IMPACT OF NEW TECHNOLOGIES, INNOVATIONS & BARRIERS ON THE SERVICE DELIVERY AND FINANCIAL INCOME OF THE PRIVATE BUSINESS IN TRANSITIONAL ECONOMIES: THE CASE OF HEALTH CENTERS

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ABSTRACT

Innovation is one of the most fundamental practices underpinning economic growth, and it has great potential to develop solutions to economic, environmental and social challenges. Innovation is the key to the survival of small and medium size companies including the private health care centers. It enables different companies to survive and prosper by creating market value and competitive advantage. Research on innovation has to date focused mainly on developed market economies and large state-owned health care centers, yet medium-sized and private centers make a significant contribution to innovation and economic growth. The purpose of the study is to investigate the impact of innovation and new technologies on financial performance of private health care centers in Kazakhstan. A review of the innovation literature was used to build the model ARIMA used in this study. The regression-correlation analysis is also used to achieve purpose of research, using case of the health private center "ZHANUYA" in Southern part of Kazakhstan. The dependent variables are: Innovation in health care center, Organizational innovation, Technological innovation, Education, R&D, Dollar exchange rate, Inflation index, Operations, Cash-in-flow budget, Long-term & Short-term assets. According to the results of the study, it can be argued that that healthcare centers that adopt technologies and innovations experience positive benefits of healthcare technology, trends and innovation. In context of specific case of transitional economies, some actions are examples that can assist the healthcare centers in innovation transition are provided.

Keywords: Innovation, New Technologies, Competitiveness, R&D.

INTRODUCTION

Innovations are an indispensable element of the functioning of the economy, where without the innovation component it is impossible to achieve effective development of the production and non-production areas of the economy. The European Commission sees innovation as the core of entrepreneurial initiative: Almost any company owes its foundation, at least in relation to its competitors on the market, to an innovation. Innovations are the global motor for economic growth and represent at the same time the key factor for more

competitiveness (Kongyrbay et al., 2017). The development and introduction of innovative technologies in the areas of production and circulation, new ways of organizing and managing enterprises have become key factors in market competition, a strong means of increasing efficiency and improving the quality of goods and services (Chiles et al., 2004). One of the important conditions for such transition is the development and formation of the economy of knowledge and high technologies, to which such spheres as education, high-tech medicine, research and development, which develop and implement innovations, are related (Saiymova et al., 2018). Without the introduction of innovations in these segments of the services market, it is impossible to achieve the main mission of the innovation policy-raising the quality of life of the population. However, technical progress alone is not sufficient in order to innovate with long-time success. Innovation also means predicting market needs, offering better quality and/or additional services, organising efficiently, meeting deadlines and controlling costs. So the term innovation becomes more and more a widely spread phenomenon and instrument. It represents an answer to continuous technical, economic, ecologic, social and political changes (Saiymova et al., 2018). At present, in global terms, the problems of interaction and interpenetration of the processes of innovative development in different sectors of the economy (including services) and the quality of life of the population of the state are important and widely discussed (Acs et al., 2009; Marcati et al., 2008; Guan & Chen, 2010).

In the literature, there are two theories of innovation that have been evaluated variously and comprehensively depending on the realities of the market economy. The first classic theory of innovation, called the "*linear model*", was one of the pillars and first theories in innovation studies. According to Laestadius et al. (2008), Bush is considered to be the one who developed the first "*linear model*" and its role in innovation. Godin (2014) held the same opinion that Bush founded the linear model where a sequence of processes is considered as one. The "*linear model*" implies that the process of innovation takes place in consequent steps, research and development, with two approaches-either to develop technology or to meet the demands of the realities of the economy. This theory advances interrelated phases of processes that create a cycle, applying fundamental research and development to products and/or services (Clark, 2002). There are several approaches to this theory, such as technology and supply push (when research and development drive the launch of new products) and demand pull (when the government, market or society demand innovations for a solution to a problem) and large-scale innovation (when government encourages innovation activity) (Nemet, 2007). Godin (2014) viewed the "*linear model*" as improving management and production outcomes, and the demand-pull approach as a critical view against the technology push approach. The latter is considered to be an "*unclear*" process. The criticism focused on the demand level and rate, which built the interaction with the ultimate consumers (Nemet, 2007). The other approach of the "*linear model*" is to consider it on a large scale, on the level of a country, i.e., when a country focuses on creating a favorable and successful environment for the innovation activities of firms, companies and industry (Foxon, 2003).

