theories to capture different dimensions of a phenomenon are also provided. Complementing different theories could provide more comprehensive understanding of the study. For example, the principles of innovation diffusion theory that emphasize the effectiveness of innovation could be complemented by institutional theory that presumes social legitimization. Similarly, different views could also be applied to understand management innovation, for instance by focusing on the contextual dynamics of institutional, fashion and rational perspectives in the different phases of the management innovation process (Cozzarin, 2017). As well, researchers could examine the recent management tools utilized in practice such as financial application for problem solving. Neural networks systems as well as time series analysis are starting to be used for forecasting, budgeting, and cost determination. These suggestions were named as possible advances of Zawawi and his teams work (2010), stating that interactions should provide practical arguments towards innovation diffusion approach.

Most innovations have been adapted by fast moving business. These traits are visible due to investment possibilities. It is relatively easier to review the innovation in areas that deal in consumer goods. Nonetheless, innovations have also been seen in various healthcare sector aspects (Laursen & Salter, 2004).

Healthcare industry is one of the largest and fastest growing industries in the world, and it continues to be a most sensitive industry related with innovations. The larger healthcare landscape includes all goods, services, and payment mechanisms for achieving and maintaining one's health. It includes, but is not limited to: physician offices, hospitals, labs, radiology centers, physical therapy offices, pharmaceutical companies, pharmacies, and now health insurance companies, group purchasing organizations, pharmacy benefit managers, corporate healthcare systems, and combinations of insurance/PBM/pharmacy and much more (Porter, Larsson & Lee, 2016). All these entities are not necessary in each healthcare interaction for a patient. Improving pharmaceutical care is constantly addressed within every country. In recent years, health care insurance companies had tried different policies, such as outcome-based funding for effective prescription of medicine by general practitioners, in an attempt to improve the quality of pharmaceutical care and to control the cost of medicines. However, the expenditure on pharmaceutical care barely dropped (Batenburg et al., 2015).

Cases in many countries have been studied, regarding healthcare sector changes. Larisch, Amer-Wåhlin and Hidefjäll (2016) have analyzed Stockholm healthcare situation. Larisch, Amer-Wåhlin and Hidefjäll (2016) took this region due to the fact that Stockholm region was one of Europe's largest life science clusters with 611 companies and 20,852 employees. 28 representatives from 16 different organizations, which were members of Stockholm Healthcare Innovation Advisory Board participated in the interview-based cases. Larisch, Amer-Wåhlin and Hidefjäll (2016) have developed

a framework using structural parts: institutions, actors and networks and function part: legitimation, guidance of search, creation of system, market formation, resource mobilization entrepreneurial experimentation, knowledge development and diffusion which lead to outcome - innovation in process, product, organization and business. Larisch, Amer-Wåhlin and Hidefjäll (2016) conducted case studied that provided results such as insufficiency in innovation exploitation due to several mutually supporting blocking mechanisms. The development of healthcare innovation-related communities of practice was in initial stages and should have been strengthened by providing easily accessible internet platforms for knowledge development and diffusion. Chenhall and Langfield-Smith (2017) conducted research in Denmark hospitals aiming to define the role of which patient narratives play in supporting translation and meaning making in healthcare innovation processes. Analysis was followed thought two innovation projects and analyzing the processes of defining problems, constructing patient narratives and evoking new insights into patient experience. In the two local healthcare innovation projects the patient narratives created new insights into patient experience by demonstrating voices from the worlds of patients in relation to the logic of healthcare professionals (Gadolin & Andersson, 2017). Innovation workshops became new platforms for collaboration between healthcare professionals and patient narratives, serving to translate new ideas of patient involvement into the everyday life of healthcare organizations (Teoh & Cai, 2015). A joint healthcare innovation strategy for academia, industry, and healthcare could have strengthened the inclusion of more competence fields for the co-creation of holistic healthcare innovations. To dismantle the linear way of innovation, more resources specific for healthcare innovation and opportunities for intra and entrepreneurship and business acumen in healthcare were necessary. The institutional framework: procurement and reimbursement processes, and innovation process had to be faster and more effective adapted to create a more enabling environment for innovation. A systematic encouragement of healthcare professionals and patients' need articulation on both the demand and supply side was necessary for value-based healthcare. Overall, deeper knowledge of connection between functional and structural dynamics and their impact on the innovations were necessary to make further conclusion in the studies. Teoh and Cai (2015) Larisch, Amer-Wåhlin and Hidefjäll (2016) and Gadolin & Andersson (2017) suggested reviewing the process of innovation development and relevance in the field of healthcare.

The process of reviewing, controlling, and evaluating the development of innovation implementation falls under managerial account field as this area is vast and covers many aspects of performance measurement in the organization. Thus, reviewing the cases of performance measurement in the field of healthcare gives better understanding of the need for it in the light of innovation.

1.2 Analysis of the research relevance of the performance measurement in healthcare

One of the most important aspects to be considered in relation to the performance measurement process is that performance measures work qualitatively to provide the valuable information on products, processes and services which are produced in a business. Hence, implementing a performance measurement is an effective way to understand, manage and improve a business organization (Cocca & Alberti, 2010; Ivanov & Avasilcăi, 2014). This mentioned approach has been employed by many businesses and it has been adapted accordingly into the specific fields. Recent changes in the working style demonstrate a great potential for improving the business performance of knowledge-intensive organizations (Malerba, 2010; Ruostela et al., 2012). More flexibility and autonomy allow workers to decide when, where and how their work is shaped. Mobile work practices

present the potential to enhance both the productivity and the well-being of knowledge workers, and more widely, the business performance of knowledge-intensive organizations and the wider society. These various changes may have implications, for example, employee motivation or the real estate and facility management perspectives, office space requirements and workplace services (Laihonenet et al., 2012, Palvalin et al., 2014). Such organizational structure requires a couple of modules to be applied in order to prove the efficiency of working style adjustments. In the research conducted by Palvalin and Vuolle (2016), many open-ended conclusions were drawn in terms of performance measurement usage. It is worth mentioning that the authors advised on utilizing the multidimensional performance measurement. In the analysis, two methods were provided as the purpose of the study was to identify the productivity potential and goals for work environment change and to analyze and measure the impact of change in a workplace. Palvalin and Vuolle (2016) have concluded that the most accurate measures are: space usage, occupancy cost and environmental impact. It has also been noted that measuring the influences should be seen as a process, and the measurements should be integrated into the new ways of managing a project from the beginning in order to have a fair view of the successfulness of the implementation.

However, performance measurement and its systems are not limited to private businesses and can and should be applied in the public sector as well. Assessing the methods of efficient government spending is difficult without specific performance measurement (Striteska & Spickova, 2012). This statement is in line with the argument by Rossi and Aversano (2015) who claim accountability can be promoted by using performance measurement, especially in government organizations. The researchers Ali, Elham and Alauddin (2014) analyzed the case of performance measurement impact on the accountability in the public sector. Later on, research on the same theory by Lee (2018) was conducted. Author believed that due to performance measurement credible organizations monitor the production of internal services that contribute to the efficient and effective production of external services for clients; outputs can be measured as services provided in terms of such factors as quantity and quality; and outcome measurement is paramount in non-profit organization as it promotes accountability, the concept that is vital in the non-profit sector. Ali, Elham and Alauddin (2014) highlight the significance of implementation stage in the performance measurement. This is due to the fact that the stakeholders in a public sector vary, and to some extent, have a conflicting interest. The authors note that measures were applied in terms of financial capacity, stating that, a more in-depth approach should be given to the non-financial performance measures.

Performance measurement in most cases arises from a financial aspect, however, it can be applied to review and analyze not only the financial side but also drive deeper into an organizational side of the company. Exemplary cases all over the world have been investigated by how these systems can be employed to shape behavior and to discuss and express the beliefs and values of organization members (Chenhall, Hall & Smith, 2017). The research conducted in Sri Lanka suggested the development and operation of performance measurement, particularly, its manifestations in material artefacts which could help staff to consider, reflect and articulate their values and beliefs. Researchers Chenhall, Hall & Smith (2017) referred to the theory that the engagement of organizational members in the performance measurement process is likely to be important for the expressive role of performance measurement (Chenhall, Hall, & Smith, 2017). The second author participated in the development of performance measurement for the mental health program, which were government hospitals and rehabilitation centers, along with the two non-government organizations. By comparing different sections and indicators that were trialed, tested with face-to-face meetings and seven

frameworks, the performance measurement system was developed. Therefore, LEAP (i.e., an acronym representing "Learning, Evaluation, Assessment for Partners") was the end product. Various indicators were introduced to expand the scope of answers. The aim of these indicators was to evaluate the level of concerns whether staff workers at the mental health facilities informed patients about their diagnoses, treatments, side effects of medication, recordings of information about patients and their openness in the communication with the personnel. The results of developed performance measurement showed that it could provide a mechanism through which the values and beliefs of organizational members can be expressed as part of their work, helping staff and volunteers to express and discuss the importance of the beneficiary in meetings where the indicators were developed and refined. Chenhall, Hall & Smith (2017) stress the development and communication between the organization as the main key of the non-financial performance measurement indicators. For performance measurement to reveal the expression of beliefs and values, it must involve people in meaningful action of some kind whether that is developing indicators, providing feedback on PMS design or considering the implications of performance measurement information (Chenhall, Hall & Smith, 2017).

Following the concept of performance measurement, the researchers Nakaima, Sridharan and Gardner (2013) aim to develop a functional system for health equities in Toronto area. The authors note that such challenges as coordinating the various parts of the system, the heterogeneous nature of such sub-systems or how evaluations and measurement can improve performance (Fawcett, Schultz, Watson Thompson, Fox, & Bremby, 2010) are the main drive points for the research. The question on why performance measurement of health equity initiatives matters has been raised together with the exploration on the mechanisms by which performance measurement in itself can affect health equities. A focus on measuring health equity consistently over time can also raise the salience of equity as an important goal for all organizations, thus authors stress selecting the right indicators – not just clinical but those reflecting 'a success' in addressing disparities and needs of disadvantaged – and collecting, compiling and analyzing the data effectively, atop other building analysis of this data, and evaluating how well individual programs, institutions and the system as a whole perform against equity objectives and indicators, and adjusting accordingly (Evans et al., 2009). The research consisted of three steps: hospital-specific analysis, cross-hospital synthesis, and stakeholder dialogue. The outcome provided many suggestions for creating successful performance measurement for healthcare entity. There was a lot of feedback on: the importance of examining inequities at multiple points of the patient flow through the health care system, on the relevance of developing an electronic data tracking system to record and monitor the flow of the client in the health system, and on data for examining the needs, utilization patterns and quality gaps in hospitals. Nakaima, Sridharan and Gardner (2013) suggested to develop a project by taking recommendations on integrating health equity perspectives within existing balanced scorecards, any service accountability agreements, other strategic planning, and performance management tools. Furthermore, the authors mentioned to invent a coherent evaluation and monitoring strategy to be able to assess progress, to identify successful and promising programs and services, and to produce the most efficient system with given results.

Healthcare organizations have moved from financially focused systems to integrated various non-financial concerns such as service quality, process efficiency, and other factors of interest to their various stakeholders (Landrum et al., 2010). O'Mahony and Coughlan (2016) have conducted a research in Irish public healthcare in order to provide the current situation of performance measurement in this closed of industry. The research indicated that there have been various

transformations in the Ireland's Health Services for the past couple of decades. Strategic healthcare planning in Ireland between 2005 and 2015 has been confronted by significant challenges such as population health, social changes, economic pressures, and the problems of managing large healthcare organizations. The three strategies, developed during the study period, targeted improving service safety, quality, equality, and integrating these attributes with patient experience and satisfaction. The key findings from the authors' study were that the performance measurement was not used effectively to monitor performance, as it often did not reflect a given year's achievements against those of the preceding year. The performance measurement indicators were inconsistent with frequent additions and deletions being made from year to year. The recommended changes included more industry-oriented development of balance scorecard in addition to the full deployments of united performance measurement in all areas. The best balance scorecard practice suggested that it is essential not only to the decision makers who require this information (Bedford, Bisbe & Sweeney, 2018). Lower managerial levels and all employees all-together need to have an adequate understanding of the performance measurement in order to be better at planning, communicating, and controlling healthcare strategy. The implementation and adoption of the balance scorecard in the Ireland's Health Services and different sub-organizations (e.g., hospitals, departments) could have played a vital role in enabling managers and employees to gain and practice the knowledge they needed to implement performance measurement successfully. Motivation and training about performance measurement concepts would have been efficacious in promoting their practice in hospitals: the many benefits that could have accrued included enhanced understanding and communication of strategy, improved integration between the Ireland's Health Services and hospital systems, greater staff engagement and contributions, more effective resource deployment, and standard benchmarking between hospitals (O'Mahony & Coughlan, 2016).

In summary, one can argue that performance measurement in healthcare is costly attribute that may not be the main factor of successful control, however, communities must be able to identify opportunities for reducing costs and improving quality and monitor whether these opportunities are being favorably addressed. Hence, performance measurement is the main tool to understand, manage and improve organization. Many cases were conducted for the field of healthcare in the light of performance measurement which lead to positive outcomes of increased accuracy of the measures and easier achieved set goals. As healthcare field is very sensitive to innovations, the attention is drawn to the value of it. A further case review is necessary to determine what the current state of performance measurement of innovation implementation is.

1.3. Reasoning of the research relevance of the performance measurement of innovation implementation in healthcare

It is a common goal of most managers' interest to evaluate the success of changes. The relationship between innovation and performance measurement, however, has not been discoursed vastly as it is a broad field to cover. Not only is it difficult to review the already exciting innovations, to develop new and according ones, it is also challenging to revise them in every step of the way (Clausen, Pohjola, Sapprasert & Verspagen, 2012). The challenge of the case mainly rises in measure development. The measures should be changeable and established based on the experience of evolving innovation and correspond to each situation accordingly. To achieve such goals, the evident value should be visible, and the importance of innovation performance measurement must be clear. Giving more strategic and operational principles to obtain benefits as well as a wide range of measures

of innovation should be adopted to reflect its diversity (Moretti & Biancardi, 2018). Most cases arise from the interaction between financial performance measures and its correlations among innovation aspects: know-how, external knowledge, organizing structures and so forth (Saunila, 2016). Although not all of them represent a positive outcome.

The argument for positive relationship between the profitability and innovation is based on the fact that innovation creates products with higher added value which have a competitive advantage that limits competence (González-Fernández & González-Velasco, 2018). Innovative effort is especially advantageous for small and medium enterprises as their smaller size and greater agility allow them greater flexibility to develop innovative products and processes and generate new demand that allows them to grow (Rosenbusch, Brinckmann, & Bausch, 2011). A higher level of business innovation positively influences financial performance, especially sales revenue, based on 9257 Spain companies which were analyzed in the period of 2007-2013 (González-Fernández & González-Velasco, 2018). Therefore, granting subsidies or fiscal benefits for innovating companies should be the aim of the government for raising innovation possibilities (Chua, et al., 2018; González-Fernández & González-Velasco, 2018).

A negative relationship between the exploitation of external knowledge and the return of investment of the firm in Finnish small and medium enterprises have been discovered, indicating that the firms have not been able to utilize external knowledge in a sophisticated manner (Saunila, 2014). Moretti and Biancardi (2018) also addressed the lack of strong support for innovation and performance. The aftermath of establishing intangibles predisposes the economic performance only for larger firms. Moretti and Biancardi (2018) referred to Henry Chesbrough's (2003) terminology of open innovation for the suggested changes in the field of administrative departments. This type of innovation aims to attract outer knowledge and takes examples of other practices rather than developing changes internally. Such innovation increased employment only for relatively smaller firms while it had no effect on the financial side of performance. Thus, the correlation between performance measurement and innovation is not significant. However, 4 years later, the research conducted by Sun and Zhao (2018) in selected Chinese enterprises had different outcome on external level. Innovation performance of venture capital supported enterprises are significantly higher than of non-venture capital supported enterprises. For industries with a higher external financing dependence, higher high-tech intensity and regions with better property rights protection, venture capital promotes the innovation performance enterprises more considerably (Meglio et al., 2017; Adomako, Opoku, & Frimpong, 2018; Crain, 2018). For this reason, Sun and Zhao (2018) deducted that open innovation, which was taken as venture capital, had positive impact in innovation field, stating that, the measures of the performance measurement are very sensitive to the types of innovation.

Another hypothesis about significant relationship between know-how development and profitability gave negative results as well, proving the point of measurement choice importance. The analysis indicated that the relationship is mainly nonexistent (Saunila, 2014). Yet, Aloini, Lazzarotti, Manzini & Pellegrini analyzed 477 firms from Finland, Italy, Sweden, and UK applying Intellectual property as an active element of innovation. The use of IP had a positive impact on the company's innovation performance in the sense that they allow companies to adopt open innovation models. Openness, in turn, allows companies to improve their innovation performance (Aloini, Lazzarotti, Manzini, Pellegrini, 2017). Further investigation of the effects of appropriability mechanisms and openness depth were made on two types of innovation performance across different stages of the innovation

process (Stefan & Bengtsson, 2017). Distinguishing between the stages of the innovation process is meaningful when determining the effects of openness towards different types of partners and the use of intellectual property on innovation performance. In early stages of open innovation processes, the know-how method is vastly used, however, the knowledge incorporated in new products or processes may be difficult to patent in earlier phases, due to the fact that it is not fully developed (Rauter, Globocnik, Perl-Vorbach, Baumgartner, 2018). In the Brazilian case, Oliveira et al. (2014) observed that companies with greater intangibility presented superior performance to the others and that the intangible assets could generate competitive advantages. The tests, performed by Jordão and Almeida (2013), presented increase comprehension of the knowledge embodied in the intellectual capital and of its impact on profitability and corporate return, measured by different metrics. Moreover, the study uncovered that more intangible-intensive companies present results superior to the others both in terms of profitability and return, not only individually but also by industry and behavior; this result is found in all different industries analyzed without exception.

Despite the insignificant results of relationship between ideation and organizing structures and profitability (Saunila, 2014), organizational innovation and learning are affected by the organizational values, beliefs, work environment, knowledge sharing, and all the cultural activities in the organization (Aloini, Lazzarotti, Manzini, Pellegrini 2017; Hislop & Helms, 2018; Rauter, Globocnik, Perl-Vorbach, Baumgartner, 2018). Empirical results by Shahzad, Xiu and Shahbaz (2017) were conducted: a strong positive relationship between organizational culture and innovation performance measurements in the software industry of Pakistan were proved. Organizational innovation is classified as an input in the innovation process (Haned, Mothe, & Nguyen-Thi, 2014) contributing to the open innovation concept. Another batch of results including analysis of Spanish region point to a positive direct effect of organizational innovation for both cases; that is, organizational innovation increases the probability of obtaining successful product and process innovations (Anzola-Roman, Bayona-Saez, Garcia-Marco, 2018). The research provides a string of impacts between organizational culture and innovation implementation steps: input, process and output or outcome. Many authors note that such organizational structures can be applied in most industries without exception (Jordão & Almeida, 2013). Pedrosa et al. (2015) described the essentiality of innovation for third-party logistics providers in responding to demands for advanced logistics services. Chu, Feng, & Lai (2018) investigated further on this view and applied the hypothesis of organizing structures, logistics department, and impact on a firm's overall performance. The results from empirical research presented a strong support for both political and business guanxi (i.e., a basic dynamic in personalized networks of influence, a central idea in the Chinese society) having a positive effect on logistics service innovation by third-party logistics providers in China. The selected company for which a fully functional model has been applied received financial support to invest in the technologies of express drones from the government.

A brand-new innovation, proposed by Forés and Camisón (2016), was identified as radical innovation which had great financial reward and highly competitive advantages in developing companies, in addition, it also provided benefits for customers that is essential to all customer-oriented companies. However, such radical innovations are difficult to develop (Rubera & Kirca, 2012; Kyriakopoulos et al., 2016) as driving force of radical ideas derive from the opposite direction; ideas are typically generated by individuals, developed by teams, thus ideas do not reach the organizational level until the permission to start a development project is granted (Pihlajamaa, 2017). The motivation for radical innovation development refers to factors which stimulate action and may affect the acquisition and

use of an individual's skills and abilities (Forés & Camisón, 2016) to conduct job tasks which promote radical innovation performance such as idea generation, concept development, and overcoming organizational barriers (Pihlajamaa, 2017). Radical innovations often include new technologies and aim for new markets, this usually leads to new business models as existing value chains may not be fitting (O'Connor, 2008; Kyriakopoulos et al., 2016). A high level of motivation was considered to be beneficial for finding the best strategies for resolving issues that arise during the development process (Pihlajamaa, 2017), which confirms significant relationship between individual activity and profitability (Saunila, 2016), even though no significant statistical data has been found thus far. Connectivity and inter-unit ties in the knowledge transfer network are both and separately known to allow individuals to contribute to innovation (Saunila, 2016). Innovation policy should focus on individual characteristics such as skills (Forés & Camisón, 2016) or routines established in a firm (O'Connor, 2008; van Driel & Dolfsma, 2009). Innovative knowledge based on individual skills may have indirect positive effect on companies' corporate measures (Aalbers, Dolfsma & Koppius, 2013).

The significant impact between profitability and culture control is detailed in the research by Tubagus Ismail (2016). Author emphasizes that creative industries will be able to improve Indonesian's economy as most of small and medium enterprise industries in Indonesia have cultural-based industry mentality. Cultural control is realized in written form (behavior, ethic code and mission) and unwritten one (management philosophy such as ideology, values) (Merchant & Van der Stede, 2007). Ismail (2016) has used this approach in accordance with a previously conducted research to further investigate the changes of innovation in specific areas. The positive relationship between the use of management control system and product innovation found itself enforcing to the authors approach (Aalbers, Dolfsma, Koppius, 2013; Saunila, 2016); specifically, control means revealed that interactive control system had the biggest influence (Merchant & Van der Stede, 2007; Saunila, 2016). The outcome of those studies was clear influence between control and innovation, imposing that measures are crucial metrics for successful implementation and innovation. Ismail (2016) studies contributed with two types of findings: the first analysis highlighted a cultural control positively influencing the capabilities of an organization and the second one showed that creativity does facilitate the innovation formation process. Moreover, further research was suggested concerning profitability. As Saunila (2016) has found only the correlation between cultural controls impact on profitability, causation reasoning is needed to fully support this connection.

Overall, an organization's performance is considered as a multidimensional umbrella concept including all aspects related to that organization's success and activities (Tangen, 2005). Rapid changes named as innovations are appearing in various types and affect all industries (Jordão & Almeida, 2013). In management practice, organizations have invested considerable amounts of resources to measure and demonstrate their performance (Micheli & Manzoni, 2010; Aloini, Lazzarotti, Manzini, Pellegrini, 2017). All of this has been done to develop most usable and elastic tools or measures. This includes efficiency, effectiveness, quality, productivity, quality of work life and profitability (Mosadeghrad, 2015). However, despite many attempts, there is no conclusive evidence over the most beneficial and least shortcomings of already developed performance measurement in either private or public sector organizations (Upadhaya, Munir & Blount, 2014; Larisch, Amer-Wåhlin and Hidefjäll, 2016; Saunila, 2016). Despite having been a matter of research for decades performance measurement has not reached its most disadvantage-free framework. Therefore, its application to innovation field has many variables that need to be considered for further studies to continue.

