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**THE INTERNATIONAL EXPERIENCE
OF AGRICULTURAL INNOVATIONS**

Abstract. The international experience in the field of agricultural innovations is analysed in the article. Moreover, recommendations for attracting innovations in the agricultural sector of the Republic of Kazakhstan are defined. The purpose of the research is to develop the theoretical and practical foundation that may help to define recommendations on how to apply economic mechanisms to develop the agricultural sector in Kazakhstan. The research methodology is based on econometric, quantitative and comparative methods. The research practical significance is in describing the current state of innovations in the developed countries. The research results illustrate that Switzerland is the leading power in the field of innovations based on due to its high performance in the following aspects: innovators, research systems, human resources, corporate investments.

Keywords: innovations, international experience, Summary Innovation Index, Global Innovation Index, Innovation Efficiency Ratio, agriculture.

There are different indicators that may show comparative indication for the innovation performance in different countries or regions of the planet. The European Commission for the mentioned purpose relies on the European Innovation Scoreboard [1]. This indicator is calculated based on 27 different indicators that belong to 10 innovation dimensions and the following four types of scores [2]:

- a framework conditions score (performance drivers in the innovation field external to an enterprise) is based on the human resources dimension (the number of new doctorate graduates, population with completed tertiary education between 25-34 years, the number of people involved either in education in training who aged between 25 to 64 years), attractive research systems dimension (the number international scientific publications when at least one author is from abroad, the share of scientific publications from the total number that are part of 10% of the most cited publications worldwide, the number of doctorate students from abroad), innovation-friendly environment dimension (the number of business organisations of at least 100 Mb/s internet access, the motivational index which defines the ratio between shares of people in improvement-driven and necessity-driven businesses);

- an investment score is based on finance and support dimension (the share of the GDP that equals to research and development expenditures by the government in the public sector and costs related to the higher education, the proportion of the gross domestic product that equals to expenditures related to venture capital), firm investments dimension (the share of the gross domestic product that equals to all expenditures in the business sector related to research and development, the share of turn-over for all enterprises that equals to the amount spent on innovations which are non-R&D, the number of businesses that provide any level of ICT related training to their employees);

- an innovation activity score (innovation aspects in the business field) relies on innovator dimension (the percentage of small and medium-sized enterprises (SME) which introduced to a market or a business venture at least one process or product innovation, the share of the small and medium-sized enterprises (SME) that adopted at least one organisational or marketing innovation, the percentage of small and medium-sized enterprises (SME) that are innovating at the in-house scale), linkage dimension (the

percentage of small and medium-sized enterprises (SME) involved in cooperation in the field of innovations, the number of public-private research co-publications per million people, the percentage of the gross domestic product that equals to public research and development costs paid by the private enterprise sector), intellectual assets dimension (PCT patent, trademark and design applications that define different varieties of Intellectual Property Rights);

- an impact score (effects caused by enterprise activities in the field of innovations) is based on employment impact dimension (the number of employees in the business sector assigned to activities that are knowledge sensitive, the number of enterprise workers in 50% of the most innovative and fast-growing industries) and sales impact dimension (medium and high-tech product exports in current prices and national currency, service exports that are knowledge-intensive, sales due to new-to-market and new-to-firm innovations).

The figure below illustrates the European Innovation Scoreboard for the European Union members as well as for the following countries located outside of the EU: Iceland, Israel, Macedonia (former Yugoslav Republic), Norway, Serbia, Switzerland, Turkey, Ukraine.

The figure above illustrates that Switzerland has the highest score of the Summary Innovation Index – 0.80775. Moreover, the meanvalue for the European Innovation Scoreboard among countries of the European Union and other eight non-EU countries equals to 0.4464525 scores of the Summary Innovation Index [3]. On the other hand, a trimmed mean is more accurate measure of mathematical expectation or average when outlier observations of largest and smallest values are not taken into the account while