The second comprehensive theory in innovation is related to the emergence of a systemic approach. This theory considers that a unit contains interrelated and interdependent parts (Jacob et al., 2006). In its turn, the systemic innovation theory, at the end of the 20th century, was viewed as complex, interrelated processes. The systemic approach to innovation can be applied at different levels including supranational, national, regional, local, and sectorial levels. The innovation system theory involves complex work by different stakeholders, institutions and organisations to produce and spread innovation. The role of institutions is to minimize

uncertainties in the innovation process and to encourage innovation activities. This theory maintains that innovation happens when all of the prerequisite conditions are present (Greenacre et al., 2012). These conditions include a proper R&D sector, public investment in R&D, quality and commercialization of research, a strong educational system, innovation subsidies and tax incentives, the building of platforms and linkages, rising consumer awareness and other specific courses of action and public policy efforts (Lundvall & Borras, 2005). For instance, OECD reported that businesses innovate when they have the motivation and capacity to do so (OECD, 2005). When these motivations and capacities are present, an innovative environment is created. Government has the important role of creating and maintaining these positive conditions; however, if incentives are used inappropriately, this can have a negative effect on businesses as it may create unfair competitive conditions and additional bureaucracy (Patanakul & Pinto, 2014). Furthermore, a lack of financial, technological and human qualified resources, a lack of strategies and clear goals, and the existence of corruption, might hinder the development of innovation (Karatayev et al., 2016; Karatayev et al., 2017a: 2017b) and impact on socioeconomic and environmental outcome (Koshim et al., 2018; Rivotti et al., 2019). The innovation system theory encompasses all processes and actors as one whole unit, leading to a set goal (Balzat, 2003; Kongyrbay et al., 2017).

The relationship between innovation and productivity and the extent to which the former determines the latter has been the subject of several studies over the past few years. Innovation may be a direct result of managerial choices or may be imposed by external conditions. Organizational studies provide insights into the role of innovation in managing system-wide problems, such as adaptation to the environment, the ability to allocate resources for innovative (or operational) programs or activities, as well as overall organizational results and effectiveness (Dias & Escoval, 2013). Innovation in health care depends on the characteristics that flow from its unique nature, in addition to its status as a public organization (public health unit). This is a more complicated process because innovative methods must be tested before their continuous implementation, and laws must regulate their adoption (Naranjo-Gil, 2009). The strategic trends of the innovation development of the service sector institutions and its structural components are created in accordance with the types of innovations identified according to the areas of implementation.

METHODOLOGY

Health systems in low-and middle-income countries continue to face considerable challenges in providing high-quality, affordable and universally accessible care. In response, policy-makers, donors and programme implementers are searching for innovative approaches to eliminate the geographic and financial barriers to health. A significant proportion of healthcare in developed countries is delivered by private providers; a diverse group including large hospital groups and small clinics, formal and informal, non-profit and for-profit business models. Here, we focus our analysis on private health centers in Kazakhstan as there is an urgent need for new innovative models of development, and governments are increasingly looking to development new roadmap of institutional reforms as an alternative. The objective if this paper is to find how innovation and technologies is being used by private health centers that seek to improve service delivery and finance income in transitional post-soviet economies.