2. THEORETICAL ASPECTS OF THE PERFORMANCE MEASUREMENT IN THE PROCESS OF INNOVATION IMPLEMENTATION IN THE HEALTHCARE SECTOR

The second part of the thesis provides the theoretical aspects of literature analysis of performance measurement of innovation implementation in healthcare. Review of the following part aims to achieve a more comprehensive assessment of the topics of performance measurement and innovation, and in addition - provide compressive knowledge of innovation implementation using performance measurement.

2.1. Theoretical aspects of the performance measurement

The concept of the performance measurement. According to Behn (2003), performance measurement is "the process of collecting, analyzing, and/or reporting information regarding the performance of an individual, group, organization, system or component". Neely (2005) defined performance measurement as "the process of quantifying something which leads to performance". Performance measurement has been defined as the development of indicators and collection of data to describe, report on, and analyze performance (Porter & Lee, 2016); the production of information about an organization's performance, and that it is ongoing and it occurs regularly and the information serves as basis for modifying plans to enhance performance useful to the firm's stakeholders (Julnes & Holzer 2014); the process of measuring the performance of an organization, a program, a function, or a process (Bedford, Bisbe & Sweeney, 2018). Typically, it provides feedback to managers on the effectiveness of improvement interventions as part of learning and development (Liebowitz, 2012; Spekle & Verbeeten, 2014) and has to answer the following three questions (Liebowitz et al., 2012; Wong, Tan, Lee, & Wong, 2015):

- How well an organization is performing?
- Is the organization achieving its objectives?
- How much has the organization improved from a last period?

Parker (2000) and, later, Liu, Love, Smith, Regan & Sutrisna (2014) has expanded the reasoning behind organizations using performance measurement:

- identify success
- identify whether they are meeting customer requirements: unless they measure, how do they know that they are providing the services/products that their customers require?
- help them understand their processes: to confirm what they know or reveal what they do not know
- identify where problems bottlenecks, waste, etc., exist and where improvements are necessary
- ensure decisions are based on fact, not on supposition, emotion or faith or intuition and show if improvements planned, actually happened.

Behn (2003), Pitt & Tucker (2008) and He & Abdous (2013) have listed three broad purposes of performance measurement:

- to ensure the achievement of goals and objectives;
- to evaluate, control and improve procedures and processes; and

- to compare and assess the performance of different organizations, teams and individuals.

Most common usage of performance measurement is used to help for the allocation of resources, assets and communicate progress towards strategic objectives and to evaluate managerial performance (Ittner & Larcker, 2003; Franco-Santos et al., 2012). Another purpose of performance measurement is to fulfil the following two criteria (Tangen, 2005; Striteska, & Spickova, 2012):

- Information from the performance measures is usable by the organization. To collect information that is not used is a waste of resources. This criterion is highly dependent on the information retrieved from the measure going to the right person at the right time;
- Information from the performance measure has to be beneficial to the organization. The term beneficial should in this context be interpreted as a combination of quality and usefulness.

The aim of main features of performance measurement is to be able to categorize elements that drive the organization to their main goals. Having distinct figures allows for comparisons to be made to enable performance improvements of the organization. Features have to be able to reflect on the overall organizational goals and strategies, be relevant, timely actionable, applicable to financial and non-financial aspects (He & Abdous 2013). Based on Kerssens-Van Drongelen & Fisscher (2003), Tangen (2005), Taticchi (2012) and Franco-Santos (2012), table 1 provides the most applicable features: measure, metrics, indicators, data and method. The measuring attribute is usually developed by organizations in order to link to strategic objectives, to capture data or variable to measure performance and generate decision-useful information (Julnes, 2007; Upadhaya, Munir & Blount, 2014). Metrics and indicators are described as financial and/or non-financial form, and they are usually used interchangeably in many general discussions about performance measurement because all can be used in performance measurement. Metric is used interchangeably with measure (Bourne et al., 2013; Choong 2013), and indicator is used interchangeably with measure (Julnes, 2007; 2012; Choong 2013; de Lancer Julnes & Holzer, 2014). In addition, Trochim (2006) states that an indicator consists of a combination of qualitative and quantitative attributes, collected, and processed using multidimensional scaling and cluster analysis to create an unambiguous and valid tool to inform users of direction or measure. Data or variables are usually financial, non-financial, quantitative or qualitative (Franco-Santos et al., 2012; Liu, Love, Smith, Regan & Sutrisna, 2014) As the measurement used in organizations is overwhelmingly financial and quantitative, a manner or mode of procedure, especially an orderly, logical, or systematic way of instruction, inquiry can be called a method for performance measurement (Choong, 2013).

In most cases features are altered and adapted accordingly to industry, company, scope of field. Thus, each feature can develop specific traits and according to Gomes et al. (2004), performance measurement should have several characteristics:

- Involve relevant non-financial information based on key business success factors (Bititci et al., 2012);
- Articulate strategy and monitor business results;
- Measures and related systems are based on organizational objectives, critical success factors, have a customer orientation and monitor both financial and non-financial results (Watts & McNair-Connolly, 2012);
- Dynamically follow strategy (Upadhaya, Munir & Blount, 2014);
- Long-term oriented, and simple to understand and implement;

- Link to reward systems;
- Cover financial and non-financial set of measures that are coherent and consistent with the strategic framework (Bititci et al., 2012).

Table 1. Main features of performance measurement

Features of PM	**Definition**	**Authors**
Measure	define the size, amount, or degree of (something) by using an instrument or device marked in standard units, it assesses the importance, effect, or value of entity	McNair, Lynch & Cross, 1990; Parker, 2000; Simons et al., 2000; De Toni & Tonchia, 2001; Behn, 2003; Gomes et al., 2004; Merchant & Van der Stede, 2007; Cocca & Alberti, 2010; Bititci, Garengo, Dörfler & Nudurupati, 2012; Clegg, MacBryde, Dey, Elg, Broryd & Kollberg, 2013; Wong, Tan, Lee, & Wong, 2015; Rossi & Aversano, 2015; Jordão & Almeida, 2017; Bedford, Bisbe & Sweeney, 2018; Lee, 2018
Metrics	Standards of measurement by which efficiency, performance, progress, or quality of a plan, process, or product can be assessed.	Parker, 2000; De Toni & Tonchia, 2001; Behn, 2003; Merchant & Van der Stede, 2007; Cocca & Alberti, 2010; Striteska & Spickova, 2012; Bititci, Garengo, Dörfler & Nudurupati, 2012; Clegg, MacBryde, Dey, Elg, Broryd & Kollberg, 2013; Choong, 2013; Wong, Tan, Lee, & Wong, 2015; Bedford, Bisbe & Sweeney, 2018; Lee, 2018
Indicators	Measurable variable used as a representation of an associated factor or quantity	Behn, 2003; Cocca & Alberti, 2010; Striteska & Spickova, 2012; Bititci, Garengo, Dörfler & Nudurupati, 2012; Ferreira, Shamsuzzoha, Toscano & ; Cunha, 2012; Clegg, MacBryde, Dey, Elg, Broryd & Kollberg, 2013; Choong, 2013; Wong, Tan, Lee, & Wong, 2015; Rossi & Aversano, 2015; Jordão & Almeida, 2017
Data	Information in raw or unorganized form that refer to, or represent, conditions, ideas, or objects	Striteska & Spickova, 2012; Bititci, Garengo, Dörfler & Nudurupati, 2012; Ferreira, Shamsuzzoha, Toscano & Cunha, 2012; de Lancer Julnes, & Holzer, 2014; Wong, Tan, Lee, & Wong, 2015; Rossi & Aversano, 2015; Bedford, Bisbe & Sweeney, 2018
Method	Procedure for accomplishing or approaching something, especially a systematic or established one	De Toni & Tonchia, 2001; Behn, 2003; Gomes et al., 2004; Cocca & Alberti, 2010; Striteska & Spickova, 2012; Ferreira, Shamsuzzoha, Toscano & ; Cunha, 2012; Choong, 2013; de Lancer Julnes, & Holzer, 2014; Rossi & Aversano, 2015; Palvalin & Vuolle, 2016; Jordão & Almeida, 2017; Bedford, Bisbe & Sweeney, 2018; Lee, 2018; Cestari et al., 2018

To be effective performance measurement should be dynamic and has to be modified as circumstances change so that performance measures remain relevant (Zizlavsky, 2014), and for that purpose multidimensional performance measurement ensures that:

- relevant performance dimensions are considered (Ittner et al., 2003)
- allows managers to focus on the "means to the end" (Tung et al., 2011)
- demonstrate strong performance in a variety of areas (Tung et al., 2011)
- are capable of providing signals and motivating improvement in crucial activities (Hoque & Adams, 2008)
- if objective and subjective non-financial measures are included, better overall performance of organization is achieved (Van der Stede et al., 2006)
- non-financial performance measures are better in helping organizations implement and manage new initiatives (Van der Stede et al., 2006)

Conceptually, performance measurement lacks an agreed established definition. According to Amaratunga and Baldry (2002), a performance management is a system that uses information on performance to produce a positive change in organizational culture, systems and processes. Similarly, Rossi & Aversano (2015) add that there is an embedded role for PMS as part of Operations Strategic Management Systems. Ivanov and Avasilcai (2014) note that PMS is responsible for the management of operations strategy implementation. Understanding the role of a performance measurement system is a first step in defining system capabilities and functions that will support such strategic management system (Pinheiro de Lima et al., 2008). Many authors highlight the importance of establishing causal links between business strategy and performance measurement design and suggest there are theoretical constructions that mediate the relationship between strategy and performance measures and that these links should be studied in terms of their structural and dynamics characteristics. Gunasekaran, Patel & McGaughey (2004) developed relevant principles for performance measurement design that cover the dynamic nature of measures—measures as part of a fast feedback subsystem, and measures designed to stimulate continuous improvement capability rather than simply monitoring the ongoing operations strategy. While a strategic management function is identified by the performance, measures implemented, its important role in developing continuous improvement capabilities (Alegre & Chiva 2008; Li &Tang, 2009; Nakaima, Sridharan & Gardner, 2013).

According to Lee (2018), measurements are the yardsticks that tell about how much has been done and motivate organizations to perform further. Measurement is about performance, and it is necessary to measure, monitor, control and manage things and process in understanding firm performance (Taticchi et al., 2010).

The process of performance measurement. The process of performance measurement has been divided into four stages (Neely et al., 2005; Bourne et al., 2013); these being design, implementation, use and refreshing (Fig. 1).

Figure 1. Stages of performance measurement process (Neely et al, 2005)

The processes of design and implementation have been studied and both have an impact on the outcome (Bourne et al., 2013) and effectiveness of the measurement (Neely and Bourne, 2013). Most of the papers that contain performance measurement draw attention to the need for continuous reviews of the measures themselves, their results, and their impact on goals and strategy with a clear focus on improvement and learning (Evans, Lowinger, Sprivulis, Copnell & Cameron, 2009; Rubera & Kirca, 2012; Nakaima, Sridharan & Gardner, 2013) to keep the measures and measurement system relevant for the organization and its users (Ivanov & Avasilcăi, 2014). Franco-Santos (2012) has synthesized key processes associated with the use of performance measures and has distinguished seven factors, based on pervious authors' works:

- the linking to strategic objectives;
- the method of data capture;
- data analysis;
- interpretation and evaluation;
- the provision of information and communication;
- decision-making;
- taking action;

However, the phases can overlap as different individual measures are implemented at different rates. Thus, some measures can be implemented before all the measures have been completely designed, and from the various authors' cases, it is often the seen that there is an overlap between implementation and use (Bourne et al., 2013).

Due to variety of performance measurement attributes the difficulty of implementation arises. Parker (2000) and Liu, Love, Smith, Regan & Sutrisna (2014) addresses lack of accurate includability, separation timely issues:

- measures tend to be very insular or inward-looking (although financial data can be compared with other organizations, arguments can make comparison unreliable due to additional reasoning behind the resulting of the measure)
- measures fail to accurately include the less tangible factors such as product or service sustainability and employee morale, (though metrics are constantly being developed, they are very industry oriented and short-lived)
- they are lagging indicators (they show what has happened in the past and are poor predictors of future performance).

According to Simpson, Padmore & Newman (2012) performance measurement rarely lives up to the high expectations. He addresses along the following lines that organizations are usually swamped with indicators, which they use and drop constantly. Many companies fear the change and rather choose to focus on the less risky approach such as improving already existing strategies, dropping new business models and new performance measurements altogether (Pichlak, 2016). Nakaima, Sridharan and Gardner (2013) write that it is impossible to improve just one measurement of a company's performance without somehow affecting other areas of performance. Performance measures then, rapidly lose the capacity to evaluate the organization as no indicators stay long enough to provide sufficient results. In addition, indicators lose the relations between each other making it difficult to determine the state of organization. De Bruijn (2007) is convinced that due to inconstancy

in performance measurement usage the public sector will have negative effects in the long term. The possible issues (cost, accuracy, time, efficiency) for successful performance measurement implementation are noted by many authors. However most common have been these six constrains, expanding Parker's (2005) and de Bruijn's (2007) view on negative side of performance measures:

- Even though surveys provide direct response from the customer to the firm, it can be high cost instruments that require be high maintenance. It takes many costs to gather data, an unbiased sampling scheme needs to be devised and questions carefully constructed. Firms also need to be aware of survey fatigue (Tate, 2000).
- Data may be too infrequent for management decision making. An annual customer or employee survey cannot provide necessary effects as managers cannot wait a year to decide about issues of the customer or employee satisfaction.
- Measurement of the three categories of intangible assets (human, structural and relational capital) is often complex and multi-dimensional. Measures often require significant investment to develop a reliable instrument (Dewangan & Godse, 2014).
- The firm does not want to record the data because it indicates an undesirable event has occurred; for example, fraud, crime, accident, fine, litigious complaint. The challenge is to find early warning indicators.
- Apportioning the right level of accountability for a measure can prove an elusive issue, as many do not want to be assessed by uncontrollable measures.
- Since most data must be gathered manually, due to various changes in the necessity of information, reporting soon becomes a burden and the firm is forced to simplify the measures on its scorecard (De Bruijn, 2007)

Even though, performance measurement concept lacks stability it has been used in many parts of organization and for some cases performance measurement can even serve as a control system. For example, public sector used total quality management systems. As these systems have non-financial indicators. Within the European Foundation for Quality Management, there is an "improving public sector performance group", whose mission is to promote and support improvements by the use of excellence concepts in public sector organizations. Thus, performance measurement comes a perfect control and comparisons instrument (Jordão & Almeida, 2017).

Performance measurement must be integrated with at least three other types of systems (Parker, 2000; Pitt & Tucker, 2008; Taticchi, 2012):

- the accounting system regarding both the balance sheet accounting, the analytical cost accounting and the budgeting;
- the manufacturing planning and control system (MPCS);
- the strategic planning;

In order to perform a complete review of performance measurement, it is, therefore, necessary to assess not only the effectiveness of the measures but also the effectiveness of the system as a whole (Alberti, 2010). During these implementations, the author observed that:

- organizational culture and management styles have an impact on how performance measurement systems are implemented and used, thus affecting its success or failure;

- and performance measurement systems can affect management styles and, to a certain extend organizational culture

Performance measurement must be multi-dimensional, process based, address stakeholder goals, follow a cause and effect relationship between measures and be easy to implement and use (Dewangan and Godse, 2014). A growing stream of literature provides evidence that the use of multidimensional performance measures adds to the effectiveness of performance measurement systems (Hoque & James, 2000; Ittner et al., 2003; Simpson, Padmore & Newman, 2012; Ivanov & Avasilcăi, 2014; Jordão & Almeida, 2017). Models developed for large enterprises seem not to apply well to small or medium enterprises (Saunila et al., 2016), as confirmed also by the gap between theory and practice observed by numerous authors in SME (Cocca & Alberti, 2010; Sousa et al., 2016).

Moreover, performance measures usually focus on past activities. In other words, the aim is to gather information to support the control activities rather than the forecasting and planning processes. Performance measurement has traditionally concentrated on studying SMEs from traditional performance measurement perspectives (Bititci et al., 2012), such as production and finances. Performance measurement today is seen as a comprehensive process, which means that all things happening in the organization are considered to have an impact on the performance of the organization. These things include leadership and management, employees' task motivation, the quality of operations, and the ability of products to fulfil customers' needs (Bourne, 2013; Taticchi, 2012; Bititci et al., 2012; Ukko et al., 2014).

Types of measures in performance measurement. In development measurement systems it is important to already, be aware of what to measure, since the difficulty arises in the process of knowing how to measure the product or process. Tangen (2005) and Neely (2005) has noted many potential issues in development of performance measurement formula that should be considered carefully:

- formula should be easily measured and easily understood
- objective criteria should be used in the formula rather than subjective
- ratios should be used instead of absolute numbers
- formula should stimulate improvement
- formula should be designed in consultation with people whose performance is measured
- the formula should be as accurate as possible
- group measures should be used rather than measures based on individual performance
- formula should have an appropriate precision.
- formula should not indirectly support negative behaviors
- the formula should not measure someone on something over which they have no control
- the formula should not be based on misleading "weighting"

What is more, Choong (2013) defines a measure as a quantitative expression – that composes of a number. The Institute of Electrical and Electronics Engineers (2013) defines measure as such "is to ascertain or appraise by comparing to a standard". "A standard or unit of measurement; the extent, dimensions, capacity, etc., of anything, especially as determined by a standard; an act or process of measuring; a result of measurement" (De Toni & Tonchia, 2001).

Tangen (2005) has introduced one classification of the measures. These measure types represent measures that give beneficial information and are used in the organization (table 2).

Table 2. Measure classification based on Tangen theory

	Indispensable	**Useful**	**Informative**
Information benefit	High	Medium	Low
Information usage	High	Medium	Low

Indispensable measure must be considered very beneficial to the organization as well as utilized to a high degree. This type is necessary for organization in order to function properly. Further, important decisions are often based on the information from these measures, such as planning and control issues. Useful measure is considered meaningful, but not as vital as with the first measure. The usage of the measure is still good, but the information from a typical "useful" measure only has a limited impact on the organization. Last type includes measures that are mainly employed for informative purposes. The information is used to a minor degree and is usually considered secondary compared to the information from the other measure types. These types are in line with the main purpose of the performance measurement (Tangen, 2005). These types of classifications can be used in every sector of every department. This form is primary and aims to rate measures on a basic level, therefore has been used in various researches as background to determine the placement of the measure.

Another approach towards classification came from Mills (2000) as author addressed the need to evaluate the implementation of strategy and to challenging the strategic assumptions. For those two reasons measures are segregated in five categories (table 3). This type of performance measurement classification system has been supported by various authors (Gunasekaran & Kobu, 2007; Bourne et al., 2013).

A behavior setting of measures can be seen as a small-scale social system whose components include people and physical objects. Its setting program; the goal and the sequentially ordered activities guide this social system. Thus, grouped and defined measures can create performance measurement (Clegg, MacBryde, Dey, Elg, Broryd & Kollberg, 2013). Chenhall (2017) notes that management accounting systems have increasingly sought to provide information for developing a strategic orientation to organizations' operations, notably through performance measurement systems (Simons, 2000; Ittner & Larcker, 2001; Tangen, 2005; Choong, 2013).

Table 3. Measure classification based on Mills theory

Measurement	**Measure**	**Expressed as metric of**
Efficiency	Ability of an organization to perform a task	Actual input/planned input
Effectiveness	Ability of an organization to plan for output from its process	Actual output/planned output
Quality	Whether a unit of work was done correctly? Criteria to define "correctness" are established by the customers	Number of units produced correctly/total number of units produced
Timeliness	Whether a unit of work was done on time? Criteria to define "on-time" established by the customers	Number of units produced correctly/total number of units produced
Productivity	The amount of resource used to produce a unit of work	Outputs/inputs

Following the indicator variety research by Rossi and Aversano (2015) has provided four distinct performance dimensions, which could also be identified as indicators: costs/productivity, time, flexibility, quality. Simons (2000) classified the properties of measures in terms of objectivity, completeness and responsiveness. Objective measure is one that can be independently verified. A good example is financial measures such as income, expenses, profitability, earnings and asset

valuation. Objective non-financial measures include volumes, cycle time and waste. A complete measure captures all the relevant attributes that define performance. Such as quality measure, which is properly defined in terms of prevention, inspection and failure costs (Peters, Wieder, Sutton & Wakefield, 2016). A measure is responsive to the extent that a manager can take action to influence it. Responsiveness is related to controllability.

Going deeper into the various indicators is noted that most indicators do not stand-alone and are used as a group of various indicators. These groups are usually labeled as key success factors, key performance indicators or key performance factors, they can be grouped to create balanced scorecard, or be altered to new performance measurement method. These indicators can have been the mirror of the partner organizations' current situation and can be used as indicators for future development (Ferreira, Shamsuzzoha, Toscano & Cunha, 2012). Since performance measures can be compared to productivity measures, due to the output and input concept, elements such as goal setting, planning, organizing, monitoring and controlling have been defined as possible indicators (Ali, Elham & Alauddin, 2014). Moreover, if this indicator was designed strictly, it could also be used as a tool for public communication and education reform (Simpson, Padmore & Newman, 2012). Hence, the proposed indicators should contain the following characteristics be quantitative, be objective related and have monitoring function (Peters, Wieder, Sutton & Wakefield, 2016) (Fig. 2). The quantitative measures are based on amount and measurement is expressed in numbers, it is usually a raw data feature and can represent different performance measures such as revenue, cost, investment, could also be number of workers or patients (Spekle & Verbeeten, 2014). It is also important for indicators to be directly related to organization parameters as they must have a representative meaning and provide direct or underlying value, reflect subjective views of the expected behavior of the systems in the chosen industry. Monitoring function in each indicator is needed as a form of control. It aims to help understand trends in usage or behavior, and to understand the impact of changes that are made. Thus, each indicator is tailor specifically to industry, organization, sector, field, department and even team (Muchiri, Pintelon, Gelders, & Martin, 2011).

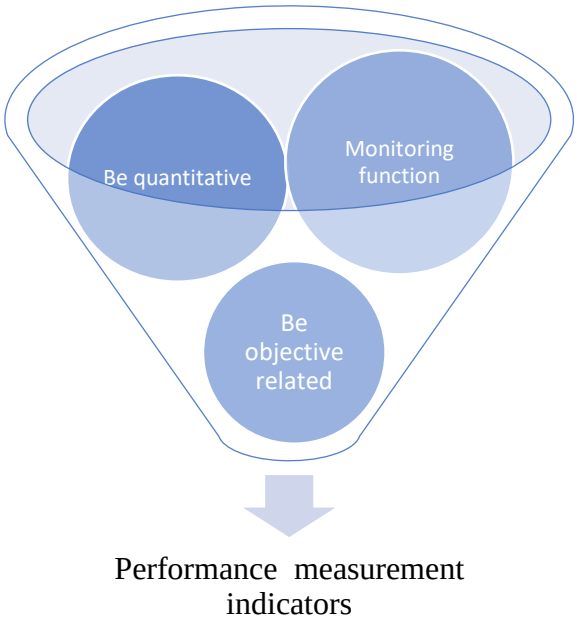

Figure 2. Performance measurement indicators according to Peters, Wieder, Sutton and Wakefield (2016)

Organizations benefit from performance measurement that facilitate managerial decision-making through the adoption of diverse, strategically aligned metrics (Simons, 2000; Ittner et al., 2003; Bititci et al., 2012; Saunila, 2016). It has been argued that such performance measurement play a key role in better aligning financial evaluation practices and the pursuit of growth opportunities (Simons, 2000).