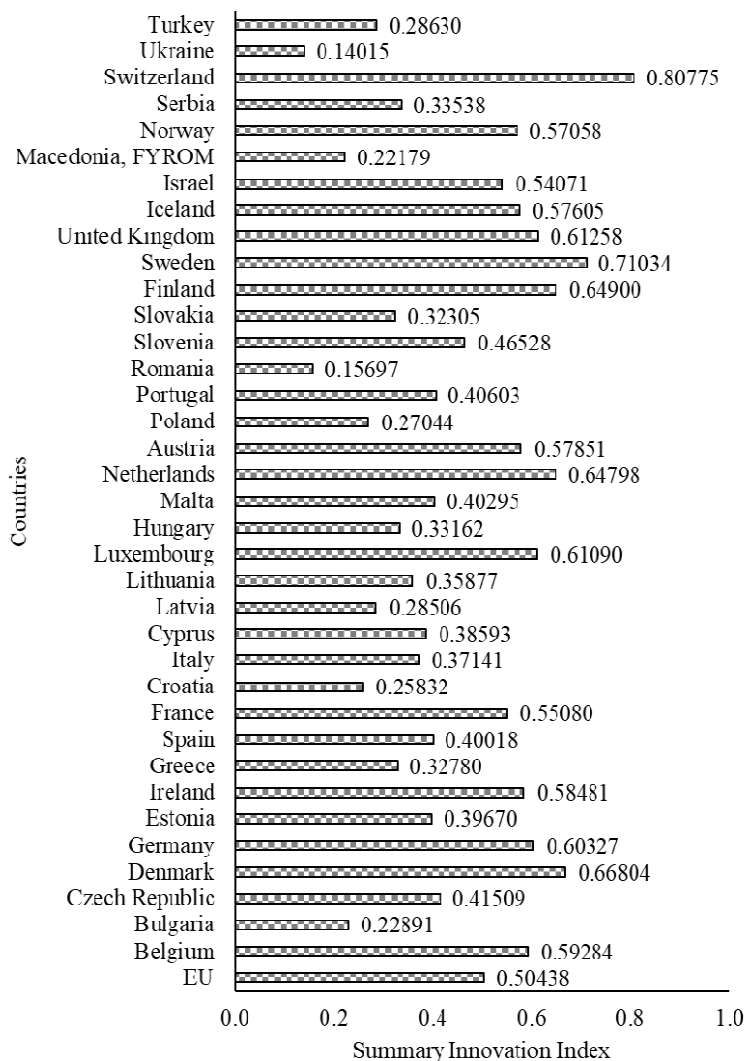


Figure 1 – The European Innovation Scoreboard in 2017, Summary Innovation Index [3]

calculating the mean value [4]. The trimmed mean for the Summary Innovation Index in 2017 for the countries defined in the figure above equals to 0.4455338 (the EU value is not considered).

The standard deviation value Scoreboard without considering the overall European Union value is 0.1686007. This indicator helps to understand dispersion or variation level for the country data in relation to their values of the Summary Innovation Index in 2017. There are two possible rules related for this value [5, 6]:

- lower the standard deviation value becomes more closer are the data to the mean value which is also known as the expected value;
- high indicator of the standard deviation may define that the data is spread over the wider value range.

The figure below illustrates the boxplot graphical depiction analysis for the European Innovation Scoreboard in 2017 which is shown by the figure above.