Regression-correlation analysis is used for secondary data (40 observations) for the years 2008-2017. The concept of regression-correlation analysis is based on both models of P. Romer and R. Lukas. The models of P. Romer and R. Lukas are the beginning of the theory of

endogenous growth, which included their own arguments and prerequisites for a non-decreasing return on capital (Lucas, 2003). The Romer model develops the The Romer model develops the Arrow model, in which a production function of the following form was formulated:

$$Y_i = A\ (K)\ F\ (K_i,\ L_i) \quad (1)$$

Where i is the firm index (Arrow, 2017).

In this model, the level of technological development depends on the total capital stock in the economy. The production function in the Romer model is written as follows:

$$Y_i = A\ (R)\ F\ (R_i,\ K_i,\ L_i) \quad (2)$$

Where Rj is the research and development results of private company i (Grossman & Helpman, 2015).

The sources of growth in the model are knowledge and learning by personal experience; these factors underlie the increasing return on capital. An enterprise, increasing its capital, is learning to produce most efficiently. Training on your own experience is accomplished through the investment of the company. The model also implies that the knowledge of each company is represented by a public good, access to which any company is able to have at no cost. The models described earlier provide a convincing explanation of endogenous growth based on an investment in capital in a broad sense. Nevertheless, according to the view of D. Grossman and E. Helpman, pointing to the sources of growth, they cannot explain the mechanism, which are innovations. The Grossman and Helpman model was the first endogenous growth model to link technological progress with innovation activity and innovation. The model of Grossman and Helpman goes back to the work of J. Schumpeter, in which he introduced the concept of innovation, and also laid down the basic principles of the theory of creative destruction, based on the innovative activities of entrepreneurs (Grossman & Helpman, 2015; Schumpeter, 2006).

RESULT

Aidis et al. (2007) focused primarily on entrepreneurship in transition economies in post-soviet countries including Kazakhstan. The authors pointed out that entrepreneurship in in all post-soviet countries have the same common characteristics and problems; however, the experiences of entrepreneurs are different in these countries due to their different development paths since the collapse of Soviet Union in 1990. For example, Lithuania, after leaving Soviet Union, has accelerated country's liberalisation and transformation due to European Union membership requirements, while, Kazakhstan experienced slow transformation alongside with economic and political reforms. The authors also showed the most important factors influencing business development growth by addressing different questions to respondents in order to identify the most important factors that prevent development of SMEs, in which, taxation was reported as the most important factor. In all these countries, business development cases also indicated institutional deficiencies in particular regulatory and legal issues as the next major factors. The entrepreneurs also mentioned financial factors including a lack of access to capital and external financial resources. This issue is particularly important for Kazakhstan, where most of entrepreneurs have to start their business development using self-financing support and or support provided from informal sources, such as family members and friends. The bank loans are

available; however, banks are not so much interested in providing loans to start new businesses especially in case of business development. Other obstacles in transition economies were the lack of assistance, the lack of networking and informal discrimination against female entrepreneurs. Thus, the limited number and size of the female business communities affect the characteristics of networks by female entrepreneurs in the transition economies. However, male entrepreneurs in transition economies possess more contacts with fellow entrepreneurs in high administrative positions enabling them to use informal networks from Soviet times. Such phenomenon occurred during the Soviet government, where women were mostly excluded from the high level positions.

In general, reviewed studies show that factors influencing on entrepreneurship are shaped by the country context. These factors might be related to religion, gender, culture, historical paths, geopolitical, environmental and resource base characterises of country, existing economic and technological challenges and opportunities, and the country's financial, economic and political profile. As stated by Duman et al. (2015):

"*Entrepreneurship may exist in different forms at different cultures and it may have different features and barriers across countries and regions*".

Reviewed studies also demonstrate that barriers to entrepreneurship has been widely examined and analysed both in developed and developing countries; however, due the fact that Kazakhstan is post-Soviet country with transition economy and oil and gas exporter, the factors influencing on SMEs growth as well as barriers to entrepreneurship in Kazakhstan might be different compare to other countries. It makes Kazakhstan entrepreneurial environment as an interesting case for study. Understanding and analysing the factors and barriers affecting entrepreneurship activities in Kazakhstan might lead to improvement of the effectiveness of business policy frameworks in the country.