Performance measurement has become increasingly important for two reason: justification to general management and support management, and practice within organizational behavior (Pitt & Tucker 2008). Without having an effective performance measurement, an enterprise may find it hard to effectively manage its operations and keep its employees motivated (Dewangan and Godse, 2014).

Models developed for large enterprises seem not to apply well to small or medium enterprises (Saunila et al., 2016), as confirmed also by the gap between theory and practice observed by numerous authors in who review the performance measurement models in small or medium enterprises (Hudson et al., 2001; Cocca & Alberti, 2008; de Sousa et al., 2014).

PMS provides a two-tier measurement perspective: performance of exactness and performance of activities/things within the confine of an organization. As the traditional accounting measurement system or other measurement systems are unable to differentiate measurement between these two perspectives, we will need the features of PMS to differentiate between data, and the measurement of the exactness and performance of activities/things within an organization (Choong, 2013).

Performance measurement application in health care industry. While the literature of performance measurement has focused on the shift from traditional performance measurement, which focus on financial measures, to multidimensional performance measurement, such as the performance pyramid (Lynch & Cross, 1990), the balanced scorecard (BSC) (Kaplan and Norton, 2001), and the performance prism system (Bourne, 2013), there is limited empirical evidence examining the application of performance measurement in healthcare. According to Porter (2016), enhanced performance in any sector depends on the existence of a common goal for the activities and interests of different stakeholders. In the health-care sector, this goal is associated with the definition of value represented by the patients' health outcomes by the unit of currency invested in the process. Health-care service providers represent "the intermediate" between those who finance the health-care system and those who pay and use these services (Swayne, 2005). Blass, Gouvea da Costa, Pinheiro de Lima and Borges (2016) have conducted research in health care facilities to gain further insight into the practice of environmental performance measurement. Health-care operations consist of an open system, including inputs represented by people under treatment, materials and equipment, end activities (specialized health-care services) and support activities such as laundry, maintenance and IT. The process consists of diagnosis and patient treatment, that is, activities performed by the medical personnel. The outputs of the process are treated and/or cured people, knowledge acquired through research and process waste. Health-care indicators correspond to measurable variables related to structure, process and results (Blass et al., 2016). Interviews with general manager were carried out in various Brazil hospitals. The outcome reviled that there were no investments in environmental protection. The hospitals only fulfilled their legal obligations (Borges et al., 2016). In 2016 Borges proposed a framework for the health care industry that added up to 8 steps, which were segregated in 3 phases: conception, implementation and analysis. This type of segregation falls in line with the main performance measurement application defined by previously mentioned authors (Neely et al., 2008; Borges et al., 2016). Borges et al. (2016) and Neely et al. (2008) express the need for further investigations due to sustainability indicators, which often consist of dimensions that are

incomparable, restrictive and even insignificant. New models were stressed as a necessity to define relevant indicators for monitoring and evaluating performance in health care sector (Borges et al., 2016).

Performance measurement provides hospital administrations with hard evidence about existing practices, values, beliefs and assumptions and enables the administration to develop a systematic means of identifying shortfalls and improve its future performance (Purbey, Mukherjee & Bhar, 2007). As today's environment is highly dynamic, design, implementation and use of measurements should be a simultaneous and continuously evolving process (Ahmad, Barnes & Chakrabarti, 2010). Framework suggested by Bhar et al. (2007) noted on three fields such as efficiency, effectiveness and flexibility. By differentiating measures in these categories should help the healthcare units to directly use the framework for assessment of their performance and will help in benchmarking the organization so that customers can know the worth of money they pay for the service (Bhar et al., 2007).

No single design of performance measurement would serve all organizations, and therefore organizations should adapt and update their performance measurement in the light of changes in the internal and external business environments (Bourne, 2013). Typical external factors affecting organizations and thus potentially driving the need for such adaptation could include changed levels of competition, new IT and other technologies, the changing nature of work and changing demands such as deregulation. In addition, different organizational factors may influence the nature of PMS (re)design and use, such as size, age, ownership, culture and strategy (de Lancer Julnes & Holzer, 2014). Various fields can be evaluated due to multidimension tendencies of performance measurement. Innovation concept has been part of newest research, as it has been proven as diving force of many enterprises. Due to this it is important to analyze performance measurement in terms of innovations.

2.2. Theoretical aspects of the innovation implementation

Concept of innovation. Innovation gives firms intangible competency to cope with unanticipated business and macroeconomic turbulence (Malerba, 2010; Rosenbusch, Brinckmann & Bausch, 2011). Extensive and intensive search are suitable search strategies for innovation in goods (Segarra Ciprés & Bou-Llusar, 2018).

Innovation is: 1)frequentative process that aims to create (Kusiak, 2009); 2) this successful application of new ideas (Dodgson, Gann & Phillips, 2014); 3) future customer needs, expectations and potential customers promptly (Rajapathirana & Hui, 2018); 4) focus on the existence of a new idea or behavior (Jiménez-Jiménez & Sanz-Valle, 2011); 5) driving force for economic and social change (Santos, Basso, Kimura, & Kayo, 2014); 6) invention and exploitation (Dewangan, & Godse, 2014); 7) driver for companies to prosper, grow and sustain a high profitability (Love, Roper & Du, 2009).

Chesbrough defines innovation as "a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology" (Chesbrough, 2006). In an innovation process, projects can be launched from internal or external sources and new technology can enter at various stages (Giannopoulou, Yström, Ollila, Fredberg & Elmquist 2010). Focus lies on the transformation of the previously solid boundaries of the company to a semi-permeable membrane that enable innovation to move more

easily between the external environment and the internal R&D processes. A central part of innovation process is also to organize the search for new ideas that have commercial potential (Laursen & Salter, 2006).

Segarra Cipres and Bou Llusar (2018) identify four generic innovation strategies (Fig. 3) of pooled R&D that aims to gather already conducted research than can be used and applied in various new investigations, spinouts – a way to escape large firm bureaucracies. This strategy arises from authors notes on high cost and time consumption of bureaucracies. Another strategy is introduced as selling complements which is accepting commoditization or develop differentiated products based on commodities and taking a step further is donated complements of which general purpose technologies are sold so users can develop differentiated products.

Figure 3. Generic innovation strategies by Segarra Cipres and Bou Llusar (2018)

Innovation mainly focus on interactive processes through which knowledge and technologies can easily flow inwards and outwards through firm boundaries. They are based on the fundamental assumption that invention and innovation do not necessarily have to take place at the same location as that in which they are being transformed into new products and then commercialized (Inauen & Schenker-Wicki, 2011).

While innovation has been proposed as a new paradigm for the management of innovation (Chesbrough, 2010), existing research on innovation focuses mainly on the importance of internal R&D capacity, and largely ignores the importance of internal management structure and competencies. One of the most significant measures of economic performance and competitiveness of innovative is exporting, a key measure of internationalization. Exporting of R&D and innovation to global markets is seen as a means of survival, growth and gaining an edge over domestically oriented competitor, particularly during the global financial crisis and recession. Existing research suggests that most enterprises are increasing their share of global markets, and a considerable number of European companies are engaged in international activities; however, only a small percentage are involved in exporting beyond the domestic market (European Commission, 2019). Although product innovation, in general, is significantly and positively related to export performance, the combination of both internal capabilities and open innovation practices influence a firm's degree of international market success (Clausen & Pohjola, 2009).

Innovation capability is defined as a potential of an organization to create innovations continuously, and it consist of the determinants influencing an organization's capability to manage innovation (Saunila, 2014). To be effective, the measures should focus on the critical success factors (table 4) in a particular company and its processes (Birchall et al., 2011). From that, innovation can be taken into account as an organizational capability because it is the act that allows resources to be used with a new ability to create value (Yang et al., 2006).

Table 4. Elements of innovation capability by Saunila (2016)

Innovation capability	Description	References
External knowledge	The exploitation of external networks and knowledge – their importance in enhancing the organization's overall innovation capability	Lawson & Samson, 2001; Saunila, Pekkola & Ukko, 2014; Chua, 2018; Tidd & Bessant, 2018
Structures	The structures and systems that successful innovation requires – the generation, development, and implementation of ideas, the ways in which the organization's work tasks for innovation are organized	Lawson & Samson, 2001; Oke, 2007; Saunila, Pekkola & Ukko, 2014; Dodgson, & Phillips, 2014; Basu, 2014; Lyytinen, Yoo & Boland Jr, 2016; Saunila, 2016; Damanpour, Sanchez-Henriquez & Chiu, 2018
Regeneration	The organization's ability to learn from experience and to use that experience to create and develop innovations	Saunila, Pekkola & Ukko, 2014; Saunila, 2016; Chua, 2018; Anzola-Roman, Bayona-Saez, Garcia-Marco, 2018
Leadership	The overall atmosphere of the organization that supports and motivates innovation, and a leadership culture that facilitates innovation	Saunila, Pekkola & Ukko, 2014; Basu, 2014; Saunila, 2016; Egbetokun, Oluwadare, Ajao & Jegede, 2017
Employee activity	The employees' individual innovation capability as well as motivation and activity to foster innovations	Saunila, 2016; Damanpour, Sanchez-Henriquez & Chiu, 2018; Tidd & Bessant, 2018
Work well-being	Employee well-being and the work climate for innovation development	Love, Roper & Du, 2009; Saunila, 2016; Chua, 2018
Know-how	The expertise of one's work plays, includes knowledge as well as improvement in employee skills	Oke, 2007; Love, Roper & Du, 2009; Massa & Tucci, 2013; Saunila, 2016; Egbetokun, Oluwadare, Ajao & Jegede, 2017; Chua, 2018; Anzola-Roman, Bayona-Saez, Garcia-Marco, 2018; Tidd & Bessant, 2018

Generally, innovation is a complex process, one easily identified as being of critical importance for organizational success yet not easily managed (Upadhaya, Munir & Blount, 2014).

Even though heavy investments are required to develop new processes, products, systems, innovation could be the source significant cash flows to firms (Tidd & Bessant, 2018). Many studies have drawn causality between innovation and profitability (Löfsten 2014; Saunila 2016; Kim et al, 2018). In the context of SMEs, innovation capability is a broader concept, meaning that the effects of different determinants of innovation capability should be taken into account when studying the relationship between innovation capability and firm profitability (Saunila et al., 2014). The profitability of a firm is not necessarily dependent on the amount of new innovations. The firms that are more profitable have capabilities or competences that competitors lack. These capabilities may be linked to the process of innovation (Love et al., 2009). The current literature has focused on measures that reflect results but not measures that reflect the reasons for the results. These measures measure innovation performance instead of the ability to innovate. They oversimplify the complex nature of the sources of innovations (Breznik & Hisrich, 2014). The challenge is to find measurement methods that predict measures of innovation performance (i.e. leading measures) to provide a holistic picture through innovation performance measurement. In other words, innovation performance measurement should provide a multidimensional picture of the issue (Dewangan & Godse, 2014).

Innovation types and models. The Henderson-Clark (Henderson and Clark, 1990; Breznik & Hisrich, 2014; Lyytinen, Yoo & Boland Jr., 2016) framework had categorized innovation into four broad types based on the following criteria:

- incremental innovation having minor improvements in function and form;
- modular innovation with significant improvements/alterations in function due to change in technology – but no change in form;
- architectural innovation with minor change in technological function but significant alteration of linkages and hence form;
- radical innovation where both the form and function have undergone major changes.

Modular and radical innovations are capital intensive due to their focus on improving function. To improve function, significant R&D expenses for technological improvements have to be undertaken. In contrast, architectural innovation focuses on forms and hence on alternative superior process of integration. Incremental innovations provide minor improvements in both (Basu, 2014).

A radical or disruptive innovation is an innovation that has a significant impact on a market and on the economic activity of companies in that market. Radical innovations create major disruptive changes, whereas incremental innovations continuously advance the process of change (Luo, 2015). Following guild lines of Acosta et al. (2017) product and processes, radical and incremental concepts, are used as elements of technical innovation.

Incremental innovation is related with an existing product, service, process, organization or method whose performance has been notably increased or upgraded. This can have two approaches. Either a simple product may be improved by lowering cost or enhanced performance through use of higher quality components or materials, or a complex product incorporating a number of integrated technical systems may be improved by partial changes to one of the systems (Puga, 2010). Gasvaer (2013) has noted three models on performance improvement:

- incremental improvement based on a “bottom-up” strategy;
- radical improvement based on a “top-down” strategy;
- improvement based on an integrated strategy

Even though Gasvaer (2013) proved by empirical research that continuous improvement is the major driving force behind any improvement effort, in today's competitive environment, the challenges for all businesses is not only to innovate in existing markets to survive and remain profitable, but also to innovate in new markets in order to stay in front of competitors (Upadhaya, Munir & Blount, 2014).

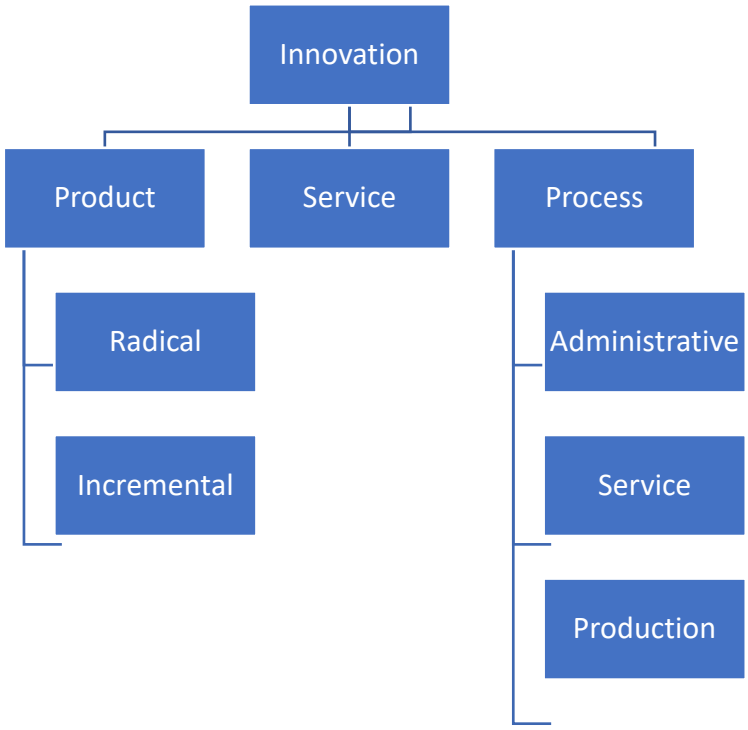

Figure 4. Types of innovation based on Oke (2007)

Another binary structure is product innovation and process innovation. In such models or frameworks, innovation is either a product innovation or process innovation (Demirel & Mazzucato, 2012; Breznik & Hisrich, 2014). Product innovation is concerned with the development of new products and services for the market (customers) while process innovation relates to ways of undertaking production or service operations. Product innovations aim to present a new or improved product or service for the customers and customers see the impact of such innovation in the products or services they receive, while process innovations change or improve the way organizations perform (Rowley, Baregheh & Sambrook, 2011). Process innovation is the "implementation of new or significantly improved production or delivery methods". It may be considered changes in tools, human capital, and working methods or a combination of these such as install of new or improved software to speed up the claim settlement process and policy issuing (OECD, 2020).

As innovation is a broad concept it has many layers that can be segregated into elements. Many authors identify different features, but most commonly agreed on are products, knowledge, process, service and system reviewed in table 5. Goal-oriented innovation processes usually include all relevant functions like marketing, R&D, engineering, sales (Hinings, Gegenhuber & Greenwood, 2018). Hence, an innovation process is a specific sequence of cross-functional, unlimitable activities in a structured order, that can be chosen. Within that sequence, the input: ideas, resources, is processed to an output or the innovation that creates value to an organization or a customer (Teoh & Cai, 2015). The intention of the product elements is to interweave possibilities like new technologies, market niches with targeted markets customer needs that have been identified. Its success depends on a firm's ability to manage the resources, applied to those processes (Tidd & Bessant, 2018). Innovations are often influenced by knowledge management (Wang and Noe, 2010; Keszey, 2018). Knowledge is the firm's most strategically important resource (Rosenbusch, Brinckmann & Bausch, 2011) and knowledge sharing influences innovation outcomes to firms' maximum performance (Keszey, 2018). Value proposition offered to the customer (Haned, Mothe & Nguyen-Thi, 2014; Chua, 2018), service interfaces that embody service offerings, service operations (Dodgson, Gann & Phillips, 2014) and

supportive technologies that fuel service innovation (Kieliszewskiet al., 2019) are all labeled under service element. Service innovation has been defined as the creation of new service offerings, service delivery processes and service business models (Lyytinen, Yoo & Boland Jr, 2016). In most cases an innovation system is a focusing device or some sort of analytical tool (Egbetokun, Oluwadare, Ajao & Jegede, 2017) which enables the analyses and understanding of the innovation process (taking into account learning and interaction among economic agents) with the aim of finding out which institutional configurations best support strong dynamic economic performance (Oke, 2007).

Table 5. Elements of innovation

Element	Definition	Reference
Product	Physical, virtual or cyber form of an item, having cost and each is sold at a price	Lawson & Samson, 2001; Laursen & Salter, 2004; Tangen, 2005; O'Connor, 2006; Smith, Abdullah & Razak, 2008; Kusiak, 2009; Breznik & Hisrich, 2014; Fores & Camison, 2016; Cozzarin, 2017; Chua, 2018
Knowledge	Understanding, awareness of or information about a subject, process, product facts, information, descriptions, or skills	Kusiak, 2009; Love, Roper & Du, 2009; Saunila, Pekkola & Ukko, 2014; Breznik & Hisrich, 2014; Cozzarin, 2017; Chua, 2018; Kieliszewski & Anderson, 2019
Process	Series of actions or steps taken in order to achieve a particular result	Swayne, 2005; Tangen, 2005; O'Connor, 2006; Oke, 2007; Smith, Abdullah & Razak, 2008; Love, Roper & Du, 2009; Saunila, Pekkola & Ukko, 2014; Breznik & Hisrich, 2014; Chua, 2018
Service	Sequence of interdependent and linked procedures, sequential outputs ending in result	Lawson & Samson, 2001; Swayne, 2005; Tangen, 2005; O'Connor, 2006; Kusiak, 2009; Love, Roper & Du, 2009; Saunila, Pekkola & Ukko, 2014; Breznik & Hisrich, 2014; Kieliszewski & Anderson, 2019
System	Set of detailed methods, procedures and routines created to carry out a specific activity	Love, Roper & Du, 2009; Saunila, Pekkola & Ukko, 2014; Fores & Camison, 2016; Cozzarin, 2017; Chua, 2018; Kieliszewski & Anderson, 2019

No matter whether the innovation comes as a new product, new feature of an existing product, new service or procedure (Fig. 4), it is crucial for organizations to ensure that the newly developed solution meets the recreated demands from markets and delivers a new value that the customers are willing to pay for (Rubera & Kirca, 2012).

Rapidly changing markets strong competition and developing technologies or pushing companies to introduce new products systems and processes for that innovative solutions have to be provided (Malerba, 2010; Inauen & Schenker-Wicki, 2011). Many businesses encounter issue on how build competitive, sustainable strategy that would provide profit (Chesbrough, 2010). Amplifying the novelty in companies, it is a strain the business strategy. Many companies cannot evaluate the success and the usefulness of the innovation they create. Even though many different business models have been generated, the difficulty arises in defying their success and accuracy (Teece, 2010; Rajapathirana & Hui, 2018). It is not enough to apply financial performance measurements to the new business models. Different measures, that focus on performance rather than financial aspect, have to be developed and applied in order define the value of innovation. Innovation is not exception to standard input-output framework. Thus, many authors (O'Connor, 2008; Kusiak, 2009; Malerba, 2010; Fernández-Mesa & Alegre, 2015; Hui & Rajapathirana, 2018) build their frameworks on Wassily Leontief method developed back in 20th century. Cruz-Cazaresa et al. (2013) have proposed to calculate the coefficient technological innovation activities using input and output concept as well along with the yearly efficiency change based on a global Malmquist index - a standard approach to

measure productivity over time. Cestari et al. (2018) applied the same model with additional elements: inputs, controls, outputs, and mechanisms. The innovation process at the firm-level entails the transformation of internal organizational innovation inputs usually include internal R&D, and human capital development into product and process innovations. For the case of output fundamental measure of economic efficiency are used together with target-oriented measures (Barsa, Vermeulen, Knoben, Kinyanjui and Kimuyu, 2017).

Much literature focuses on various "innovation-related" measures as the performance output, including scale measures for innovation performance (Pullen, DeWeerd-Nederhof, Groen, & Fisscher, 2012; Cruz-Gonzalez, Lopez-Saez, Navas-Lopez, & Delgado-Verde, 2015), continuous measures of innovation outputs, such as the number of new or significantly improved products, or percentage measures, such as the share of sales from innovative products/services (2010; Breznik & Hisrich, 2014; Tidd & Bessant, 2018). Innovation can help SMEs become more competitive, and one way is to pay attention to innovation performance measurement (Saunila, Pekkola & Ukko, 2014; Barasa, Vermeulen, Knoben, Kinyanjui & Kimuyu, 2019).

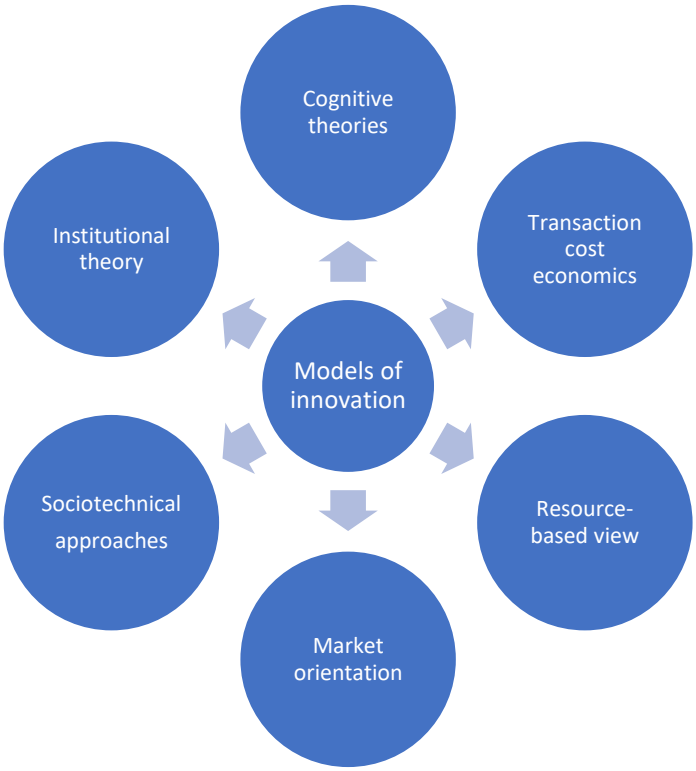

Figure 5. Potential models of innovation based on Lawson and Samson case

Benn Lawson and Danny Samson (2001) review the six possible theories (Fig. 5) and concluded that none of them provide full picture towards guiding managers to successful innovation measurement. In the analysis, they strongly disagree that innovation management is industry or sector specific, relying on (Wang & Miao, 2015; Inkinen, 2015) introduced core elements that are effective and can be found on firm level. Innovation process is considered likely to exist in varying degrees within all high-performing innovators despite the sector or industry.