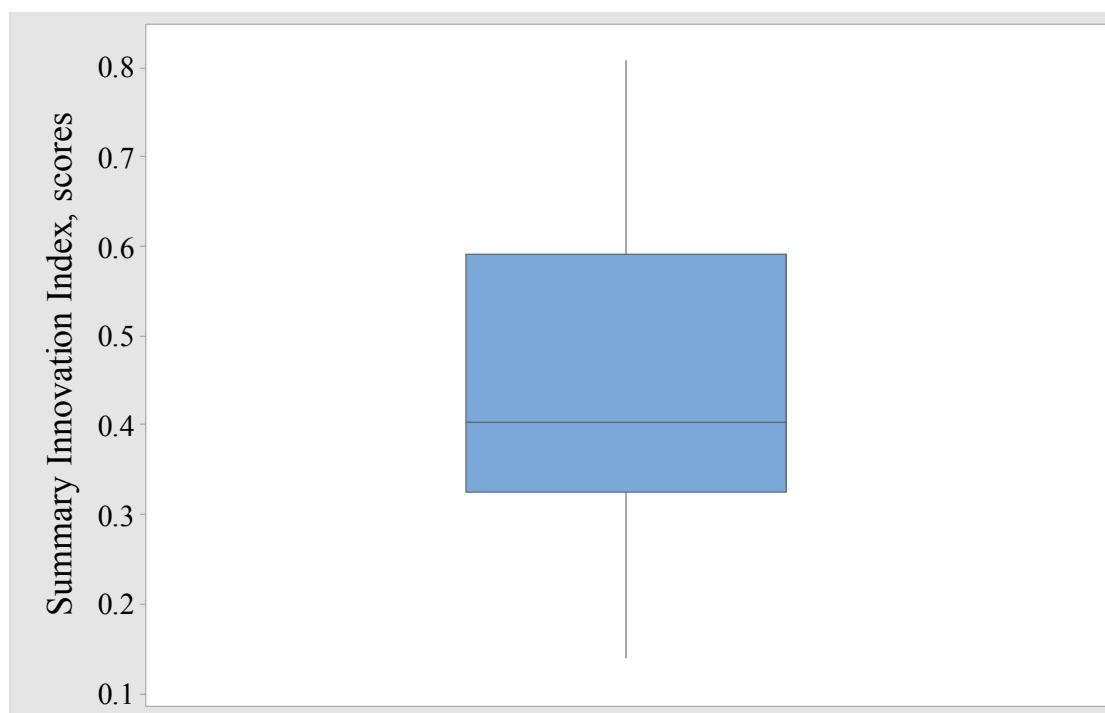


Figure 2 – The boxplot depiction for the graphical analysis for the Summary Innovation Index scores in 2017 of the European Innovation Scoreboard without taking into consideration the overall value for the European Union.
Note: calculations are made by the author.

The figure above illustrates that the median value for the Summary Innovation Index among 36 countries in 2017 equals to 0.40449 scores which is 0.09989 scores or 19.80451% less than the EU overall value of 0.50438 scores (shown by figure 1). The first quartile value of the European Innovation Scoreboard for the Summary Innovation Index among 28 European Union member states and 8 non-EU countries is 0.32424 scores. On the other hand, the third quartile for the same value for same countries without considering the EU overall value equals to 0.59083 Summary Innovation Index scores. Therefore, the interquartile range of countries surveyed by the European Commission for the European Innovation Scoreboard in 2017 equals to 0.26659 scores.

The analysis of the market leaders may help to understand on how to adopt their experience of innovations to the agricultural sector of the Republic of Kazakhstan. Therefore, the figure below illustrates how for the Summary Innovation Index scores in 2017 is made for Switzerland (figure 1 shows it as the market leader) and for the United Kingdom of Great Britain and Northern Ireland (the leader among the European member states).

The figure above illustrates that focus on the human resources, research systems, firm investments and innovators dimensions allowed Switzerland to gain the leading role in the innovations sector. This can