To analyze impact of new technologies, innovations & barriers on the service delivery and financial income, this study uses the case of private health care center "*ZHANUYA*". The goal "*ZHANUYA*" is to provide primary health care, specialized medical care within the guaranteed scope of medical care with affordable, high-quality and safe public services, including preventive, diagnostic and therapeutic services. The main tasks of health care center "*ZHANUYA*" are included: (i) ensuring the availability and quality of medical care; (ii) provision of pre-medical, qualified, specialized and highly specialized medical care to the population; (iii) organization and implementation of a complex of preventive measures aimed at reducing the morbidity, disability and mortality of the population; (iv) organization and implementation of dynamic monitoring of persons suffering from chronic diseases; (v) improvement of activities and the introduction of new technologies for the prevention, diagnosis, treatment and rehabilitation; (vi) ensuring continuity with other health organizations and interagency cooperation.

Income of the company was used as a dependent variable, and key indicators affecting income were used such variables as:

"*Innovation in medical services, organizational innovation, technological innovation, education, R&D, dollar exchange rate, inflation index, operations, cash-in-flow budget, long-term assets, short-term assets".*

Before conducting a correlation-regression analysis, we conducted statistical tests for the presence of autocorrelation and for the normal distribution of errors in Table 1. As can be seen

from Table 1 for the LM test, there is no autocorrelation in the three models, which means that the errors of the regression model will not lead to a deterioration in the quality of the estimates of the regression parameters, as well as to an overestimation of the test statistics by which the quality of the model is checked. In our model, all the coefficients are significant and therefore can be preceded to the evaluation of the model.

Table 1
THE RESULTS OF DIAGNOSTIC TESTING

Test	Statistics test	*p*-value
Model I		
LM test for autocorrelation presence Null hypothesis: autocorrelation is missing	$X^{2(2)}$ 0,597	
Test for normal error distribution Null hypothesis: errors are distributed according to the normal law	$X^{2(2)}$ 3,885	0,143
Model II		
LM test for autocorrelation presence Null hypothesis: autocorrelation is missing	$X^{2(2)}$ 1,020	
Test for normal error distribution Null hypothesis: errors are distributed according to the normal law	$X^{2(2)}$ 1,998	0,368
Model III		
LM test for autocorrelation presence Null hypothesis: autocorrelation is missing	$X^{2(2)}$ 3,206	
Test for normal error distribution Null hypothesis: errors are distributed according to the normal law	$X^{2(2)}$ 10,580	0,005

As can be seen from the calculations in Model ARIMA (Table 2), we see that income of company is influenced by such factors as Technological innovation, Education and Dollar exchange rate at the level of 0.01% and Inflation index at the level of 0.5%. This is explained by the fact that technological innovations and knowledge in medicine today are connected with the latest technologies of the diagnostic and treatment process, with the creation of more advanced medical equipment and the provision of completely new medical services to the population. Significance of factors such as Dollar exchange rate and Inflation index is determined by the fact that 100% of medical equipment and 90% purchased medicines and medical products of LLP Zhanuya are foreign-made. In the transition from one model to another, Operations variable and such variables as Technological innovation, Dollar exchange rate, Inflation index lose their significance, and the significance of the influence of the Education variable increases on the final estimate of the estimated parameter at the level of 0.001%. In the third model, we remove some factors from the study and add others, such as Cash-in-flow budget, Long-term assets, and Short-term assets. It was determined that these variables significantly affect the final assessment of the estimated parameter at a significance level of 0.001% and 0.01% with a positive effect. However, with the inclusion of these interaction variables, Education loses its significance, and the variables Technological innovation and Operations become significant at the 0.001% significance level also with a positive effect on the parameter being assessed.