Coming from the competitive point of view the process of change and adaptability is firm's asset towards evolutionary path. Dynamic capabilities can be applied through all functions including product and process development, human resources, research and development and manufacturing

(Saunila, 2016). Innovation concept can be applied to all those functions making it the accurate concept for dynamics theory (Lawson & Samson, 2001). Going further into the capabilities of the firm we can say that innovation capability can integrate all knowledge based: functional and technical capabilities (Jugend, Araujo, Pimenta, Gobbo Jr & Hilletofth, 2018).

Innovation in healthcare. Changing a massive system such as healthcare to address the many factors, including social factors, which affect equitable health outcomes, is a complex challenge (Gardner, 2008). In healthcare ecosystems, economic motivations for innovation are mediated by social motivations, introducing the concept of social innovation, defined as the identification of new ideas able to meet social needs, creating new relations and collaborations (Tidd & Bessant, 2018). Motivation becomes a key role in innovative processes, interpreted as the opportunity to create new collaborations, developing new products and services and improving end users' life conditions (Bessant et al., 2012). Healthcare innovations can be defined as implemented new or significantly improved products – goods or services, processes, marketing methods or business models, policies, or organizational structures (OECD, 2020). Usually inventions such as medico-technical devices or new organizational tools are describe and most used under innovation comprehension. (Coccia, 2012). Healthcare innovations aim to improve measurable indicators of healthcare, including quality, health disparities, effectiveness, patient-centeredness, safety and timeliness (Agency for Healthcare Research and Quality, 2013), that lead to better health outcomes. The drivers are individuals or organizations contributing directly or indirectly to healthcare innovation (May, 2013). External sourcing drivers emphasize two types of motivations: improved efficiency through scale economies and access to innovations (or innovation-producing capabilities) not held by the local firm (Moullin, Sabater-Hernández, Fernandez-Llimos & Benrimoj, 2015). New therapies or clinical practices typically imply new types of relations between service provider and user, or between stakeholders and new work processes in order to meet social needs in new ways (Darso & Hoyrup, 2012). Medical innovation thus implies social innovation (Crepaldi & Demarchi, 2016). Healthcare ecosystems include a variety of elements with a wide range of interests, conflicting needs, priorities and influence. They can be classified as follows: regulators. providers (doctors, nurses and other health professionals), payers (statutory health insurance, private health insurance and government), suppliers (scientific institutions, universities, pharmaceutical and medical companies), patients (beneficiaries of care and source of valuable knowledge) (Bessant et al., 2012). Patients gain their insights into how they solve a specific problem and declare their innovation needs. Patients as "lead users" are individuals who had experienced needs for a given innovation (product or process) earlier than the majority of the target market (Larisch, Amer-Wåhlin & Hidefjäll, 2016). Recent literature observations highlighted how in some healthcare organizations patients are starting to have an increasing influence as they are end-users and lead users of products and services. They are in a useful position to evaluate some critical aspects and to develop some alternative ideas able to increase efficiency, improve medical devices, and test new ways of treatments, meeting the mutual motivations of health suppliers and stakeholders often reluctant to transfer patients' ideas into their processes (Freire & Sangiorgi, 2010; Agarwal, Brem & Grottke, 2018). The intended benefit of innovation processes in healthcare appears to be an inter-disciplinary and inter-organizational phenomenon, which is also mirrored in recent streams of research in collaborative innovation (O'Mahony & Coughlan, 2016) and co-creation. Healthcare practitioners from different disciplines and organizations frame problems differently, thus assessing solutions from their own distinct perspectives (Nakaima, Sridharan & Gardner, 2013). Analyzing the process of measuring efficiency, which enables organizations to better understand the effectiveness of their management practices, is

of great interest to many sectors. To optimize medical resources' allocation, performance management and organizational efficiency analysis, important support bases for decision-making processes (Chuang, Chang & Lin, 2011) support hospitals. This process of resource transformation, that is, inputs, outputs and outcomes, creates the conditions to effectively meet the demand of its users for higher quality, quantity and level of services desired while, at the same time, reducing and restricting costs (Tidd & Bessant, 2018). According to Langabeer (2009), health care services represent a set of outputs, such as number of patients treated, hospital discharges, doctor consultations, (Abolghasem, Toloo & Amézquita, 2019) using specific and common assets:

- labor and capital represented by money
- technology
- people
- space
- equipment
- information

Different innovation processes result in different outputs. Some result in tangible products or changes to those products, while others result in changes to services or in the way the organization performs its tasks (Rowley, Baregheh & Sambrook, 2011). If organizations want to survive, they need to invest in different types of innovation, since different types of innovation influence organizations in different ways and achieve different outcomes and impacts (Hasnain-Wynia, Kang, Landrum, Vogeli, Baker & Weissman, 2010). According to Tidd and Bessant (2018), the potential discontinuity of market and/or technology of one product is the measurement of innovativeness. A recently proposed and popularized model for the management of innovation is based on the need for companies to open up their innovation processes and combine internally and externally developed technologies to create business value (Chesbrough, 2003). Chesbrough argues that internal R&D no longer is the invaluable strategic asset that it used to be due to a fundamental shift in how companies generate new ideas and brings them to the market.

2.3. Theoretical assumptions for the framework of the performance measurement of innovation implementation in healthcare

The purpose of literature analysis was to gather deeper knowledge about innovations and performance measurement, and their synergy by finding the best way to create the performance measurement of innovation implementation. Many authors provided different types of performance measurement and miscellaneous types of innovations, giving vast field for potential frameworks to be developed for any interested industry. This thesis aims to create a framework of performance measurement of innovation implementation, which can be used in healthcare industry.

Innovation has been identified as one of the main trends in healthcare industry according to Crepaldi and Demarchi (2016). Literature analysis revealed that innovations can be classified in many ways accordingly to the industry, market size, business needs, development level, etc. Often innovations are described as external knowledge acquisition and commercialization, and sometimes are segregated into inbound or outbound (Gunasekaran & Kobu, 2007; Bourne et al., 2013). However, according to literature analysis, the most common classification of innovations in healthcare can be described as such types: technical, administrative and hidden (Fig. 6).

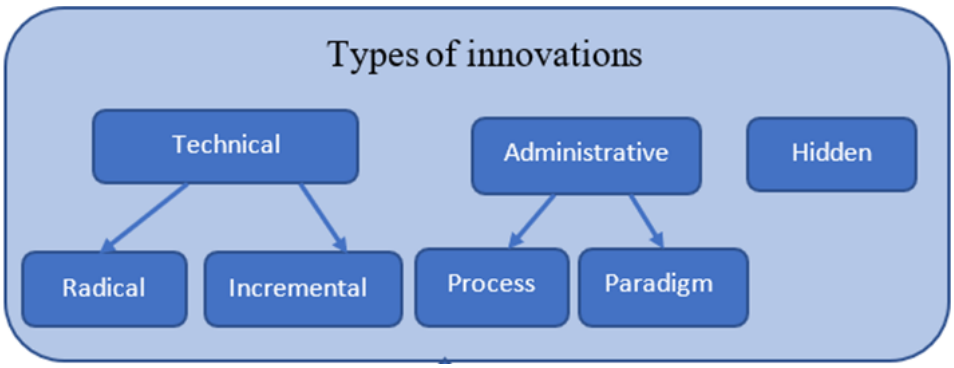

Figure 6. Types of innovations

Technology innovation means activities advancing a corporation's dynamic gain through combination of new production resources, such as new products or services, new processes, new resources, new market exploration and new management organization (Wang & Miao, 2015; Keszey, 2018). As factors are found that enhance additive values of products by means of technology innovation, production of commodities of new qualities and reduction of costs take place; technical innovation makes up major sources for a corporation to acquire competitive edges (Tidd & Bessant, 2018). That is, technology innovation is defined as innovation by means of changes and advancement in science and technology, and new markets come into being or go out of existence accordingly as new technology and products come into being and goes so far as to induce the country to change. Therefore, technology innovation has potentials to change a corporation on a small scale to the world as a whole on a larger scale (Barasa, Vermeulen, Knoben, Kinyanjui & Kimuyu, 2019). Damanpour, Sanchez-Henriquez and Chiu (2018) further expanded their research on types of innovation by introducing ancillary innovation in addition to technical and administrative innovations. Authors suggested that, there is a requirement to distinguish ancillary innovations, which are those types of innovation that require the involvement of both the organization and some of its clients. Accordingly, ancillary innovations are customer dependent innovations such as "customer active programs for product-idea generation and point-of-purchase or fashion videos" (Arranz, Arroyabe, Li & de Arroyabe, 2019). Technical innovation refers to any type of innovation structured from a technical viewpoint and which lies at the heart of operations; such innovations influence the flow of product or process operations (Demirel & Mazzucato, 2012). Technical innovation may take a number of different forms: production processes and operations related to the central activities of the organization.

Administrative innovations are defined as those that occur in the administrative component and affect the social system of an organization. The social system of an organization consists of the organizational members and the relationship among them (Pichlak, 2016). Administrative innovations constitute the introduction of a new management system, administrative process, or staff development program. An administrative innovation does not provide a new product or a new service, but it indirectly influences the introduction of products or services or the process of producing them (Sheshi & Kercini, 2017). It is argued that given the focus on meeting client needs in the process sector, the nature of service innovation is best understood through its relationship to the service user (Cozzarin, 2017). Administrative innovation and technical innovation are usually a binary model of types of innovation, with technical innovation relating to new products, processes or services, while administrative innovation involves changes to the social structure of the organization (Arranz, Arroyabe, Li & de Arroyabe, 2019) such as "policies of recruitment, allocation of resources, and the

structuring of tasks, authority and reward" (Barsa, Vermeulen, Knoben, Kinyanjui and Kimuyu, 2017).

Hidden innovations are defined as that which is not recorded using traditional innovation indicators and is common in the creative industries. Much activity in creative industries involves research and development of new products – though outside product design, it is not usually described in such terms. Such activities may not take place in conventional laboratories (Cunningham, 2013). But research into people's tastes and preferences is vitally important in shaping new products and services. Yet it is excluded from R&D surveys and tax credit systems (Sheshi & Kercini, 2017). Numerous innovations that take place on-the-job during the creation of new products and which fail to be recognized or replicated or new solutions which are one-offs as businesses do not find easy to reproduce are labeled as hidden innovations (Cunningham, 2013).

Conducted literature analysis allows to formulate the assumption: *Different types of innovation (technical, administrative and hidden innovation) are differently important for innovation implementation process.*

Literature analysis revealed that performance measurement according to different stage of performance can be classified differently. Often performance measures are classified in such types input, output, efficiency, quality and outcome (Pullen, DeWeerd-Nederhof, Groen, & Fisscher, 2012; Teoh & Cai, 2015; Fernández-Mesa & Alegre, 2015; Hui & Rajapathirana, 2018; Tidd & Bessant, 2018). However, according to literature analysis, the most common classification of performance measures in healthcare can be described as such types: financial and non-financial measures (Fig. 7).

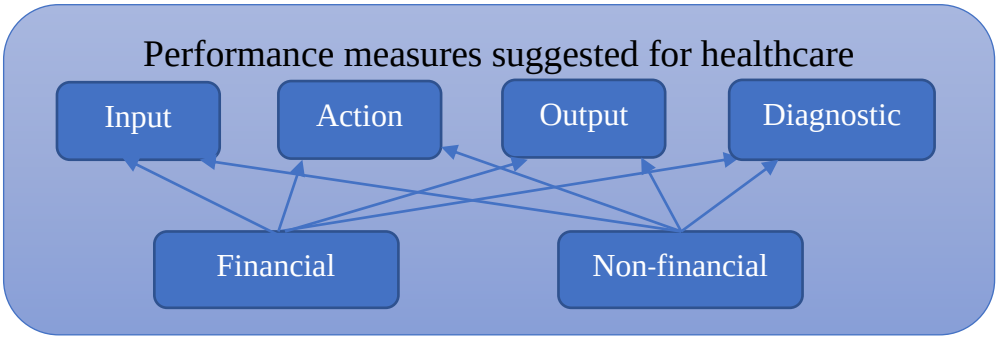

Figure 7. Types of performance measures

Financial measures aim to set norms for a particular type of business or investment. Examples of input financial measures could be money spent on equipment, facility costs, rental fees, total operating expenditures and etc. Output measures are usually a result-oriented measures like revenues, or profit. In the middle of input and output action measures can be calculated, usually these measures are productivity or efficiency based, thus can be cost per patient treated, cost per employee and so on. Diagnostic measures are often needed for quality, accuracy and satisfaction purposes, therefore cost of damaged goods or taxpayer error rate on tax returns can be identified as diagnostic measures.

Non-financial measures are metrics are quantitative measures that cannot be expressed in monetary units. Thus, potential input measures are number of employee hours worked, number of facilities used, numbers of employees. For the output measures in healthcare it can be number of treated patients or sold drugs. Non-financial action measures can be ongoing cases such as developing

number of drugs or ongoing treatments and rates or percentages like successfully treated patients of specific drug can be labeled as diagnostic non-financial measures.

The literature analysis allows to formulate the assumption: *Different measures (financial and non-financial) of performance are differently important for innovation implementation process*.

Many frameworks have been developed for the sake of valuating innovation and this proposed framework takes one-step ahead aiming to be applicable to entire healthcare industry. The framework of performance measurement of innovation implementation applies Damanpour et al., (2018) innovation segregation together with Parker (2000) developed performance measurement. These two authors have developed the most functional structures in their respective fields; therefore, combining these two allows vast application for the industry. Pharmaceuticals are goal-oriented type of area and binary frame types work best for this market. This case binary framework is layered using two out of three pairs of innovation types. Radical and incremental types are applied to technical innovations, by doing so technical innovation become solely external and become related to sector products or services provided. For the internal part, administrative innovations are used. Administrate innovation can be in spectrum of process or paradigm. Paradigm innovation, changes in the underlying mental models, which frame what the organization, does (Bessant & Tidd, 2018). Innovation ambidexterity relates to the simultaneous realization of opposing organizational outcomes and, in particular, to the simultaneous achievement of incremental and radical innovations (He & Wong, 2004; Raisch & Birkinshaw, 2008; Lin et al., 2013; Sheshi & Kercini, 2017). These types of innovations require different, fast adapting and easily changeable performance measurement system. Achieving such model for innovation ambidexterity would have valuable tracking tool for management and stakeholders (Bedford, et al., 2018). Drawing on definition of PMS innovations as a type of administrative innovation, namely “as those that occur in the social system of an organization (Damanpour, Sanchez-Henriquez & Chiu, 2018). The social system here refers to the relationships among people who interact to accomplish a particular goal or task (Leotta & Ruggeri, 2017).

The literature analysis allows to formulate the assumption: *Different types of innovations requires different measures in performance measurement to ensure the innovation implementation process in healthcare.*

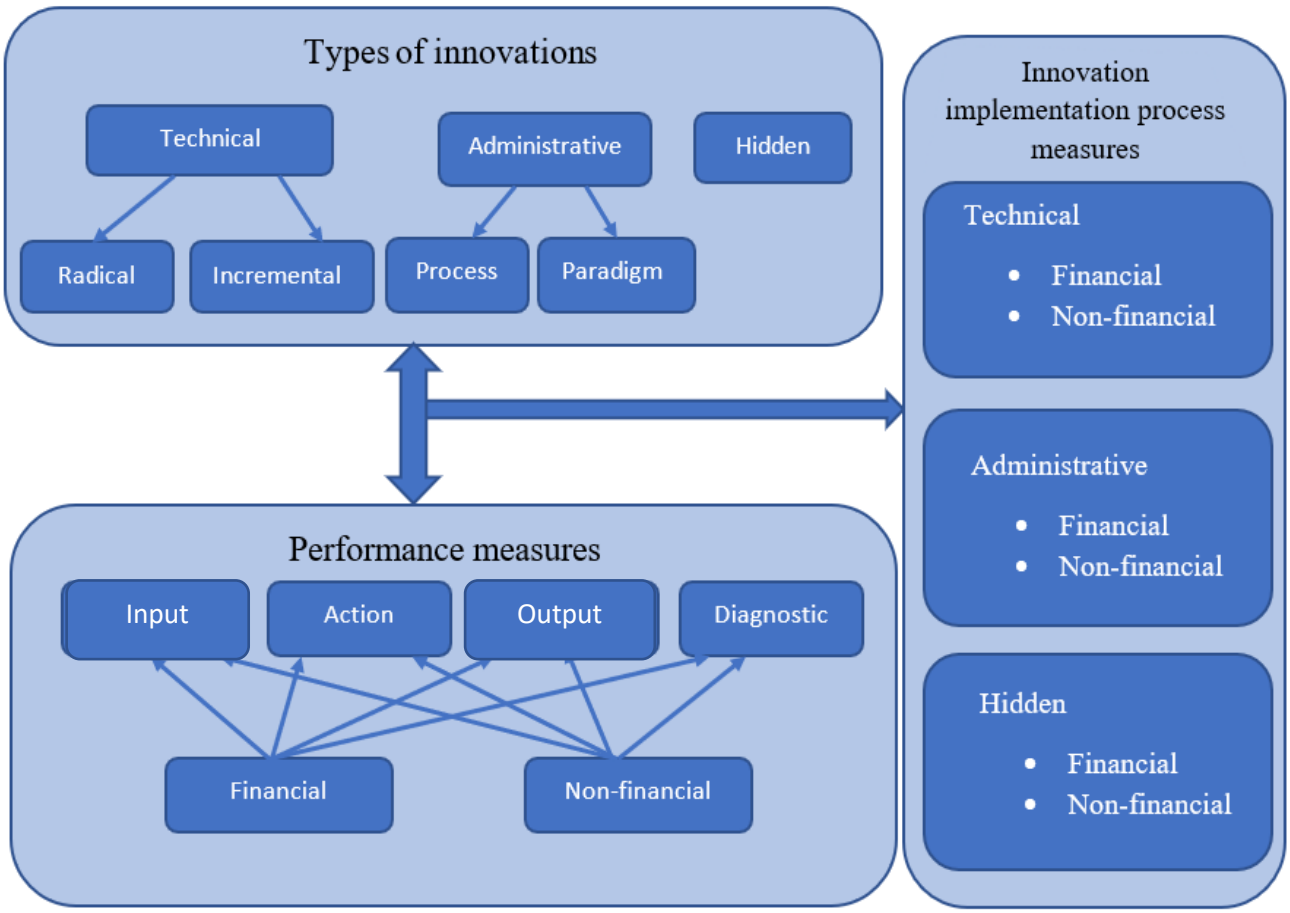

Figure 8. The logic of the framework preparation for performance measurement of innovation implementation

Framework (Fig. 8) follows the input-output concept as it is most common way to evaluate the innovation cases. Specifically, for healthcare inputs are capital, raw materials, customer requirements. Potential outputs are much more health care industry orientated. Number of patients treated, pharmacies in which drugs can be found, amount of prescriptions, market shares of the drugs, clinical researches conducted - these types of outputs can be applied only to health care industries. The middle of the model (action) can vary vastly not only inside healthcare industry but also in the same company as each innovation is unique. In this paper, suggested framework applies only to a every part of innovation process and is directed to healthcare industry. In many cases the performance measurement system is designed for already implemented innovations, the use or refreshing of them (Neely, 2005; Nakaima, Sridharan & Gardner, 2013; Rossi & Aversano, 2015). This thesis aims to distinguish indictors, financial and non-financial alike, to measure the performance of the implementation part of the innovation process. Most common measure such as revenues, costs, number of clinical trials, number of patients, number of drugs will be applied, however deciphering additional measures, could provide beneficial knowledge to the company in early stages of innovation process development. By using financial measure such as revenue, cost, margin or economic indicators, together with non-financial measures, mainly effectiveness and flexibility, a potential performance measurement could be developed for better innovation implementation evaluation.

In innovation studies, two main categories exist: the relationship between innovation and performance and different types of innovation in organizations (Oke, 2007; Dewangan, Godse 2014). Small and large firm are fundamentally different from each other in three central aspects: uncertainty,

innovation, evolution, and the aim of performance measurement should support organizations to manage uncertainty, to innovate their products and services, and to sustain evolution and change processes (Bititci et al., 2012). Rossi and Aversano (2015) and Palvalin & Vuolle (2016) claim that organizations should have used performance measurement that focus on breadth, not depth. By doing this, organizations could develop a simple model and an integrated approach to corporate governance. Innovation in organizations has been studied as a one-dimensional construct without taking into account the various aspects that constitute innovation. First, the analysis should provide more insight into how performance measurement of innovations is used as part of management practice in organizations. Second, further qualitative studies are needed to understand the causal relationships between different measures (Saunila, 2016). It is needed to stress that healthcare organizations differ from other organizations. Due to this, this thesis seeks to explain by merging two possible aspects, technical, administrative and hidden innovations can be evaluated by financial and non-financial performance measurement.

Rapidly changing markets strong competition and developing technologies or pushing companies to introduce new products systems and processes for that innovative solutions have to be provided (Demirel & Mazzucato, 2012; Wang & Miao, 2015). Many businesses encounter issue on how build competitive, sustainable strategy that would provide profit (Chesbrough, 2010). Amplifying the novelty in companies, it is a strain the business strategy. Many companies cannot evaluate the success and the usefulness of the innovation they create. Even though many different business models have been generated, the difficulty arises in defying their success and accuracy (Teece, 2010). It is not enough to apply financial performance measurements to the new business models. Different measures, that focus on performance rather than financial aspect, have to be developed and applied in order define the value of innovation.

The suggested framework in table 6 takes technical innovations such as new products or services, new processes, new resources, new market exploration and new management organization, splits them into radical as a new creation and incremental as a significant enhancement on existing ones, and applies suggested financial and non-financial performance measures of input, action, output and diagnostics. Thus, allowing to measure a new or enhanced product or service in every stage. Measuring the raw material cost and number of employees for the input of the radical and incremental innovations. For the action measures cost per developed or renewed product can be labeled under financial field and similarly hours spent for the same product can be put under non-financial area. Output is most comply calculated as the revenue of for the service or product and the number of those services/products produced are categorized as non-financial measures. The diagnostic measures can vary based on the market or industry but commonly quality measures like the cost of defective goods (financial) or number of defective goods (non-financial) can be applied for both: radical and incremental innovations.

Table 6. Framework of performance measurement of innovations implementation

Types of innovations		**Technical**		**Administrative**	
		Radical	**Incremental**	**Process**	**Paradigm**
Input	**Financial**	Input orientation to technical innovations (radical -financial)	Input orientation to technical innovations (incremental -financial)	Input orientation to administrative innovations (process -financial)	Input orientation to administrative innovations (paradigm -financial)
	Non-financial	Input orientation to technical innovations (radical -non-financial)	Input orientation to technical innovations (incremental -non-financial)	Input orientation to administrative innovations (process -non-financial)	Input orientation to administrative innovations (paradigm -non-financial)
Action	**Financial**	Action orientation to technical innovations (radical -financial)	Action orientation to technical innovations (incremental -financial)	Action orientation to administrative innovations (process -financial)	Action orientation to administrative innovations (paradigm -financial)
	Non-financial	Action orientation to technical innovations (radical -non-financial)	Action orientation to technical innovations (incremental -non-financial)	Action orientation to administrative innovations (process -non-financial)	Action orientation to administrative innovations (paradigm -non-financial)
Output	**Financial**	Output orientation to technical innovations (radical -financial)	Output orientation to technical innovations (incremental -financial)	Output orientation to administrative innovations (process -financial)	Output orientation to administrative innovations (paradigm -financial)
	Non-financial	Output orientation to technical innovations (radical -non-financial)	Output orientation to technical innovations (incremental -non-financial)	Output orientation to administrative innovations (process -non-financial)	Output orientation to administrative innovations (paradigm -non-financial)
Diagnostic	**Financial**	Diagnostic orientation to technical innovations (radical -financial)	Diagnostic orientation to technical innovations (incremental -financial)	Diagnostic orientation to administrative innovations (process -financial)	Diagnostic orientation to administrative innovations (paradigm -financial)
	Non-financial	Diagnostic orientation to technical innovations (radical -non-financial)	Diagnostic orientation to technical innovations (incremental -non-financial)	Diagnostic orientation to administrative innovations (process -non-financial)	Diagnostic orientation to administrative innovations (paradigm -non-financial)

Following the second type of innovation: administrative. Described as creation of a new organization design which better supports the creation, production and delivery of services or products

administrative innovation can be a process or a paradigm. Innovations for process in administration level can be new organizational structure development, in this type of innovation financial measures for input, action, output and diagnostics will be the salaries of the team that create the new structure. For the non-financial measures time of the employees is most likely used for this innovation measurement. The paradigm type of administration innovation can be seen as already created model that is adapted for the business. For this case input financial measure could be the cost of such model and non-financial measures could be time used to find and analyze the suggested model. Following the action element: financial side would be the cost of implementation and the non-financial would be the number of workers needed or hours spent for the module to be applied. Output is usually attached to the target of the innovation and the diagnostics would be the quality and the efficiency of the implemented administrative paradigm

Hidden innovations are a complex concept innovation that are mostly analyzed in creative industry. Due to their inconsistence nature and lack of possible planning possible measures are hard to define. The same rules of financial and non-financial distinction can be applied. In most cases hidden innovations are one-time project that could have cost measures from financial side and time measures for non-financial aspects. In this thesis hidden innovations are not analyzed further as the main industry for cases studies are healthcare.

The conceptual model is a tool that enables managers to assess the level of innovations used and their relationship to performance measurement in different dimensions, identify areas for performance measurement improvement in relation to innovation, and compare the performance measurement of innovations against other organizations. The results of the model should provide meaningful information on the current state of the level of performance measurement used of the innovation implementation in healthcare industry. Based on the proposed theoretical model of performance measurement of innovations implementation, further empirical research is conducted to evaluate the feasibility of applying the model in organizations. The following are methodological considerations for analyzing performance measures for innovations implementation and the results of a case study.

By measuring the early phases of innovation process, companies can make time- and money-saving decisions based on the measurement information. Measurement of later phases of innovation development can be assisted by a business performance measurement system (Saunila & Ukko, 2014).

Performance measurement plays a key role in evaluating the achievement of organizational objectives, developing strategic plans and compensating managers (Liu, Love, Smith, Regan & Sutrisna, 2014). Performance measurement is the process of quantifying the efficiency and effectiveness of action (He & Abdous, 2013) Main importance of the performance measurement is the dynamics of the system. This is the key element of relevance and continuity in order to reflect business issues, which can be detected on time (Taticchi et al., 2010; Lee, 2018). Performance measurement can contribute to a significantly better understanding of innovation when the measurement has been conducted properly (Dewangan & Godse, 2014; Saunila & Ukko, 2014).

3. RESEARCH METHODOLOGY OF PERFORMANCE MEASUREMENT IN THE PROCESS OF INNOVATION IMPLEMENTATION IN THE HEALTHCARE SECTOR

The third part of this work provides the methodology for the framework of the performance measurement of innovation implementation in healthcare. The research aims not only to test the practical applicability of the conceptual theoretical model, but also to address the lack of practical research by demonstrating how organizations can evaluate the implementation of innovation and compare their assessments with other organizations.

The **aim of this research** is to test the framework of the performance measurement of innovation implementation in healthcare.

The objectives of the research:

1) to identify the current state of innovations (types) and performance measures in the organizations being analyzed;
2) to analyze the results of performance measurement of innovation implementation assessments;
3) to compare the results of the analyzed organizations;
4) to make recommendations for improving the performance measurement of innovation implementation.

Research method. This thesis is based on a two in-depth cases study. This design was chosen because of the need to study the usage and details of performance measurement; the design presents the opportunity to research events in their natural context. Voss et al. (2002) distinguished between different purposes with case study research: exploration, theory building, theory testing and extension/refinement. The present study aims to explore the performance measures in innovation implementation using healthcare industry. Exploratory research was selected for the studies above conclusive. Purpose of this research was to generate insights about the current health industry situation, as there is a lack of such. Qualitative research, on the other hand, is concerned with qualitative phenomena relating to or involving quality or kind. Due to field specifics, qualitative method provided better benefits. The aim was to broaden the knowledge of the pharmaceutical company innovations, quantities studies approach would have not allowed to discover new traits and new trends in the industries as these types of studies are closed-ended. Qualitative interviews are a well-established methodological approach in management science (Birkinshaw et al., 2007; Qu & Dumay, 2011; Choy, 2014; Jamshed, 2014). They have also been instrumental in understanding perceptions about the managerial challenges of innovation (Hossain, 2015), in unravelling complex sector cognitions (Massa & Tucci, 2013), or in comparing the cognitive structures of managers within and across industries (Bessant et al., 2012; Jamshed, 2014). Case study research refers to an in-depth, detailed study of an individual or a small group of individuals. Such studies are typically qualitative in nature, resulting in a narrative description of behavior or experience. Case study research is not used to determine cause and effect, nor is it used to discover generalizable truths or make predictions. Rather, the emphasis in case study research is placed on exploration and description of a phenomenon. The main characteristics of case study research are that it is narrowly focused, provides a high level of detail, and is able to combine both objective and subjective data to achieve an in-depth understanding. Going further conceptual research is related to some abstract ideas or theory, which fit the framework of field research in open point of view. Such research follows case-study methods

or in-depth approaches to reach the basic casual relations. They usually go deep into the causes of thing or events that arose the interest of the field study. In those cases, very small samples are used, and very deep probing data gathering is conducted.

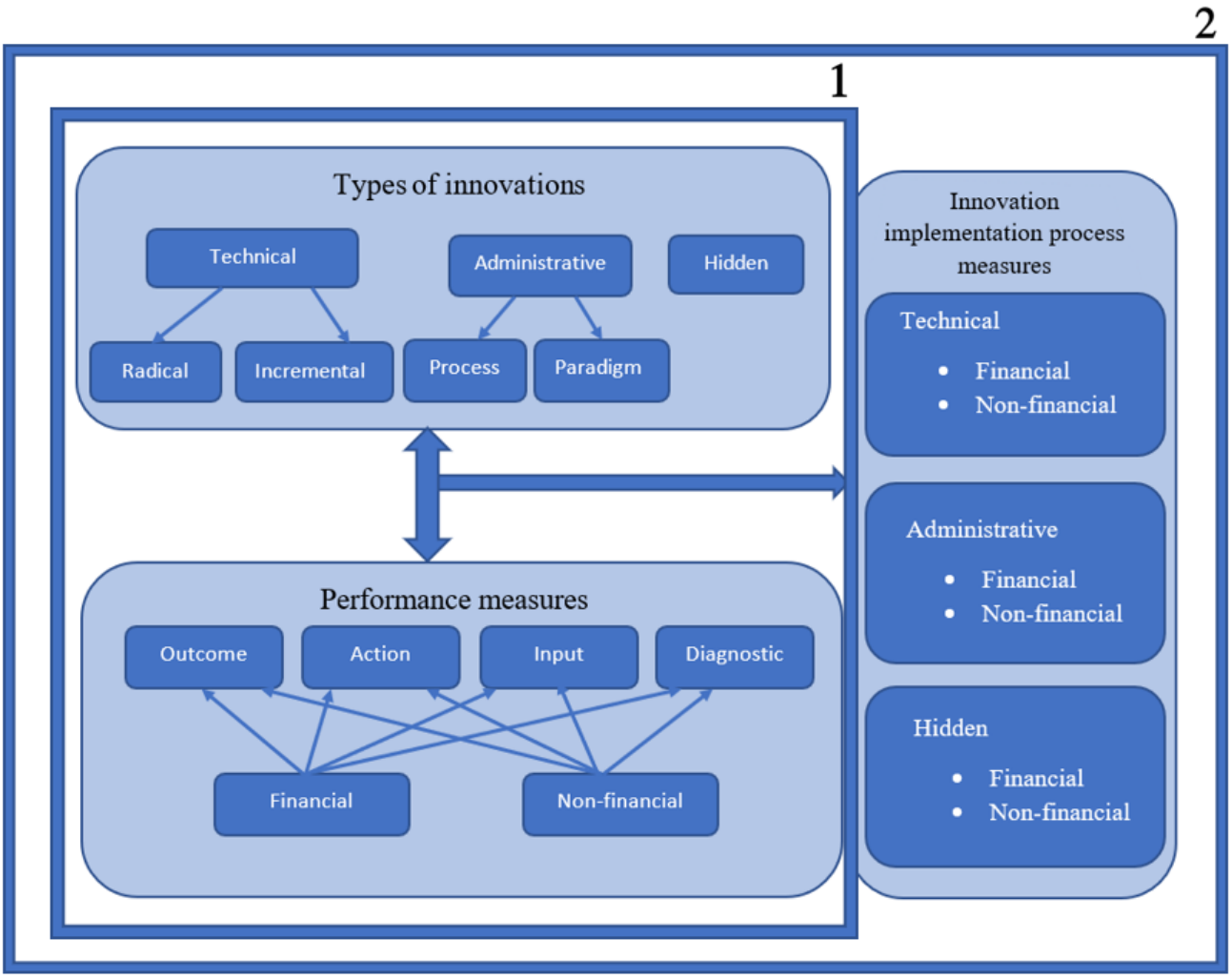

Figure 9. Scheme of the framework application for separated pharmaceutical cases analyses

Descriptive research is a quantitative research method that attempts to collect quantifiable information to be used for statistical analysis of the population sample. In addition, none of the variables is influenced in any way. This uses observational methods to conduct the research. Hence, the nature of the variables or their behavior is not in the hands of the researcher. Additional note is on cross-sectional study where different sections belonging to the same group are studied. First part of the study was **documentation analysis**, applied to two research pharmaceutical companies using proposed framework, first part of research (Fig 9, part 1). Companies' names have been changed due to sensitive information. No details regarding the identifications of case participance are provided. Documents including income statement, balance sheet, profit and loss statement, letter to shareholders, notes, propositions for 5-year plans were reviewed. Analysis were done based on technical innovations and their segregation. Therefore, main conclusions were extracted from R&D aspect. The data from the document analysis were segregated and subjected to a simple thematic analysis. Second part of the study involved **interviews** to clarify how performance measurement can be useful while implementing innovations. Standardized, open-ended interview questions were sent out to entities representatives (Fig 9, part 2). Questions (appendix 1) were divided accordingly to the

framework starting from the concept of innovations in the company, following with already existing organizational performance measurement. In the third part, open-ended questions were related to the link (if such exists) between innovation and performance, and to what extent this link is analyzed. Interview was closed with background questions of the participants. A narrative approach guided interviewees through the main topics but also provided them with an opportunity to frame responses according to their own logic and experiences. Managers were asked to illustrate their answers with examples. Direct citations for the thesis were used as in the work as responses were provided in English language. The items mentioned in the interviews were then expanded and cross-checked with data from additional documents gathered for the first part. There responses to each question were reviewed and grouped based on the main idea, in order to provide insight to innovations and performance measurement.

In the 7 table of research instrument there are potential measures that can be found in the health care industry. For the technical innovation types health care industry usually create new drug or treatments that can be analyzed in the financial and non-financial perspectives. The distinction between radical and incremental can be very clear as a completely new product or service would be considered radical whereas additional indication for the drug or an altered step in the treatment would be considered incremental innovation. For technical innovation financial measures would be the cost of raw materials, cost of employees, revenues or profit. Non-financial measures are more tailor to healthcare as it can be number of patients treated, number of hospitals, number of pharmacies, number of medical representatives and so on.

Administrative type of innovations can be review in the organizational level as new already developed model can be applied to chain of pharmacies or country level hospitals or pharmaceutical company that has affiliates all over the world. This type of paradigm innovation is usually measured with the cost of such model in each stage of the innovation and the hours and employees needed for the model, in addition, rate of successful implementation can be measures together with employee satisfaction of the new model. Process type of administrative innovation is usually used in the lower level and is created by the administrative team of the organization. In case of the hospital, it could develop its own bureaucracy process that would need project teams of employees from administration. Such project teams are evaluated by cost and number of employees/working hours, followed by satisfaction rates, completion rates and effectiveness measures. Due to specialties of the healthcare industry hidden innovations are not included in the research. Hidden innovations are describe as one time accidents that provide successful results, unexcepted positive turn of events or a side process that can add value, all of these description could not be applied to healthcare sector as any unexcepted developments are interpreted as potential risks and are accounted as negative factors rather than innovations.

Table 7. The logic of framework of performance measurement of innovations implementation for instrument of research

Types of innovations		**Technical**		**Administrative**	
		Radical	Incremental	Process	Paradigm
Input	Financial	Cost of raw materials for new drug	Cost of additional materials for renewed treatment	Cost of the development of the new bureaucracy system	Cost of the new administrative processes in hospital, IT costs, additional tools cost.
	Non-financial	Number of R&D teams needed for the drug development, competitor potential, reimbursement system by country	Hours of medical representatives spent	Time of the employees who create new bureaucracy system, whether the health care organization uses electronic medical records or medication order entry systems,	Hours spent on research of the new administrative processes, staff overtime, percentage of electronic health records,
Action	Financial	Cost of labor for the drug creation	Cost of labor for the treatment renewal	Cost of implementation of the new bureaucracy system	Cost of the adaptation of new administrative processes, additional hires cost
	Non-financial	Employees needed for the drug production, average minutes per surgery, ongoing clinical trials	Additional time spent for the new step in treatment, patient wait times by process step	Hours spent for new bureaucracy system	Hours spent on new administrative processes, equipment utilization rate
Output	Financial	Revenues from the drug sold,	Revenues from the treatment provided	Cost saved due to faster bureaucracy system	Cost saved due to more efficient administrative processes
	Non-financial	Number of drugs sold, price agility, The ratio of drugs to patients, surgical mortality rates	Number of new patients treated, post-procedure death rate	Time saved due to faster bureaucracy system	Work hours saved due to more efficient administrative processes, rate of improved performance
Diagnostic	Financial	Cost of defective drugs.	Cost of defective treatments provided	Cost of delayed process	Cost of ineffective administrative processes parts
	Non-financial	Satisfied customer number, patent/generic opportunity, the rate of surgical complications or hospital-acquired infections.	Success rate of the additional treatment step, complication rate, number of patient complaints	Number of satisfied employees,	Effectiveness per hours rate, time save/spent of additional reporting

Research selection background. Healthcare industry was selected based on origin (both cases are global companies having branches in Lithuania but are clustered under Baltic structure) and organizational type, having only distribution service. No product production takes place in these affiliates. Another criterion for the company selection was product based. Pharmaceutical representatives need to have at least two spheres in healthcare, preferably consumer healthcare and specialty healthcare.

Due to peculiar trends in each sphere it is important to have an overview of the industry. Healthcare can be a broad concept due to various entities included in the activity. Drug based segregation can be done by separating specialty care products and consumer healthcare products. This way rare disease, vaccines and oncology medicine can be grouped under specialty care. Common products such as cold medicines or antibiotics are usually assigned to consumer health care. In addition, consumer health care medicine is also known as RX (prescription drugs) or OTC (over the counter drugs).

Another important distinction should be mentions. Generic drugs known as copies of brand-name drugs that have exactly the same dosage, intended use, effects, side effects, route of administration, risks, safety, and strength as the original drug. In other words, their pharmacological effects are the same as those of their brand-name counterparts. In addition, brand drugs, which are, originally developed drugs. For case studies two companies have been selected, both of which work only with brand name drugs. This selection is important due to fact that drug-developing companies take more interest in healthcare innovations.

For obtaining data for the study, contacts were established with two pharmaceutical representatives working in Lithuania but having Baltic cluster roles. Due to health care industry being sensitive, interview participants' names were not disclosed.

Collection of data. Data collection was conducted in April of 2020 by organizing sending out interview questions via emails. In two weeks' time first round of questions were collected and reviewed by the author. A second time questions were sent out with additional comments, for the purpose of more accurate details, collected after a week. Responses where provided in English; therefore, no translation was needed.

4. RESEARCH FINDINGS OF PERFORMANCE MEASUREMENT IN THE PROCESS OF INNOVATION IMPLEMENTATION IN THE HEALTHCARE SECTOR

The fourth part of this work provides the findings of performance measurement of innovation implementation in healthcare industry's pharmaceutical area by firstly providing document analysis of two pharmaceutical company cases followed by the second part of case study, in the form of interview with companies' representatives. The aim of this part is to provide practical data backing up the previous situation and literature reviews together with adopted potential healthcare framework.

4.1. Main findings of document analysis

The scope of practical analysis is limited to one country and two pharmaceutical companies. Currently, Lithuanian healthcare is fully covered by the government. Emergency medical services are provided free of charge to all residents. Access to hospital treatment is normally by referral by a General Practitioner. Prescriptible medicines are listed in the Lithuanian State Medicines Register. Lithuania has health insurance, prioritizes disease prevention and aims to improve primary care. Almost all hospitals are government owned as private healthcare is rare for Lithuanians, with few locals able to afford the cost; however, private clinics for medical tourists are a growing industry in the country. These clinics have to be of the very highest standard to compete, and so have state of the art equipment and highly qualified, multi-lingual staff. Now that Lithuania is part of the European Union, these clinics also have to meet strict EU standards. The pharmaceutical industry is almost completely private sector, however. There are less than 100 government owned pharmacies in comparison to total of over 1300 pharmacies all over the country. Sector of pharmaceutical companies as owned by multinational entities. Biggest pharmaceutical companies in the world establish affiliates in Lithuania in order to be able to import their production. This sector falls under regulation of European Medicines Agency, main aim is to protect and promote public and animal health, through the evaluation and supervision of medicines for human and veterinary use. EMA evaluates and monitors centrally authorized products and national referrals, develops technical guidance and provides scientific advice to sponsors. Due to this agency more and more companies establish its branch in Lithuania provided larger selection to consumers.

Two of the largest pharmaceutical companies in the world are used for the case studies in this thesis. Due to sensitive industry of the healthcare companies' names have been changed to preserve their identity. Documents used in the analyses are covering 2019 period. The first case of the study is a company encrypted with the title "Medica". It is a Swiss multinational pharmaceutical company, dealing in pharmaceuticals, generic drugs, over-the-counter drugs, vaccines, diagnostics, contact lenses, animal health over 20 years. Company had many merges and acquisitions in the begging of the 21st century aiming to expand its portfolio and to reach as many markets as possible. Currently "Medica" products can be bought in 155 countries. Employing over 100'000 people all over the world company has been named as most successful in the field of achievement to cost saving ratio. In comparison the second company "Pharma" is an American multinational pharmaceutical entity dealing in two sectors: innovative health, which includes branded drugs and vaccines, and essential health over 170 years. Despite being a much older company "Pharma" provides its product to 125 countries proving to have less market access that "Medica". The lower trend in employment is also visible as "Pharma" employees close to 90'000 people all over the world. Non the less, it is a very strong competitive company having a place at the top 10 pharmaceutical companies in the world.

The first part of review is focused on performance measurements of companies “Medica” and “Pharma” in the form of comparison. Reviewing financial statements, notes, balance sheets and provided pipelines, various measures have been extracted in the table 8.

Table 8. Performance measurement indicators extracted from “Medica” and “Pharma” document analysis

Performance measurement indicators		**Company “Medica”**	**Company “Pharma”**
Financial	Net sales	47.4 billion US dollars	51.7 billion US dollars
	Net income	7.1 billion US dollars	13.1 billion US dollars
	Free cash flow	12.9 billion US dollars	15.8 billion US dollars
	Discontinued operations	1.8 billion US dollars	10 million US dollars
	Market capitalization	214 billion US dollars	196 billion US dollars
	Net assets	55.6 billion US dollars	32.8 billion US dollars
	Margin (%)	25.4 %	31.4 %
	Loss of patent (Generic)	0.5 billion US dollars	0.1 billion USD dollars
	Dividends per share	3.04 US dollar	1.44 US dollars
	EBITDA	15.2 billion US dollars	19.18 billion US dollars
	Enterprise value	230 billion US dollars	236 billion US dollars
Non-financial	Technical operations (sites, warehouses)	27 sites that include production, R&D, warehouses and headquarters.	58 sites including 9 R&Ds, production, warehouses and headquarters.
	Organization restructuration (FTEs)	1.8% reduction of employees	2% of total number of employees
	Employee welfare (courses, recognitions, leadership experiences)	Parental leave (14 weeks), global recognition, 2 free learning platforms, leadership program.	Mentorship program, “Best” awards, gender equality, Experiential program.
	Total projects entered since 2015	42 medical projects in various aeras	52 medical projects in various aeras
	Dropped projects since 2018	13 discontinued projects	14 discontinued projects
	Over-all acquisitions	5 significant acquisitions expanding “Medica” portfolio	7 significant acquisitions expanding “Pharma” portfolio
	Commercial assets	19	24
	Discontinued clinical trials in 2019	2	7
	Number of patients dropped due to discontinued clinical trials in 2019	283	Not disclosed
	Employees certified on the Code of Conduct	116 884	88%
	Animals used in testing	512 137	Around 50 000

Both companies operate in different types of business units therefore selected indicators for performance measurement where abstract and global, to reflect entire companies state. Due to both companies having a separate division for innovations there was a possibility to extract innovation measures as well. Company “Medica” focuses on two division mainly separating oncology and other therapeutic areas. Under other therapeutic ears consumer healthcare has its own sub-division. From the financial perspective both companies have very similar structure and measure standard financial KPIs such as revenues and cost, profits, gross margin and other financial measures. Over all a slight better performance is seen by “Pharma” as it has higher revenues by almost 4 billion US dollars, 6% larger margin and 25% bigger earnings before interest, taxes, depreciation, and amortization. However, a very important market capitalization measure is higher in “Medica” pharmaceuticals

company showing that for investors from outside the stock are more attractive of the “Medica” company. This could indicate that in the markets “Medica” is seen as a higher potential company. In terms of non-financial indicators both companies group various metrics into themes of indicators such as supply measures, sustainability measures, employee performance indicators and so on.

Both companies introduce digitalization as part of their long-term strategies. Due to high trend of robotics and artificial intelligence labor force is chaining in all industries and it is clearly visible in the pharmaceutical area as both companies reduced their number of employees by approximately 2% and have targeted even higher reduction percentage for upcoming year. However, “Medica” companies has released some notes on the reduction policy stating that there are no redundancies, they are not creating new vacancies. In addition, due to saved cost on payrolls employee welfare has been increased in “Medica” giving minimum of 14 weeks of paternity leave in any site, buying out access to globally known and used Coursera and LinkedIn learning platforms and developing new leader\ship programs for their internal managers.