Table 2 MODEL ARIMA (EXACT MP METHOD)			
Variables	**ARIMA models, used observations of 2008:1-2017:4 (T = 40)**		
	I	**II**	**III**
Cost	0,0000*** (0,167)	1,65e-061*** (0,384)	0,1913 (1,299)
Innovation in medical services	0,7834 (0,025)	0,4527 (0,020)	
Introduction new technology	0,9332 (0,014)	0,5012 (0,012)	
Organizational innovation	0,4965 (0,092)	0,7687 (0,093)	
Technological innovation	0,0184** (0,046)	0,1519 (0,049)	0,0029*** (0,048)
Education	0,0238** (0,012)	0,0056*** (0,014)	0,4605 (0,013)
R&D	0,6777 (0,014)	0,9447 (0,16)	
U.S. dollar exchange rate	0,0399** (0,001)	0,4524 (0,0009)	
Inflation index	0,0881* (0,133)	0,1277 (0,127)	
Operations		0,0592 * (0,233)	1,15e-06*** (0,231)
Cash-in- flow budget			6,58e-05*** (0,034)
Long-term assets			2,41e-05*** (0,158)
Short-term assets			0,0134** (0,011)

Note: ∗=p<0.05, ∗∗=p<0.01, ∗∗∗=p<0.001.

CONCLUSION

The studies of innovation theories establish two main theories: the linear model and innovation as a system. Both theories function depending on the goal of the innovation application. The literature shows that beyond these two models a new and significant approach, eco-innovation, has been shaping innovation objectives and innovation policy. Innovation policy interpretation establishes three perspectives of the policy: small-scale innovation policy that pursues the effective performance of a unit (a firm, enterprise, a company); large-scale innovation policy-connecting main policies and domains of a government, and the ultimate objective of innovation policy; and facilitating sustainable development. It is worth noting that innovation policy is formulated based on innovation feedback from all actors involved in the innovation process and aimed at innovation products. To analyse innovation policy, the literature proposes different approaches. The regression-correlation analysis is used to investigate the impact of innovation and new technologies on indicators of financial performance in a private health center in Kazakhstan. Health organizations in Kazakhstan need a developed infrastructure including equipment, availability of qualified medical personnel and the creation of conditions for the introduction of innovations, which are also priority aspects of the development of new technologies. The costs of medical institutions for education and staff development have an important impact on the introduction of innovation in the company. So, as is the development of

medical technology, scientific advances related to obtaining high-quality treatment, optimal management of processes in the medical industry, with the creation of new medical products, technologies or services that have competitive advantages. As indicated in the Romer model, the level of technological development depends on the total capital stock. In order to increase the profitability of companies we require long-term and short-term assets, as well as close interaction with the state, which is confirmed by empirical research.

By analysing impact of new technologies and innovations on the income of the health centers, our paper fills gaps in the health management literature in terms of geographical focus providing new evidence and insight into challenges posed by the adoption and implementation of innovations and technologies in transitional post-Soviet economies countries like Kazakhstan. There is little information on the Kazakhstan health private center and the role of modern technologies. In terms of practical implication of this research, our case study shows that healthcare centers that adopt technologies and innovations experience positive benefits of healthcare technology, trends and innovation. The following actions are examples that can assist the healthcare centers in innovation transition: (i) Recognize the risks and costs of innovation, including the disruptive effects even of beneficial innovation. (ii) Have more effective systems for controlling the diffusion of innovation, including better systems for accrediting use of technologies. (iii) Study innovation at the same time as it is occurring, and collect data to link new interventions to outcomes (both intended and unintended). (iv) Run adoption and implementation studies using high-quality social science methods and theory alongside trials; do not wait until the trial is complete before working out what is needed to adopt and implement the intervention in real life. (v) Clarify lines of authority in relation to innovation and use institutional authorities to mediate and adjudicate between the competing interests and demands of front-line actors, patients and their advocates, and manufacturers. (vi) Identify the potentially unwanted or unhelpful effects of innovations in systems, and the ways they are metabolised by healthcare organisations, before proceeding to full-scale testing and implementation. *(vii)* Improve training of health professionals to deal with the challenges both positive and negative of innovation.

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