The most important group of measures are related to various medical project conducted in the companies. Both companies agree that it is crucial to trac discontinued project as their costs are significant and the overall brand name greatly suffers from discontinued trials. In the last two year both companies dropped similar amount of trials however “Medica” costs where significantly higher than “Pharma”. As “Medica” provided much more clarity and transparency in its documentation it was seen that all the clinical trial participants who had to be dropped from the trials had received compensations. It was also disclosed that additional tests were taken to ensure that discontinuation was necessary for the mentioned trials. In comparison, “Pharma” did not provide the number of patients dropped due to discontinued clinical trials and in 2019 it had 7 discontinued clinical trials, 5 more than “Medica”. In addition to clinical trials company’s ability to acquire another company is vastly appreciated in the pharmaceutical market. Merges and acquisitions strategy give the biggest weight in companies daily work. Acquiring companies that already have successful products allows companies to expand their market access and increase and/or diversify their portfolios. In terms of “Pharma” which has been much longer in the market, 7 most significant acquisitions are noted including: new generic drug profile, additional customer healthcare drugs and new biopharmaceutical portfolio. Even though “Medica” has been around for 20 years it has already made huge acquisitions expanding its products to ophthalmology, additional oncology divisions and biotechnology.

Another potential group of indicators that are gaining investor and consumer interest is sustainability. From document analysis it is seen that “Pharma” has more than twice sites in numbers in comparison to “Medica”. Due to automatization process and employee reduction policy many sites are planning to be closed or restructured. On the other note, animal welfare has been an increasing conserve for many US and EU organizations, thus high number of tests used on animals are decreasing the value of “Medica” brand name. In the pipeline of 2020, it is seen as a key issue that need to be resolved address immediately. In comparison, “Pharma” has been reducing test with animals since 2011, this year reporting around 50’000 tests conducted. All KPI groups are in accordance with both companies’ strategic objectives. “Medica” strategic objectives are aligned with the five strategic pillars: innovation, operational excellence, data and digital, people and culture, and building trust with society, and “Pharma” provide strategic imperatives: value provided though products, flow of medicines thought R&D, people and talent development, adapting to new “Pharma” scale and influencing external environments.

Table 9. Innovation measures extracted from “Medica” and “Pharma” document analysis

Innovation measures		**Company “Medica”**	**Company “Pharma”**
Financial	Net sales of innovative medicine division	37.7 billion US dollars	33.4 billion US dollars
	Operating income of innovative medicine division	9.2 billion US dollars	10.7 billion US dollars
	Margin (%)	31.5 %	32 %
	R&D costs	9.3 billion US dollars	8 billion US dollars
	Discontinued developments	around 1 billion US dollars	Not disclosed
Non-financial	R&D projects (new)	17 new projects	10 new projects
	R&D projects (on-going)	15 new launches	11 new launches
	Major submissions of new drugs (FDA approved)	30	25
	NME approvals of potential blockbusters (FDA non-approved)	5	8
	Clinical data readouts	More than 30	24
	Phase 1 and 2	114	63
	Phase 3	37	26
	Pipeline potentially	90%	94 %
	New indications for exiting products	19	12
	Commercial assets	4	-
	New clinical trials	11	3
	Number of patients in new clinical trials	494	Not disclosed

Both companies’ address innovations as a separate division, proving that pharmaceutical markets are driven by new creations, especially in the form of product development. As separate divisions they each have groups of indicators (table 9) adapted specifically for innovation evaluation. For financial measures, standard indicators are used. As “Medica” and “Pharma” companies are similar in performance and size, innovation measures such net sales, operating income, R&D cost are fairly similar. In terms of “Medica” it has slightly lower operating income in comparison to “Pharma”, 9.2 billion US dollars to 10.7 billion US dollars. However, it spends around a billion US dollars more on R&D section. “Medica” also provides cost of discontinued projects, which they describe as production cost that were wasted, such as raw materials, labor, technical devices, administrative costs: patents, licenses, legal documents and so on.

Following the concept of R&D indicators, non-finical ones are much more individual and applied directly to the industry. Both companies count and disclose new R&D projects that were started from scratch, however, continues projects are calculated as well. R&D projects can be identified as technical innovations and new projects – radical technical type, whereas continues projects can be labeled as incremental technical innovations. In addition to overall project tracing, there are many segregations regarding different types of project levels.

As both companies’ main market is United States they aim to get as many approvals from Food and Drug Administration. “FDA approved” label means that benefits of the product outweigh the known risks for the intended use. Therefore, this product is safe to use. In case of “Medica” 30 products have been released into the market during 2019 with such label. “Pharma” was behind by 5. Due to the

sizes of companies it is not uncommon to have such a high number of products released yearly. As this label is needed in case some adjustments have been made to previously approved drug. Another significant project that pharmaceutical companies' value are drugs with new molecular entity (NME) approvals. This type of drug contains an active moiety that has never been approved by the FDA or marketed in the US. It is a very important discovery and recognition as it has a potential to be the new "blockbuster" drug. Every pharmaceutical aims to have as many blockbusters as possible as they are extremely popular drugs that generate annual sales of at least $1 billion for the company that sells it. Usually such drugs are created treat common medical problems like high cholesterol, diabetes, high blood pressure, asthma, and cancer. Due to high potency of such drugs, both companies made 5 and 8 in 2019, respectively. From "Medica" and "Pharma" documents it was reveal that it is a higher number than excepted. Both companies connect such an increase with higher R&D costs.

A separate information together with indictors are given on clinical trials. This type of projects takes more measures as they are the implementation step of innovation. Clinical trials are usually measured in every step financially and non-financially. However, this is very sensitive area for pharmaceuticals as it is the root of their potential success. Clinical trials have four staged, fourth being the fully developed drug or treatment. The first clinical trials consist of a new compound – generally performed in a small number of healthy human volunteers – to assess the drug's safety profile, including the safe dosage range. These trials also determine how a drug is absorbed, distributed, metabolized and excreted, and the duration of its action. Second trials are related to clinical studies performed with patients who have the target disease, with the aim of continuing the first trial safety assessment in a larger group, assessing the efficacy of the drug in the patient population, and determining the appropriate doses for further evaluation. Both companies provide combined data for first two stages, company "Medica" conducting almost twice more than "Pharma". Third trials are large-scale clinical studies with several hundred to several thousand patients, which are conducted to establish the safety and efficacy of the drug in specific indications for regulatory approval. Therefore, it is not surprising that the third stage results are provided separately: "Medica" conducting 40% more than "Pharma". These trials may also be used to compare a new drug against a current standard of care to evaluate the overall benefit-risk relationship of the new medicine. Most of those clinical trials are continues, allowing already developed drugs to receive new indications. This way, the drug can be used for broader specter increasing its market and revenue. New trials are started every year and in 2019 "Medica" has started 11 new trials, stating that it is a very high number in comparison to previous year. That statement can be backed up by the competitor "Pharma" data of only 3 new clinical trials.

Overall looking from the financial side "Pharma" has higher financial indicators. However, looking from the innovation aspects "Medica" has been conducting significantly more trials, has more approved drugs and has disclosed more information on entire process of R&D. These results have been achieved with higher financial cost in comparison to "Pharma", even though net sales and operating income indicators of innovation division are much lower in "Medica". Even though both companies have vast portfolios, "Medica" is the dominating by sheer numbers of non-financial indicators. "Medica" strategy is clear in terms of providing more new drugs in various areas. By doing so "Medica" raises its market share and potentially revenue in the long run. In order to better understand the two strategies of the level of innovation implementation in both of these companies, following part represents the interview results.

4.2. Main findings of the analysis of interviews

Second part of the research had an interview questions sent out to two representatives from Lithuanian based branches of "Medica" (appendix 2) and "Pharma" (appendix 3). This approach was applied due to changes in global health situation as pandemic was declared. COVID-19 has led to country level quarantine, making an interview interaction physically impossible and allowing only non-interactive communication. Following the concept of having true responses of the companies' representatives, questionnaires were sent out to people originally intended to be interviewed. From the received responses further insights, details and recommendations on performance measurement of innovation implementation in "Medica" and "Pharma" have been made.

Getting acquainted with companies. It is worth noting that branches of the discussed companies are not separate entities but rather a supporting, local-based offices. Therefore, they operate on the same model as the whole company, simply by a smaller scale. Representatives involvement in their companies are shown in table 10, giving affair and true view of the branches' work in the retrospective of global entities.

Table 10. Interview based analysis of respondents' data

Respondents basic data	**Company "Medica"**	**Company "Pharma"**
Role in the branch of the company	Manager of oncology business unit	Manager of distribution for Essential Health unit
Relation with development and performance of the company	*"<...responsible for meeting set KPI from global team...>"*	*"<...report branches results to our region manager...>"*
Years of working experience in the company	7 years	3 years

The first objective (table 11) was to better understand the overall view of "Medica" and "Pharma". Firstly, both companies named "innovation" as one of their vision, mission or targets. "Pharma" also had specially distinguished performance: *"<...deliver growth-based performance by investing effectively in our business, developing our people and executing competitively…>"*. Both companies had noted "trust" as their main mission. "Pharma" elaborated on this pillar: *"<...commit to use our science and technology to address health needs, make our products affordable and available...>"*, whereas "Medica" just noted "build trust with society" as a form of trust and business-consumer communication. "Medica" also addressed *"<...power of our people" and "Go big on data and digital*". These last two elements are closely connected to innovation as the usual drivers of creation and new ideas are the employees, together with fast growing modernization, digital innovation is becoming a new standard in many markets. Healthcare has not yet caught up with information technology changes, however it is clear that for "Medica" this is an important pillar to be considered.

Both branches are Baltic cluster-based meaning that main office has administration with finance, accounting, logistics, quality, market access, brand managers and business unit managers. For "Medica" main office is located in Vilnius, additional smaller office, named representative office, is in Riga and Tallinn, so far, has no office. All the major roles are in Vilnius, Riga has an accountant and a brand manager together with field force, and Estonia has only field force type employees. "Pharma" has a similar pattern; however, their main office is in Riga, and additional two representative offices are in Vilnius and in Tallinn. The last two have their own logistics, accounting roles and one business unit manager is located in Vilnius. Field force employees are operating in all

three countries. This type of organizational structure is common for pharmaceutical industry and is usually applied all over Europe continent.

Branches are providing smaller scope of original companies' services. "Medica" deals in oncology treatments and consumer healthcare drugs whereas "Pharma" has a wider portfolio - additionally including cardiology, endocrinology, and neurology. None of the pharmaceuticals manufacture drugs in the Baltic states, all drugs are made elsewhere and brought to Baltic cluster countries. They arrive directly to wholesalers, who later distribute drugs to their pharmacies, or hospitals who ordered them from the logistics departments.

It is a common practice among pharmaceutical companies to segregate consumer healthcare as a separate unit/division/department or make it a subsidiary company. In "Medica" organization there are 3 service units and administrative unit globally, thus local Baltics cluster took the same approach. There is small unit only for vaccines, and two larger divisions, oncology business unit and consumer healthcare business unit. For "Pharma" the trend is similar; units in the local clusters are taken based on the global practice. However, "Pharma" has *"<...two business units "Innovative Health" that deals with our patented drugs and "Essential Health" unit -biosimilars and an administrative unit"*. This type of segregation does not distinguish consumer healthcare as it simply separates the generic drugs from patented drugs.

Both branches do not have a separate position for innovations. There are none cluster-based positions for innovation, not only in Baltics but in general. Such role exists only on global level, showing that not a lot of people are involved in the process of innovation, according to "Pharma" *"There are 3 region-based positions of innovation and business development lead for the whole company".* This enforces the idea that innovations are poorly traced on cluster level as there are no responsible people for its control and performance measurements.

Table 11. Interview based analysis of Lithuanian branches' data

Lithuanian based office details	**Company "Medica"**	**Company "Pharma"**
Organization's mission/vision	*"Deliver transformative innovation."*	*"Innovation - We invest in scientific and technical excellence to develop and launch a pipeline of new products that meet the needs of patients, payers and consumers."*
Size of the branch	Baltic level cluster with main office in Vilnius. Currently employing 45 people.	Baltic level cluster with main office in Riga. Currently employing 31 people.
Services the company provide	Both branches provide drugs and treatments to wholesalers and hospitals.	
Scope of products	Vaccines, oncology treatments and over the counter consumer healthcare drugs.	Vaccines and drugs for immunology, oncology, cardiology, endocrinology, and neurology
Organizational structure	4 main departments	3 main departments
Innovation management role	Global	Global

Performance measurement in "Pharma" and "Medica" branches. In order to review the full situation of performance measurement on innovation level it was important to firstly review the performance measurements that company takes locally. A chain of questions was asked in accordance with performance measurement concept. It is also noted that branches are rarely introduced to full performance measurement. Typically, these systems are applied on international level and only parts

are adapted for branches. This approach is taken in order to measure the same indicators across every country. Later on, they are consolidated to cluster and finally - global level giving the overview of consolidated company's performance. Therefore, it was crucial to understand how companies understand the concept of performance measurement, if it is important and why they use it in the first place. "Medica" responded saying: "It is important because if we wouldn't have it, all our process analysis and management efforts would be a waste of time. I wouldn't have control over the things that really matter, and my organizational decision-making could only be suboptimal. The only reason for doing process analysis, improvement and management is to improve organization performance in meaningful ways. Without measurement, we don't know if there is improvement; we don't know what is meaningful." And use the standard definitions of performance measurement understating as a *"<... quantification that provides objective evidence of the degree to which a performance result is occurring over time"*. As the performance measurement approach is not new, there is no surprise that "Pharma" representative described it fairly similar. *"Performance measurement is the process of collecting, analyzing and reporting information regarding the performance of an individual or organization. It is a necessity because it provides the useful information about products, processes and services that are produced in a business. As a manager I need to supervise, observe and control the activities of my team while also studying various summaries or reports, this way I can manage the work in an effective manner getting the things accomplished for global management targets."* From both cases supervision and control are the main reason for performance measurement. Measurement gathered data is used to make decisions, to interpret company's surroundings, and to guide activity- that is what gets measured. "Medica" response verified the theory that measures are collected for main company leads to use *"<... global measures that are gathered from each branch and consolidated for the top or global leaders to review"*. To determine performance measurement involvement in companies' activity, examples or potential approaches where requested from the respondents. "Medica" introduced their measures segregation *"<... customer focused, finance focused, employee focused, and organization focused ...>"* and shared some indicators used in their branch office: *"<... brand preference mix index, corporate reputation improvement, perceived quality of products/portfolio, perceived value of services offered, number of new customers, average number of prescriptions per customer, sales dynamics, return on investment ...>"*. The respondent also mentioned a new performance measurement element directly aimed at employees *"<... review of 360 method for each employee ...>"*. It is a common trait of all companies to constantly look for new ways to measures each and every area of the organization. While "Medica" introduced employee-oriented measure, "Pharma" has developed new measure for business development. *"We have previously indicated to shareholders our intention to introduce a measure to recognize the importance of accelerating and strengthening our pipeline, reflecting our innovation priority. We are therefore introducing a strategic 'Pipeline progress' measure. It is targeted to reward the progress in strengthening our R&D pipeline with high quality assets and in achieving approvals in major markets for key assets or indications"*. This type of measure is a step away from their standard indicators: *"<... total shareholders return, adjusted free cash flow, innovation sales, pipeline progress. We follow the Generally Accepted Accounting Principles (GAAP) however we also have Alternative performance measures. APMs, such as adjusted profit, free cash flow and constant currency growth rates in some of its quarterly and annual reporting of financial performance and everything that is not under GAAP. These metrics are necessary for the overall view of the company there is an appropriate balance between the use of statutory metrics and APMs, together with clear definitions and reconciliation for APMs used in financial reporting"*. It is worth noting that "Pharma"

company's main office is USA based, accordingly the accounting systems is GAAP, in contrast to "Medica" which is Europe-based and use - IFRS (International Financial Reporting Standards). In addition to financial measures "Pharma" also provided their non-financial indicators *"<... company collects, evaluates, and stores an enormous backlog of data about our products, but equally there is much more information now available to our external stakeholders, including competitors, which can be used and interpreted in different ways. We have claimed data from insurers, scrip data from pharmacists, hospital admissions and discharge data, clinical trials data, and adverse event reporting data—but none of this is really captured beyond the different silos they rest in"*. From "Pharma" responses it is clear that company gives the financial measures more value, while "Medica" most likely has equally financial and non-financial type of measures. The later company's representative has noted some specifics about branch measures *"<... mainly focus on customer satisfaction; however, we receive direct targets from global finance team to provide specific revenues and gross margins. Dealing with medication area it is natural, in my opinion to put the patient first"*. This is enforced by the three non-financial measure types of the later company: customer, employee and organizational focused. "Pharma" on the other hand, stresses GAAP as the main measurement system arguing that *"<... they are understood and represented globally though regions ...>"*, however they have three very important non-financial measures that are applied globally but the information for it is collected on a country level. *"We have employee feedback - employee engagement scores from our global employee survey, supply service level – percentage of orders delivered on-time and in-full, Corporate reputation – reputation index among stakeholders and informed public measured globally and in top 13 markets"*. Relationships with physicians and other healthcare providers have been established in pharmaceutical industry for a while, however patient-centric model has not yet reached its full potential. The role of payers is very important for any healthcare organization and they are tying reimbursements to patient outcomes. Those are a potential group of measures that are not fully analyzed on branch levels. Reviewing both companies' representatives answers it was clear, that some measures are used separately and grouped according to the business need, and in some cases globally known performance measurement like key performance indicators were used. "Medica" representative responded that KPIs are called Group measures in their organization and it focuses firstly on the financial aspects *"<... we call it Group performance measurement. Our financial KPIs are usually coming from Global finance leads and are in line with the International Financial Reporting Standards (IFRS). I know that we have some non-IFRS measures, like free cash flow or net debt, a couple of measures for ongoing operations. We call them core performance measures and they are very internal, and cluster based. As an internal measure of Group performance, these non-IFRS measures have limitations, and the Group's performance measurement process is not solely restricted to these metrics. Because of their non-standardized definitions, the core measures are usually incomparable with other companies. However, we use them to give investors better view of Group's management assesses underlying performance. Specifically, to Baltics cluster very important measures that we use are a bundle of market share indicators. We evaluate how much of country's market we have by drug brand and dosage ...>"*. Taking already created systems and applying them accordingly to the need of the entity is a common approach in any industry. "Pharma" has mentioned that they take various measures from Organization Development (OD), Lean Six Sigma (Lean Sigma) and Project Management (PM) systems. In addition, representative responded that *"<... we are constantly following the market trends for new PM systems that could represent our needs better."* From the provided responses - pharmaceutical industry cannot take a fully developed performance measurement and implement it, both companies nitpick measures or parts of systems

applying them as they see fit. The need for new measures and constant performance measurement alterations show that current situation does not fulfill organizations need in term of performance tracking and control. Going deeper into the measure approach, both representatives where required to answer how these new measures are implemented, and whether additional systems such as LEAN, for example, are used. "Medica" has taken a simple solution towards new measures *"We do not change the already existing system; we simply follow the reporting of IFRS and the core measures. We add new measures to the core part of reporting. Usually each cluster has its own specific needs for tracking particular business insights. Those KPIs are reported after global core measures. If many country's show similar calculations, then this indicator is added to global core part"*. This type of approach shows that new measures are created during "work-in-progress". Organization does not predefine measures for process but rather let those measure occur naturally. As these new measures are coming from the top management *"<... standardized by the global team ...>"* it takes a while for them to recognize reoccurring trends and label them as potential measure. Distributing these new measures across clusters as new KPIs are being delayed because of that. In contrast, "Pharma" uses completely opposite approach. *"We take already existing and market tested systems. For example, Lean Six Sigma is used in global manufacturing and supply and was delivering solid, quantifiable business improvements. Our competitors have implemented such systems with success, and it became more popular in the pharmaceutical market. This gives us a way to measure our performance by standard systems and compare ourselves in the competitor spectrum"*. In the later company case this approach allows management to predefine measures before the project, already tracking all potential indicators. Another note is on systems that are already used in the same pharmaceutical market; by taking successfully working systems "Pharma" can not only track its full progress and control it but also analyze how company performed on the competitor scale.

In the theoretical part made assumption that *different measures (financial and non-financial) of performance are differently important for innovation implementation process* is proved. Companies have underlined the usage and importance of measures for a successful business model. However, this predefined new measure implementation has its negative aspects, as model systems do not leave space for potential new measures that could arise due to innovations in the specific organization. Due to many similar drugs developed across various organizations it is not enough that companies' medications work, they have to work better, or should be cheaper, than the competition. Both companies lack data on how effective their drugs are. Effectiveness data could be reviewed a global level, nonetheless drug receivers are regional based, making primary data collection important on a country level.

Innovation concept in companies. Second group of questions involved overall companies' situation in terms of innovations. As innovation is a broad term applied to virtually all industries it is common to set understanding in terms of innovation in pharmaceutical companies. There is no doubt that both companies: "Pharma" and "Medica" have a significant amount of innovations in their organizations. In the pharmaceutical industry, innovation is often synonymous with new drug discovery and approval as importance of developing new medications is clear necessity. A large majority of the industry is also looking for ways to improve existing products and services for patients, which falls under incremental innovation label. Despite the implementation of processes to streamline almost every other business operation, innovation is far too frequently the result of a one-off good idea or a fortunate coincidence. This approach is not sustainable for the industry in the long-term. Each companies' vision area includes innovation, making it a key aspect of companies' driving force.

Developing a new medication can cost billions – and pharmaceutical market unanimously agree that this field is getting more difficult. In recent years the pharmaceutical industry's R&D success rate has been under pressure and "Medica" and "Pharma" fall under the same issues. Representatives where asked to answer from their perspective if innovation is necessary for successful business. In both cases the answers where positive. "Medica" responded *"For pharmaceutical industry innovation is our key element, it is the driving force of successful and sustainable business. Innovation is critical to how we improve health and create financial value. As a research-based healthcare company we rely on intellectual property protection to help ensure a reasonable return on our investments so we can continue to research and develop new and innovative medicines."* It is clear that returns on effective innovation are huge. Companies find a clear correlation between innovation and growth. Seconding the innovation importance opinion was the respondent from "Pharma" *"Delivering innovation is our priority, it drives productivity, and productivity is what drives company's growth and the wealth. Most successful innovations hinge on the execution and help our business move forward. "Pharma" continues to build upon its heritage of innovation in biosimilars to create an environment in which physicians have more treatment options and patients have improved access to medicines"* Companies need to increase innovation to maintain the solid results that shareholders expect. Even though innovation importance and value are nonnegotiable, the segregation and description of each and every innovation is mostly organizational based. "Medica" representative divided innovation into three categories *"<... marketing, process and products ...>"* and describe each:

- *Marketing - consists of services and advertising: research into customer needs, concept and prototype tests with customers and the marketing of new products.*
- *Process - R&D, process improvement, process innovation is understood in our company as creating radical or game-changing decisions or projects.*
- *Product – launched new products, improvements such as additional indications.*

"Medica" representative also mentioned an organizational level change *"<... we recently launched a separate division for optics related products ...>"* that falls under process category; however, this is administrative type innovation. As these types of innovations do not generate direct value, usually they are not noted in statements or public-aimed presentations. Representative also shared some long-term plans *"<... we aim to minimize side effects of already developed drugs this way, we can take some of the waste out of the healthcare system, not to mention patient discomfort. Treatment customization has also been discussed in future plans. By selecting the right therapy for individual patients or by combining therapy with digital interventions we could achieve that in the near future."* In contrast to previous company, representative from "Pharma" did not provided any specific innovation categories *"<... we develop drugs in biosimilars, anti-infectives, rare disease and oncology, we also create vaccines and conduct clinical trials"*. However, respondent mentioned a potential innovation that can be evaluated on a healthcare industry level *"<... move from a world in which our regulatory-approved medicines were paid for routinely, without question, to one where our customers are insisting that we build therapies around a lower cost structure, are clinically differentiated from existing products, and add significant incremental value to the entire healthcare system."* It is neither confirmed nor denied that this type of project is in action, most likely due to competition possibility. Following the thought of administrative innovations, representative mentioned *"We have some core changes: improving the cost efficiency of in-house R&D around new medicines that customers will want to pay for; restructuring of our eight Business Units to limit*

bureaucracy, build accountability, foster a proper balance between risk and reward, and allow for faster, better decisions on the ground; and becoming a better business partner to ensure we can seize the best new external opportunities, ahead of the competition." Furthermore, on types of innovations organizations, respondents were asked to identify which innovations are more common: radical or incremental. This type of classification is usually applied to technical innovations, which in pharmaceutical industry, would be defined as treatments, drugs or vaccines. "Medica" representative could not define preponderance *"Well I cannot say which type we have more. It is equally split between developing new drugs and vaccines and diagnostics and improving already existing ones"*. Whereas "Pharma" representative identified incremental innovations as slightly more dominant due to their larger biosimilar sector *"I would name our biosimilars as incremental innovations as they are biologic medical products highly like another already approved biological medicine"*. Overall it is hard to define which type of innovation is dominant due to constant change. Each innovation can have its own scope and length, therefore in the long run radical innovations could have lower impact than incremental. It is clear that in retrospective of the entire company innovation has high importance. "Medica" respondent suggested that attention on innovation is rapidly growing on yearly bases *"Every year it becomes more and more important. The returns on effective innovation are huge and there is a clear correlation between innovation and growth, we increase our resources towards innovation very year. In today's market new products, it is a competitive necessity. We are also, constantly looking for new ways to monetize existing products and services. However, every innovation strategy needs highly skilled and motivated people to implement it and to create innovation mindset is a very hard task globally"*. In addition, "Pharma" respondent stated that innovation is vital in order to compete against other market members *"We believe that truly disruptive innovation, which we define as substantial "game changers" can carry a positive impact on the whole company. Today, innovation, more than price, is the most important source of competitive advantage in the pharmaceutical business. This automatically makes innovation a strategic factor in how we respond to the enormous transition taking place in how medicines are discovered, developed, and marketed around a more diverse customer base. Simply put, innovation is the mindset that allows us to keep pace with market change."* In order to implement any type of innovations resources are a necessity and both companies account new product and treatment-based costs under R&D. It is worth noting that administrative type innovation costs are calculated globally and allocated together with other organizational costs. Representatives shared numbers related to R&D costs detailed in table 12. However, it is important to note that pharmaceutical resources, in terms of innovation, can include all areas of the company: finding and retaining the right talent, pursuing the right partners and keeping patients and payers at the center of the process.

Table 12. Financial comparison of "Medica" and "Pharma" data

Financial details	**Company "Medica"**	**Company "Pharma"**
Net sales (Globally)	47.4 billion US dollars	51.7 billion US dollars
Net sales (Baltic branch)	35.1 million EUR	42.4 million EUR
R&D costs (Globally)	9.3 billion US dollars	8 billion US dollars
R&D costs (Baltic branch)	6.7 million EUR	9.2 million EUR

On Baltic cluster level the net sales trend is similar to the global data. In "Medica" case a little over 19% of net sales are allocated from global perspective and Baltic cluster follows this trend with the same percentage. These numbers are similar due to global team requests made on all clusters to follow this KPI close to the global team. In case of "Pharma" organization around 15% are allocated to R&D

globally and 21% from Baltic cluster. *"In some clusters, Baltics included, R&D share is more significant in comparison to other clusters. This model was adopted 5 years ago and was related with overall global accounting policies."* Common trait regarding investments are reimbursement systems *"<... payer which is the government in Baltic cases as it provides reimbursement. In Lithuania reimbursable drugs could be listed by government or some insurance companies."* Additional financial support can come from external investment as well. Both companies are listed in the stock exchange, therefore anybody interested in buy companies' shares can be labeled as an investor. For some specific projects, investments can be received from external physical or juridical persons *"<... outside investors are interested in specific drug or treatment development and they fund the process of it."*

Overall, both companies collect and allocate significat portions of money towards innovations on a yearly basis. Administrative type innovations such as division restructuration and market-based patient approach towards drugs are taking place more often. Therefore, assumption that *"different types of innovation (technical, administrative and hidden innovation) are differently important for innovation implementation process"* is proved. Various types of innovations are used in both companies, nonetheless most important innovation type remains technical: drug and treatment related. Most investment go directly to these types of innovations as they are the driving force of successful business model, according to "Pharma" and "Medica".

Reflection on performance measurement for innovations implementation. Final interview query was related to performance measurement of innovation implementation questions. From the literature analysis various types of innovation measurement metrics were introduced. Some of these indicators measure innovation as results or outcomes such as sales from new products. Others measure innovation as a process, using metrics such as the number of innovation projects in progress. And some track input measures such as the number of ideas generated, or raw materials used. Previous interview questionnaire part was related to structure and it became clear that innovation management altogether belongs to global teams as job roles are at the top of organizational charts. Nonetheless, branches are aware of the requirements and overall situation regarding innovation at some level. "Medica" representative stressed the importance of financial measure in terms of innovation *"<... it is measured mostly from financial point. There is an innovation division that deals with all innovative related things. Division is separated into oncology and consumer healthcare units and is monitored globally. Units have the same Group measures where applicable. However, I think IFRS doesn't account that much for innovation, so they probably fall into the core measure section. In particular, we have forward-looking statements relating to future actions, prospective products or product approvals, future performance or results of current and anticipated products, sales efforts, expenses, the outcome of contingencies such as legal proceedings, and financial results"*. It is constant that "Pharma" also notes on innovation measures situation, but company representative also addressed some issues with it. *"Choosing the correct KPIs for measuring innovation is necessary because we actually tend to get what we try to measure. Our goals and KPIs direct our efforts and actions towards them and help people to adapt their behavior as well as take action to reach those goals. We do struggle with measures because of the uncertainty of what should be measured in the first place"*. These responses allowed to make conclusions that innovations are measured at a very basic and mostly financial level. There is a clear need to create or determine more healthcare-based measurements adaptable to innovations. This is also noted by "Medica" responded *"I think getting the right metrics in place to measure innovation success is very tough. It's far easier to think of*

metrics to understand the perspiration half of the innovation than the inspiration piece but breakthrough innovation is often the result of the latter. So, we need to think of more not money related metrics that we could use as control points. We have a newer problem now there is more invention than ever, but far less productive innovation. If we could have some benchmarks to know when to stop or even when to drop an idea, that would have greater results". The representative from "Pharma" agreed on the lack of construction and clearness towards measurement in terms on innovation. *"It is difficult to measure innovations because the future is inherently uncertain. We have discussed in our internal teams that having a model of the innovation system especially pharmaceutical industry based, which describes the structural and operational components of the system would give us a better chance ant measuring innovation. Also, we use many output metrics that are scattered and need to have a defined structure."* These two cases stress the importance of not only clear measures but a system which would provide comprehensive results regarding understating the level of innovation implementation. Specifically, these systems would need to be adapted to healthcare industry. It could even go deeper into pharmaceutical markets as there are many details regarding development and launch of the new drug or treatment. Regardless of the lack of clear measurement system innovations have been evaluated and controlled in some forms in every industry. "Medica" representative has provided these few indicators proving that no new healthcare industry-oriented measures are used. *"We use pretty common core components—gross margin, R&D, and sales from new products, we also have a core research and exploratory development index that is calculated globally. Recently we have seen return on investments allocated to a specific drug."* Mentioned metrics are mostly financial based and can be applied to any industry with minor alterations. However, this is the pattern of pharmaceutical organizations as "Pharma" representative seconds the opinion. *"We use traditional measures of innovation, such as R&D investment and patents. We also have number of new products launched in our fiscal year, revenue and profit growth from our new drugs and treatments, return on investments of innovation activities, actual vs. targeted breakeven time for our new drugs"*. The trend in pharmaceuticals is clear regarding metrics, nonetheless some non-financial measures were also mentioned by the later company *"<... R&D spend as a percentage of sales, the number of innovation projects started, the number of new ideas in the pipeline, number of new employees in R&D"*. All of these metrics could be classified as input metrics, in general, they are a great starting point for measuring innovation because they are responsive. When measuring inputs, organization is able to react to changes sooner. However, it is important to keep in mind that input does not guarantee output. Even if all the resources are used, the results may not be seen due to the lack of correct implementation process. Outcome results have to be seen and also measured and should be used in the future of the organization, to get the full scope of the change. According to "Medica" respondent *"Most significantly, we need to ensure that our innovation and risk-taking are rewarded in the marketplace, while doing all we can to ensure affordable access for patients. We continue to work with governments, policymakers, payers and other players in the healthcare ecosystem to advocate for pro-innovation policies that benefit patients, our company and our industry as a whole. Every development process is unique because at the end of the day we get something new, however after each development we are learning to use the right methods, tools and approaches at the right times. Each of the novelty that is introduced to the company comes with a bunch of written instructions or background details, this way we are storing our know-how."* The second case organization "Pharma" acknowledges the opinion *"<... we strongly relay on our output results. Such as increase in revenue as a result of innovation as the key performance indicator. However, I know that output metrics don't tell me what went well or what went wrong and show only*

a certain time after the activities". In both cases there are clear measures taken towards innovation, however both organizations prefer financial metrics of input and output. In terms of implementation process no measures were discussed, mainly due to overall lacking metrics for innovation implementation and in cases that measures exist, they cannot be applied to pharmaceutical market. Innovation capability building, that can be described as partnerships and networks, relative to targets and competition is a common metric that cannot be used in pharmaceutical area. Mainly because there is very little or even no collaboration between organizations. The completion in this industry is notable on very level and partnerships are very few and in primary stages. Collaborations could mean joint development of new molecules through an open portal, licensing agreements, investing in a start-up exploring new therapeutic ideas or working together with others in the healthcare ecosystem all of these would speed up the innovation process for all collaborating parties. Both companies agree that lack of cooperation is negative aspect that has been raised openly for significant amount of time. "Medica" representative has noted positive and negative aspects of innovation measurement necessity altogether. *"The plus side would be control. We have much better control over innovations that we review constantly. The end product is usually much more successful because we can interfere in development of the innovations. The negatives come from additional cost that are significantly higher. Also, it is difficult to determine the measures that will be useful, as in most cases they cannot be used in every project."* And "Pharma" respondent adds to the negative aspects *"Indicators have to account for many different forms of innovation, with widely differing motivations, processes of development and consequences. We are often uncertain of what should be measured in the first place."* As company's innovation system becomes more critical to the long-term success of the company, the desire to measure and improve it increases. Innovation, however, unlike other business processes, is an area that defies the development of precise and unambiguous metrics. Innovation in the pharmaceutical organizations is an even bigger challenge as the effort to create a meaningful innovation measurement system is yet to be delivered. Although both companies use performance measurement for most activities, measurement of innovation is not as straightforward. Understanding the problem that measurement should solve for the organization and, based on that insight, to design and implement a useful and usable innovation measurement framework appropriate to healthcare market. Therefore, final assumption that *different types of innovations require different measures in performance measurement to ensure the innovation implementation process in healthcare* is correct. Having framework and model of how the innovation system is constructed and how it works should be the second step as the first remains measure indication and development. Due to global roles of the innovations in the organizations, executives have to review and refine their innovation strategy, focus on creating the correct culture in place to implement it, get the most from external collaborations, and make sure they include a variety of innovation approaches.

Findings of conducted research show that performance measurement is strongly implemented in both pharmaceutical companies. Due to specifications of the industry, measures for organization performance are adapted based on global practice, leaning more into personal performance measurement development rather than implement already created ones. Favoring financial measures for all organizational areas, both companies do use employee or patient oriented indicators, but they are not constant and vary from cluster to cluster. Going into specific field such as innovation, the importance of it is clearly stated not only by both companies but by industry itself. Importance of innovation is show in each companies' main goals or targets as well as significat cost allocation towards R&D. Technical innovations are the main focus of both companies due to new drugs and treatments being the driving force of long and sustainable business model. In many cases the later

type of innovations is significantly more valuable than administrative type by the reason of creating actual value to the company. Nonetheless, administrative innovations in both companies where detected, indicating that organizational changes are necessary for the entities to keep up with the pace of the changes in the business models. Both companies mentioned that catching up to the new demands and regulations are putting a strain on the evaluation of innovation. Innovations need to be measured in every stage and in many various indicators to provide full scope of the success or failure of the innovation. However, both companies mentioned just a couple of innovation measures that are common and are not targeted to healthcare industry. Mostly they were in form of financial indicators suggesting that new drugs and treatments are as important as the net profit they generate. Yet, both companies noted on being patient oriented, drawing a conclusion that lack of clear metrics are the fundamental issue for uncertain innovation measurement, which reasons in very unsteady and indirect performance measurement of innovation implementation. This research was conducted on pharmaceutical industry level, further research in healthcare industry is suggested in order to better represent the whole industry. Furthermore, branch offices where used in cases analyses, however innovation organization roles are globally based, thus broader analysis on global level offices are needed to fully determine the level of performance measurement of innovation implementation.

4.3. Recommendations provided for the performance measurement of innovation implementation in healthcare

In order to continue to be viable in the future, the healthcare industry must keep adapting in many ways, constantly looking for new solutions to arising problems and determent the next blockbuster moves. The pressure to reduce costs coupled with the need to be more innovative and still comply with local and global regulations has led to a number of new developments in the sector. Both cases analysis companies have mentioned decrease on in the scope of new launches, regales of the rising investments. New drug launches are reducing according to the overall pharmaceutical market reviews. Companies are trying to produce innovations more thoroughly than before, yet success rate is slowly dropping. More innovation-oriented control system could provide a better understanding of innovation urgency, success rate, overall necessity and give insights on dropping rates. The overall level of innovation situation in “Medica” and “Pharma” is presented in table 13. From the above analysis both companies have indicated financial measures for input and output measures such as investments in R&D or net sales revenues as their top priority for technical innovations. For the same type of innovation some non-financial measures such as employees in the R&D or number of treated patients are used for both companies also. However, there were no tangible measures used for action or implementation part of innovation. This gap of valuable information, once filled, could assist in terms of needed control towards new production and launches. On global level clinical trials could be accounted as such measures, nonetheless, branch offices do not account such indicators. In addition, both companies’ branch offices have low involvement in administrative type of innovations, which are becoming the core change needed in the healthcare sector. Some details of administrative innovations were described by “Pharma” representative, however only on global level and including solely financial measures such as cost.

Further provided recommendations are oriented specifically to branch offices for Baltic cluster, however case analysis showed how closely related branches are to global teams, thus issues arising in the division are linked to the top management structures. Consequently, recommendations could be applied to the top management in order to solve cases for the country or region-based obstacles.

Table 13. “Medica” and “Pharma” performance measurement of innovation implementation status

Types of innovations		Technical		Administrative	
		Radical	Incremental	Process	Paradigm
Input	**Financial**	Both			
	Non-financial				
Action	**Financial**				
	Non-financial				
Output	**Financial**	Both			
	Non-financial				
Diagnostic	**Financial**				
	Non-financial				

Patient-oriented company. Pharmaceutical industry addresses patient as the key elements of any pharmaceutical company. Both companies “Medica” and “Pharma” describe themselves as patient oriented, innovative, digitalization-aimed entities. Nonetheless the companies do not understand what the patient goes through to get diagnosed and treated, as there is no established connection between the company and the patient. Potential focus could be aimed to better understand this specific area, however, no branch level measures, with that type of patient focus, were described by both companies. At the highest level, such connection should involve listening to and partnering with the patient, and understanding the patient perspective, rather than simply inserting patient views into the established process. Only then can patient-centered outcomes truly be the core of the strategy with those insights, entity can develop drugs with labels that are more likely to meet patients’ needs, commercialize them in a more patient-oriented way, and perform clinical trials more efficiently. This would require shift in organizational structure and processes, and capabilities to focus on transparency and value for the patient, involving more administrative type of innovations. Understand how to bring value to patients could also mean expanding service offerings or rethinking entire business models. Change in organizational model is also needed, with medical affairs, market access, regulatory, pharmacovigilance, and commercial teams at global and regional levels all collaborating with a common goal: to capture patient perspectives and insights and to respond to their needs. It would also closely involve payers as they are seeking evidence in the form of patient-reported outcomes and are involving patients in health-technology assessments. A suggested tool for both branch offices could be the patient-reported outcomes measure. As only patients can report how they feel and function, this generates a need to define endpoints that are important and relevant to patients. Assessments are increasingly becoming the primary trusted evidence for all stakeholders, including payers, regulators, and patients. Even though patient-reported outcomes measures in the industry began many years ago, they do not seem to be used in widely in Baltic level pharmaceutical industries. Thus, a gap remains between ensuring that adequate patient input has been sought at the beginning of the development of the tools and the experts’ view of the patient experience. By implementing these measures to innovative drugs, branches would benefit by getting feedback, which could be used for further analyses on a global level.

Innovations on administrative level. Investing in research and development to create new drugs, treatment and vaccines is an important part of innovation, but it cannot be the only innovation area. Even tough companies report having changes in the areas like business models, products, customer experience and the supply chain, these changes are not enough to represent the current expectations of the pharmaceutical market. In the current situation “Medica” is holding innovations as their top priority element, yet organizational roles responsible for such element are only globally created. Lack

of directly responsible people in each and every region or cluster is slowing down feedback and escalation process inside the organization. Changes would need to be made by the top level of the management leading to organizational chart change. Potential roles on Baltic luster level of "Medica" could be introduced. Altogether focusing on people should become more organization-oriented approach as it is hard to get and keep the right people on board to make innovation happen.

Partnership. Finding the right external partners is a challenge for many organizations, pharmaceutical companies, however, are struggling the most. Given the scope of the challenges, really understanding how diseases work and what mechanisms will stop them in their tracks arise the necessity of collaboration. This specific market has rejected partnership for many years, intercompany researches and data analysis are only starting to catch up. Due to high competition R&D centers, business model, pipelines have been hid under the lid to avoid the competitors discovering the next blockbuster drug faster. Neither "Medica" nor "Pharma" have mentioned anything about collaborations between other entities, nor in Baltic neither in global levels. Sharing information is becoming crucial in order to adapt to changing environment and meeting shareholders' needs. Build collaborative teams, that can achieve more together, than as individuals, have to become a standard practice for pharmaceutical organizations. Yet, no company has mentioned this in their pipeline or vision for the near future. Healthcare systems and providers are generating data sets and have a huge advantage in controlling the data, and most of these organizations are willing to collaborate with pharma on a given medicine or therapeutic area. By joining forces with a wide range of organizations, from academic institutions, hospitals and technology providers to companies offering compliance programs, nutritional advice, stress management, physiotherapy, exercise facilities, health screening and other such services healthcare industry can minimize the negative outcomes and increase the success rate of innovations. As of now, collaboration between State Medicines Control Agency of Lithuania and individual branches like "Medica or "Pharma" are the only form of partnership, and even that is oriented toward pharmaceutical value rather than the patient. Collaborative business models are new future for pharmaceutical industry. These global level changes will have to start from the executives and directors, nonetheless, segregating them to branches and cluster will be crucial as collaborations will take place in specific fields and areas rather than entire organization. Collaboration purpose is not merge two companies but rather to share the knowledge of most successful fields in each company, and later on, combining the knowledge to provide new developments.

Transparency. Pharmaceutical companies have been battling the reasoning behind price transparency for significant amount of time. Better transparency on how prices are set and a greater emphasis on value and health outcome-based pricing has been requested by patients and payers alike. Price inelasticity of life-saving drugs is compounded by third-party payment, and the only constraint on pharma pricing is regulation driven by public opinion. Specifically, pharmaceutical sector in healthcare is unlike any other good or service because it directly involves life and death matters. There is no transparency because the price indicators through which buyers and sellers communicate in normal markets are not recognizable. In this sector supply and demand model does not work and normal price competitions are ineffective in terms of life-threatening illnesses. Most of the value of a pharmaceutical product is intellectual property. This includes the information obtained from clinical trials and research and development that guides the formulation of various inexpensive chemicals into a product that cures a disease. Specifically, "Pharma" does not provide many details related to clinical trials. Some clinical trials are shared but they are consolidated on global level. By measuring clinical trials in each country and reporting them on Baltic cluster level would prove better view and control

options for independent branch work. Most of the new processes in pharmaceutical sector fall under intellectual property, adding opacity to the price element. Especially since pharmaceutical companies add value through their research and development and testing - promoting transparency of clinical research is becoming a necessity. In addition, no regulations towards data sharing exists, thus "Pharma" together with other organizations can keep the clinical finding for themselves. By giving access to this data pharmaceutical organizations could define better measures for clinical trial process, as more parties would be involved, raising more accurate questions and suggesting better outcomes. Only counting units of the process but not going deeper into control and management of the process is not enough for today's market.

Digital impact. Pharmaceutical organizations have been addressing the importance of information technology transformation for many years. "Medica" as address this point as one of their missions for the company, however not actions have been taken of branch level. Executives and directors are stressing their involvement in the digitalization era, yet projects do not reach Baltic cluster so far. All regions are trying to keep the pace with changes brought by digital technology, yet they are aware of the disruptive potential and are only in the experimental stage. Many involved organizations in the healthcare sector are finding it hard to determine what initiatives to scale up and how, as they are still unclear what digital success will look like in the new future. Informational technology transformation is only reviewed and discussed on a global level, distancing the digital changes in clusters significantly. Technology based changes would have important impact on data collection and analysis, especially if implemented together with collaboration business model. Gathering and storing direct information from payers, patients, hospital representatives, would tie the whole healthcare sectors much closer, allowing a better performance measurement and management on most levels. Created data base would allow new metrics to be calculated and used in many fields, innovation included. Collaboration model would allow data sharing, which in turn would save costs and time for trial and error cases. In addition, digital-engagement technologies would bring patients closer to pharmaceutical companies, which consecutively would increase patient-oriented model for many originations. For a long-term sustainable business - healthcare industry has to implement some significat changes. Strategy of singlehandedly placing big bets on a few molecules, marketing them heavily and turning them into blockbusters are not sufficient. Administrative changes need to be done on a global level firstly, later following regions and countries. Most pharmaceutical organizations are on the right track in terms of their missions, target and vision, however this process need to be sped up in order to catch up with the rest of the world.

CONCLUSIONS

1. Current problems arising in the field of performance measurement while implementing innovations in healthcare have been identified as high cost of implementation, fast changing environment and many variable performance measures, that are not adapted to healthcare sector. Conducted research in performance measurement, innovation and healthcare cases were reviewed and analyzed in order to define the current level of the discussed topic and found result was that performance measurement in the companies' performance are at a very high level due to the belief that performance measurement lead organizations to long-term activities and success. In management practice, organizations have invested considerable amounts of resources to measure and control their performance. In addition, critical elements of an effective business of organizational success were named innovation. It is natural that organizations are aiming to evaluate the level innovations that they generate. If considered that performance measurement are not significantly sensitive to industry, then innovations are on the opposite side of the scale. Every healthcare-oriented company has a different value proposition and supporting strategies that reflects specific therapeutic areas and the individual local health economy. To develop a successful performance measurement for healthcare industry is a challenge itself, but to include innovation in the form of implementation is a task taking the process one step further. This process requires additional cost, tools such as new measures and a potential framework that could fulfil managements' needs for review and control. Presently organizations are working towards various indicators that are used next to standardized systems as previously conducted studies show that performance measurement or specifically the controlling part has a strong impact on innovation.

2. Reveal of the theoretical aspects of innovation and performance measurement has led to a development of the suggested framework of performance measurement of innovations implementation in healthcare. Many authors agreed that performance measurement purpose in the organization was to secure achievement of goals and objectives, evaluate, control and improve procedures and processes and compare and assess the performance of different organizations, teams and individuals. Performance measurement requires adaptability with related performance indicators, which means that performance measurement should be comprehensive to accommodate all organizational financial and non-financial indicators, input and output measures. Furthermore, the performance management help an organization to adopt itself with strategies and stakeholders` needs. This type of system should be applied to all levels of organization including innovation, that has been defined as a complex process that focuses on new idea or behavior which can lead to economic and social change. Based on types of innovations, performance measurement classification and indicators have been applied in order to develop a potential framework, by segregating innovations in to technical and administrative and applying financial and non-financial measures. This type of framework would provide better understanding of indicators that fall under each classification, in turn allowing possible measurement system to be developed.

3. Prepared research methodology for the framework of performance measurement of innovations implementation in healthcare aimed to test the potential framework against two selected cases. Research was conducted in the pharmaceutical market, taking two branches offices of globally famous organizations. Due to anonymity, names of the companies have been changed and branches' respondents' identity was not disclosed. Firstly, document analysis was implemented for the sake of understanding the overall level of both companies, later documents from the branch

level were gathered and included, in order to have Baltic cluster level review. Second part of research included an interview with two representatives of the branch offices. However, live interviews were canceled due to globally announced pandemic in the contact with COVID-19. Another approach was selected: interview questions where sent out to representatives to fill accordingly. Interview questions where prepared in accordance with the testable framework. Received responses were transferred to the thesis directly in the form of citation.

4. Main results of performance measurement of innovation implementation in healthcare industry's pharmaceutical area included the level of performance and innovation implementation in the branch offices of global companies. Firstly, document analysis provided global level understanding of performance measurement, innovation evaluation and integration of later two elements in each entity. Both companies showed financial and non-financial measures regarding innovations. More dominant where financial measures that involved revenues, net sales and R&D costs. The later provided to be a significant amount in both companies as 20% of net sales were allocated to R&D in 2019. In terms of non-financial measures clinical trials, R&D projects and new drug launches were accounted. However, these types of indicators are not used solely in the healthcare industry and are applied only on a global scale. To better understand the innovation implementation measures in each branch answers from the interview questionnaire were analyzed. Both interview responders had Baltic cluster roles in the branch offices and where aware of the structural principal of the entities. From the start it was clear that information about R&D divisions will be minimal as no such divisions are based in any of the Baltic countries. Furthermore, innovation roles in the companies where only on a global level. No other clusters had any direct responsibility of innovations, targets and KPIs where set by the global team regarding all areas. This was one of the reasons for the lack of performance measurement of innovation implementation. The following reasons included lack of clear metrics, fast changing market and high rivalry between companies in the industry. Overall branch offices use solitary, standard indicators, that do not cover full scope of innovation, much less its implementation. In addition, branches have a minor impact in new measures developments, mostly due to centralized roles.

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APPENDIXES

Appendix 1. Instrument for interview

I. Introduction

This interview is conducted within the scope of a research on "*Performance Measurement in the Process of Innovation Implementation in the Healthcare Sector"*, which is a part of master thesis. This research focuses on the experiences of healthcare companies in their path to innovations and performance measurement. For this, interview questions were sent to Lithuanian representatives. The findings of the research will be presented in the master thesis.

Anonymity will be guaranteed and all information possibly revealing your identity will be removed before publishing.

II. Getting acquainted (Professional background)

a) What is your role in the company?
b) How closely are you related with development and performance of the company?
c) What experience do you have regarding this company? Years?

III. Company review (Information and basic data about branch office)

a) What's your organization's mission/vision?
b) How big is your organization? (employees/ locations/ budget)?
c) What programs and services does the company provide?
d) What quantity/scope of products does it deliver?
e) What's the organizational structure? Who reports to whom?
f) Is there a person/team responsible for innovation management and tracking?

IV. Performance measurement

a) What is performance measurement in your opinion? Is it important? Why? Why not?
b) Does your company invest in PM?
c) Please describe types of measures that are used in your company. (Examples) Why are they used?
d) Which of them could be non-financial measures?
e) Non-financial or financial measures have more value in your company?
f) Perhaps, your company has some performance measurement system? (Balanced scorecards, ISO, KPI)? Why? Why not?
g) How do you implement new measures? Do you take already exciting systems such as LEAN or
h) Are they implemented from the top of the company hierarchy?

V. Innovations

a) Do you think innovation is necessary as part of successful company model? Why?
b) What is considered innovation in you company?
c) Are there more radical or incremental innovations? (Examples)
d) How much of an importance does it have in retrospective of the entire company?

e) From financial point of view how much does innovation receive?
f) What about investments from outside?

VI. Reflection on performance measurement for innovations implementation

a) Do you measure innovation? Why? Why not?
b) What could promote/increase innovation measurement?
c) Which indicators measure innovation?
d) Do you use the outcome results in your future development of organization?
e) Could you share some positive and negative outcomes of tracked innovations?

THANK YOU!

Appendix 2. Transcript of interview responded by "Medica"

Interview responded by "Medica"

I. Introduction

This interview is conducted within the scope of a research on *"Performance Measurement in the Process of Innovation Implementation in the Healthcare Sector", which* is a part of master thesis. This research focuses on the experiences of healthcare companies in their path to innovations and performance measurement. For this, interview questions were sent to Lithuanian representatives. The findings of the research will be presented in the master thesis.

Anonymity will be guaranteed and all information possibly revealing your identity will be removed before publishing.

II. Getting acquainted (Professional background)

a) What is your role in the company?

I am the manager of oncology business unit.

b) How closely are you related with development and performance of the company?

I am responsible for meeting set KPI from global team. I am also involved in creating and defending the budget for each product of my business unit.

c) What experience do you have regarding this company? Years?

I have been working in this company for the past 7, firstly as key account manager for 4 years and business unit manager for the last 3.

III. Company review (Information and basic data about branch office)

g) What's your organization's mission/vision?

Our strategy is to build a leading, focused medicines company powered by advanced therapy platforms and data science. We have five priorities to shape our future and help us continue to create value for our company, our shareholders and society:

a. Unleash the power of our people
b. Deliver transformative innovation
c. Embrace operational excellence
d. Go big on data and digital
e. Build trust with society

h) How big is your organization? (employees/ locations/ budget)?

Baltic cluster level we have around 29 million EUR sales each year. We have our main office in Riga, a smaller office in Vilnius and some field employees working in Estonia. In total Baltics have 45 employees as of today.

i) What programs and services does the company provide?

We are a pharmaceutical branch representing the main company who manufactures drugs, treatments such as vaccines, and deals in biochemical researches.

j) What quantity/scope of products does it deliver?

Branch covers vaccines, oncology department and over the counter consumer healthcare drugs.

k) What's the organizational structure? Who reports to whom?

There are four main departments. We have administration that has finance, accounting logistics and other supporting functions, the head of distribution is the leader of this department. Then we have oncology business unit: BU manager, brand manager and key account managers/specialists that cover Baltics. We have consumer healthcare BU manger, 3 brand manager, Key account manager for wholesalers and then pharmaceutical sales representatives, and marketing assistants, and a separate division for vaccines.

l) Is there a person/team responsible for innovation management and tracking?

No, this role is global.

IV. Performance measurement

i) What is performance measurement in your opinion? Is it important? Why? Why not?

A performance measure is a quantification that provides objective evidence of the degree to which a performance result is occurring over time. It is important because if we wouldn't have it all our process analysis and management efforts would be a waste of time. I wouldn't have control over the things that really matter, and my organizational decision-making could only be suboptimal. The only reason for doing process analysis, improvement and management is to improve organization performance in meaningful ways. Without measurement, we don't know if there is improvement; we don't know what is meaningful.

j) Does your company invest in PM?

There are some global measures that are gathered from each branch and consolidated for the top or global leaders to review.

k) Please describe types of measures that are used in your company. (Examples) Why are they used?

Some of the measure can include: brand preference mix index, corporate reputation improvement, perceived quality of products / portfolio, perceived value of services offered, number of new customers, average number of prescriptions per customer, sales dynamics, return on investment - we have four types of measures that we group. Our measures are really categorized into: customer focused, finance focused, employee focused, and organization focused. For example, we have a review of 360 method for each employee, we receive scores that allows us to understand our performance in the company according to each employee.

l) Which of them could be non-financial measures?

So basically, the three: customer, employee and organization focused.

m) Non-financial or financial measures have more value in your company?

Our branch is small in comparison to our colleagues from the Nordics or Central clusters. We mainly focus on customer satisfaction; however, we receive direct targets from global finance team to provide specific revenues and gross margins. Dealing with medication area it is natural, in my opinion to put the patient first.

n) Perhaps, your company has some performance measurement system? (Balanced scorecards, ISO, KPI)? Why? Why not?

Yes, we use standard types of measurements like KPIs, we call it Group performance measurement system. Our financial KPIs are usually coming from Global finance leads and are in line with the International Financial Reporting Standards (IFRS). I know that we have some non-IFRS measures, like free cash flow or net debt, a couple of measures for ongoing operations. We call them core performance measures and they are very internal, and cluster

based. As an internal measure of Group performance, these non-IFRS measures have limitations, and the Group's performance measurement process is not solely restricted to these metrics. Because of their non-standardized definitions, the core measures are usually incomparable with other companies. However, we use them to give investors better view of Group's management assesses underlying performance. Specifically, to Baltics cluster very important measures that we use are a bundle of market share indicators. We evaluate how much of country's market we have by drug brand and dosage.

o) How do you implement new measures? Do you take already exciting systems such as LEAN or create your own?

We do not change the already existing system; we simply follow the reporting of IFRS and the core measures. We add new measures to the core part of reporting. Usually each cluster has its own specific needs for tracking particular business insights. Those KPIs are reported after global core measures. If many country's show similar calculations, then this indicator is added to global core part.

p) Are they implemented from the top of the company hierarchy?

Yes, they are standardized by the global team.

V. Innovations

g) Do you think innovation is necessary as part of successful company model? Why?

For pharmaceutical industry innovation is our key element, it is the driving force of successful and sustainable business. Innovation is critical to how we improve health and create financial value. As a research-based healthcare company we rely on intellectual property protection to help ensure a reasonable return on our investments so we can continue to research and develop new and innovative medicines.

h) What is considered innovation in you company?

We have three main groups: marketing, process and products. Marketing consists of services and advertising, process -R&D, Process improvement, and product – new products, improvements. In product improvement we recently launched a separate division for optics related products, then we have new drugs coming out each year and we are also working on vaccines & diagnostic areas. In addition, we aim to minimize side effects of already developed drugs this way, we can take some of the waste out of the healthcare system, not to mention patient discomfort. Treatment customization has also been discussed in future plans. By selecting the right therapy for individual patients or by combining therapy with digital interventions we could achieve that in the near future.

i) Are there more radical or incremental innovations? (Examples)

Well I cannot say which type we have more. It is equally split between developing new drugs and vaccines & diagnostics and improving already existing ones.

j) How much of an importance does it have in retrospective of the entire company?

Every year it becomes more and more important. The returns on effective innovation are huge and there is a clear correlation between innovation and growth, we increase our resources towards innovation very year. In today's market new products, it is a competitive necessity. We are also, constantly looking for new ways to monetize existing products and services. However, every innovation strategy needs highly skilled and motivated people to implement it and to create innovation mindset is a very hard task globally.

k) From financial point of view how much does innovation receive?

Globally "Medica" spends around 10 billion US dollars per year. In the Baltic region around 6 million EUR each year are allocated to R&D.

l) What about investments from outside?

Most common form would be payers—which is the government in Baltic cases as it provides reimbursements. "Medica" is a listed company, anybody can invest by buying stocks. Usually outside investors are interested in specific drug or treatment development and they fund the process of it.

VI. Reflection on performance measurement for innovations implementation

f) Do you measure innovation? Why? Why not?

Because innovation is very import in our company, it is measured mostly from financial point. There is an innovation division that deals with all innovative related things. Division is separated into oncology and consumer healthcare units and is monitored globally. Units have the same Group measures where applicable. However, I think IFRS doesn't account that much for innovation, so they probably fall into the core measure section. In particular, we have forward-looking statements relating to future actions, prospective products or product approvals, future performance or results of current and anticipated products, sales efforts, expenses, the outcome of contingencies such as legal proceedings, and financial results expenses, the outcome of contingencies such as legal proceedings, and financial results.

g) What could promote/increase innovation measurement?

I think getting the right metrics in place to measure innovation success is very tough. It's far easier to think of metrics to understand the perspiration half of the innovation than the inspiration piece but breakthrough innovation is often the result of the latter. So we need to think of more not money related metrics that we could use as control points. We have a newer problem now there is more invention than ever, but far less productive innovation. If we could have some benchmarks to know when to stop or even when to drop an idea, that would have greater results.

h) Which indicators measure innovation?

We use pretty common core components—gross margin, R&D, and sales from new products, we also have a core research and exploratory development index that is calculated globally. Recently we have seen return on investments allocated to a specific drug.

i) Do you use the outcome results in your future development of organization?

Most significantly, we need to ensure that our innovation and risk-taking are rewarded in the marketplace, while doing all we can to ensure affordable access for patients. We continue to work with governments, policymakers, payers and other players in the healthcare ecosystem to advocate for pro-innovation policies that benefit patients, our company and our industry as a whole. Every development process is unique because at the end of the day we get something new, however after each development we are learning to use the right methods, tools and approaches at the right times. Each of the novelty that is introduced to the company comes with a bunch of written instructions or background details, this way we are storing our know-how.

j) Could you share some positive and negative outcomes of tracked innovations?

The plus side would be control. We have much better control over innovations that we review constantly. The end product is usually much more successful because we can interfere in development of the innovations. The negatives come from additional cost that are significantly higher. Also, it is difficult to determine the measures that will be useful, as in most cases they cannot be used in every project.

THANK YOU!

Appendix 3. Transcript of interview responded by "Pharma"

Interview responded by "Pharma"

I. Introduction

This interview is conducted within the scope of a research on *"Performance Measurement in the Process of Innovation Implementation in the Healthcare Sector"*, which is a part of master thesis. This research focuses on the experiences of healthcare companies in their path to innovations and performance measurement. For this, interview questions were sent to Lithuanian representatives. The findings of the research will be presented in the master thesis.

Anonymity will be guaranteed and all information possibly revealing your identity will be removed before publishing.

II. Getting acquainted (Professional background)

a) What is your role in the company?
   Manager of distribution for Essential Health unit.
b) How closely are you related with development and performance of the company?
   I report branches results to our region manager.
c) What experience do you have regarding this company? Years?
   3 years working in this position.

III. Company review (Information and basic data about branch office)

a) What's your organization's mission/vision?
   Our purpose - To improve the quality of human life by helping people do more, feel better, live longer.
   Our goal - To become one of the world's most innovative, best-performing and trusted healthcare companies.
   Our strategy - To bring differentiated, high-quality and needed healthcare products to as many people as possible, with our three global businesses, scientific and technical know-how and talented people.
   Our priorities are underpinned by our ambition to build a more performance focused culture, aligned to our values and expectations:
   Innovation - We invest in scientific and technical excellence to develop and launch a pipeline of new products that meet the needs of patients, payers and consumers.
   Performance - We deliver growth-based performance by investing effectively in our business, developing our people and executing competitively.
   Trust - We are a responsible company and commit to use our science and technology to address health needs, make our products affordable and available and to be a modern employer.
b) How big is your organization? (employees/ locations/ budget)?

Baltic cluster level we have around 33 million EUR sales each year. Our main office is located in Vilnius however we have field force in Latvia and Estonia as well. Overall there are 31 employees in Baltic region.

c) What programs and services does the company provide?

Baltics "Pharma" is an affiliate that provides drugs and treatments to hospitals and pharmacies.

d) What quantity/scope of products does it deliver?

The company develops and produces medicines and vaccines for a wide range of medical disciplines, including immunology, oncology, cardiology, endocrinology, and neurology.

e) What's the organizational structure? Who reports to whom?

We have two business units "Innovative Health" that deals with our patented drugs and "Essential Health" unit -biosimilars and an administrative unit. For each product BU we have a manager to whom marketing, medical and sales representatives report. In administration we have market access person, two logistics mangers, finance person, 2 accountants and quality manager.

f) Is there a person/team responsible for innovation management and tracking?

There are 3 region-based positions of innovation and business development lead for the whole company. In Baltics branch we don't have a separate person. Me and quality manager are responsible for innovations and changes in the Essential Health unit.

IV. Performance measurement

a) What is performance measurement in your opinion? Is it important? Why? Why not?

Performance measurement is the process of collecting, analyzing and reporting information regarding the performance of an individual or organization. It is a necessity because it provides the useful information about products, processes and services that are produced in a business. As a manager I need to supervise, observe and control the activities of my team while also studying various summaries or reports, this way I can manage the work in an effective manner getting the things accomplished for global management targets.

b) Does your company invest in PM?

We have previously indicated to shareholders our intention to introduce a measure to recognize the importance of accelerating and strengthening our pipeline, reflecting our innovation priority. This has particular importance in anticipation of our separation. We are therefore introducing a strategic 'Pipeline progress' measure. It is targeted to reward the progress in strengthening our R&D pipeline with high quality assets and in achieving approvals in major markets for key assets or indications.

c) Please describe types of measures that are used in your company. (Examples) Why are they used?

We have some measures that are total shareholders return, adjusted free cash flow, innovation sales, pipeline progress. We follow the Generally Accepted Accounting Principles (GAAP) however we also have Alternative performance measures. APMs, such as adjusted profit, free cash flow and constant currency growth rates in some of its quarterly and annual reporting of financial performance and everything that is not under GAAP. These metrics are necessary for the overall view of the company there is an appropriate balance between the use of statutory metrics and APMs, together with clear definitions and reconciliation for APMs used

in financial reporting. Also, building a coherent approach to managing the information flow is one of my most important priorities. "Pharma" collects, evaluates, and stores an enormous backlog of data about our products, but equally there is much more information now available to our external stakeholders, including competitors, which can be used and interpreted in different ways. We have claimed data from insurers, scrip data from pharmacists, hospital admissions and discharge data, clinical trials data, and adverse event reporting data—but none of this is really captured beyond the different silos they rest in. The challenge is establishing "connectivity"—where information is aggregated and applied to target our development and marketing efforts.

d) Which of them could be non-financial measures?

We have employee feedback - employee engagement scores from our global employee survey, supply service level – percentage of orders delivered on-time and in-full, Corporate reputation – reputation index among stakeholders and informed public measured globally and in top 13 markets.

e) Non-financial or financial measures have more value in your company?

We have significantly more financial measures as they are understood and represented globally though regions.

f) Perhaps, your company has some performance measurement system? (Balanced scorecards, ISO, KPI)? Why? Why not?

We use some parts from Organization Development (OD), Lean Six Sigma (Lean Sigma) and Project Management (PM). However, we are constantly following the market trends for new PM systems that could represent our needs better.

g) How do you implement new measures? Do you take already exciting systems such as LEAN or create your own?

We take already exciting and market tested systems. For example, Lean Six Sigma is used in global manufacturing and supply and was delivering solid, quantifiable business improvements. Our competitors have implemented such systems with success, and it became more popular in the pharmaceutical market. This gives us a way to measure our performance by standard systems and compare ourselves in the competitor spectrum.

h) Are they implemented from the top of the company hierarchy?

They are implemented from the top of the company.

V. Innovations

a) Do you think innovation is necessary as part of successful company model? Why?

Delivering innovation is our first priority, it drives productivity, and productivity is what drives company's growth and the wealth. Most successful innovations hinge on the execution and help our business move forward. "Pharma" continues to build upon its heritage of innovation in biosimilars to create an environment in which physicians have more treatment options and patients have improved access to medicines.

b) What is considered innovation in you company?

We develop drugs in biosimilars, anti-infectives, rare disease and oncology, we also create vaccines and conduct clinical trials. However it is the move from a world in which our regulatory-approved medicines were paid for routinely, without question, to one where our customers are insisting that we build therapies around a lower cost structure, are clinically

differentiated from existing products, and add significant incremental value to the entire healthcare system.

c) Are there more radical or incremental innovations? (Examples)

I would name our biosimilars as incremental innovations as they are biologic medical products highly like another already approved biological medicine. We have some core changes: improving the cost efficiency of in-house R&D around new medicines that customers will want to pay for; restructuring of our eight Business Units to limit bureaucracy, build accountability, foster a proper balance between risk and reward, and allow for faster, better decisions on the ground; and becoming a better business partner to ensure we can seize the best new external opportunities, ahead of the competition.

d) How much of an importance does it have in retrospective of the entire company?

We believe that truly disruptive innovation, which we define as substantial "game changers" can carry a positive impact on the whole company. Today, innovation, more than price, is the most important source of competitive advantage in the pharmaceutical business. This automatically makes innovation a strategic factor in how we respond to the enormous transition taking place in how medicines are discovered, developed, and marketed around a more diverse customer base. Simply put, innovation is the mindset that allows us to keep pace with market change.

e) From financial point of view how much does innovation receive?

Globally our budget is around 11 billion USD and on Baltics level around 10 million EUR yearly. In some clusters, Baltics included, R&D share is more significant in comparison to other clusters. This model was adopted 5 years ago and was related with overall global accounting policies.

f) What about investments from outside?

In Lithuania is reimbursable drugs could be listed by government or some insurance companies. We have market stocks available for investors.

VI. Reflection on performance measurement for innovations implementation

a) Do you measure innovation? Why? Why not?

Choosing the correct KPIs for measuring innovation is necessary because we actually tend to get what we try to measure. Our goals and KPIs direct our efforts and actions towards them and help people to adapt their behavior as well as take action to reach those goals. We do struggle with measures because of the uncertainty of what should be measured in the first place.

b) What could promote/increase innovation measurement?

It is difficult to measure innovations because the future is inherently uncertain. We have discussed in our internal teams that having a model of the innovation system especially pharmaceutical industry based, which describes the structural and operational components of the system would give us a better chance ant measuring innovation. Also, we use many output metrics that are scattered and need to have a defined structure.

c) Which indicators measure innovation?

We use traditional measures of innovation, such as R&D investment and patents. We also have number of new products launched in our fiscal year, revenue and profit growth from our new drugs and treatments, return on investments of innovation activities, actual vs. targeted breakeven time for our new drugs. Non-financial -R&D spend as a percentage of sales, the

number of innovation projects started, the number of new ideas in the pipeline, number of new employees in R&D.

d) Do you use the outcome results in your future development of organization?

Yes, we strongly relay on our output results. Such as increase in revenue as a result of innovation as the key performance indicator. However, I know that output metrics don't tell me what went well or what went wrong and show only a certain time after the activities.

e) Could you share some positive and negative outcomes of tracked innovations?

Indicators have to account for many different forms of innovation, with widely differing motivations, processes of development and consequences. We are often uncertain of what should be measured in the first place.

THANK YOU