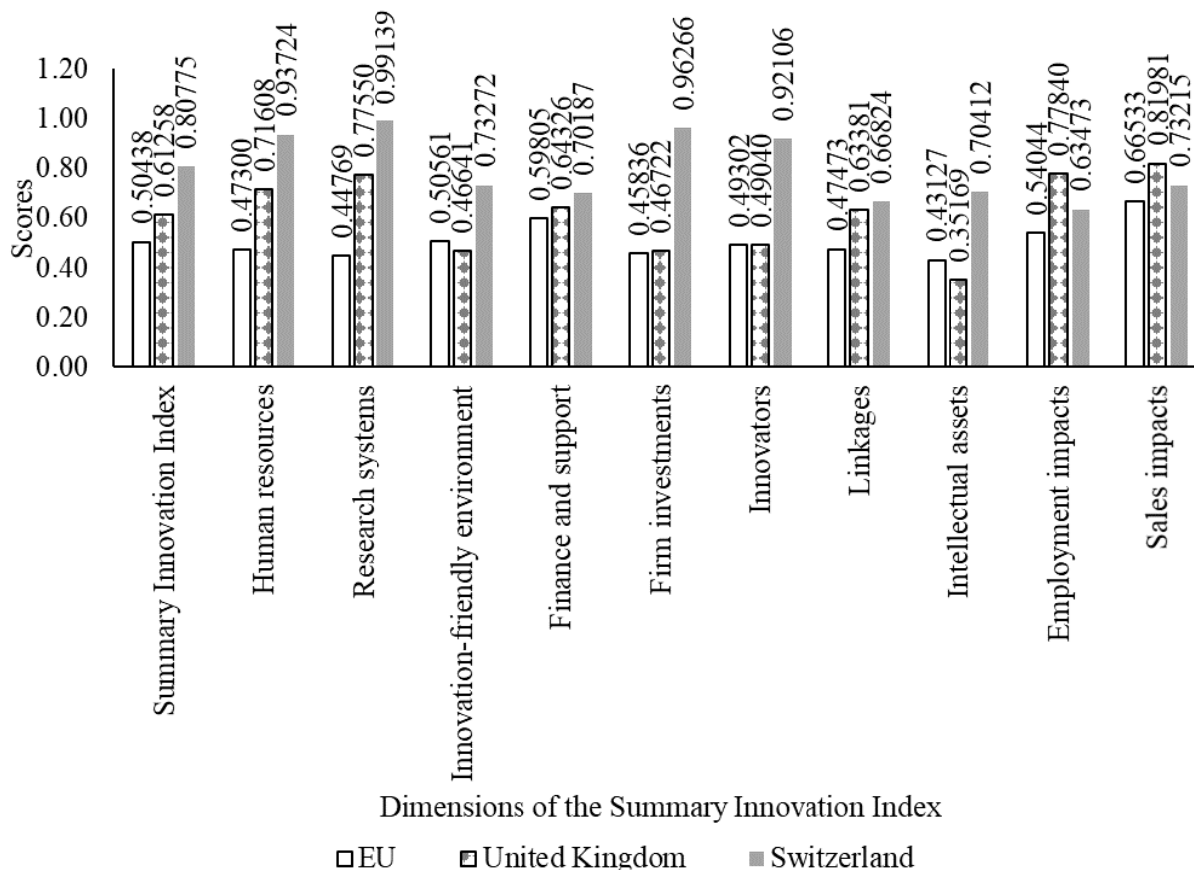


Figure 3 – Innovation dimensions that define the value of the Summary Innovation Index for the European Union, the United Kingdom which is the EU leader, and Switzerland which is the top leader for 2017, scores [7]

be proven by the fact that score for each of the mentioned dimensions are above 0.9 scores, e.g. innovators dimension score is 0.92106 [7].

The analysis of the innovation experience belonging to 36 countries defined the European commission may help to define the following steps require to improve the state of introducing innovations to the agricultural sector of the Republic of Kazakhstan:

1. Making tertiary education more accessible:
 - creating infrastructure that would make easier for younger generation to attend universities for younger generation in the rural areas that are primary focused on the agricultural production;
 - through government subsidies that would motivate to study undergraduate and postgraduate degrees related to the agricultural production;
 - allocating the government grants for engineering specialists in the fields related to producing and providing services to innovative technologies for the agricultural sector;
 - funding professional and vocational courses in the rural areas;
 - creating the government training programmes for retraining jobless people which would allow them to become employed in the agricultural sector.
2. Making international scientific cooperation in the agricultural field more accessible through:
 - the government subsidies for the local scientists involved in the international research projects;
 - tax discounts for attracting foreign research teams, scientists and research publishers which operate in the agricultural sector;
 - creating international research and industrial zones related to agricultural innovations;
 - government support for sending doctorate students for making agricultural research in the top global research institutions and universities;
 - creating Kazakhstani database related to innovations in the field of the agriculture.

3. High speed internet connection and good telecommunication infrastructure should cover the majority of the urban and rural areas. The volume of available information about agriculture in the web is constantly rising [8, 9]. Therefore, providing better broadband connection may help more people to get access to information that may become the foundation for creating innovations in the field of the agriculture.

4. Creating the financial motivation in the form of tax discounts and government loans in improvement-driven enterprises that focus on innovations in the agricultural sector.

5. The government subsidies for research, development and adoption of knowledge-based technologic processes in the agricultural sector.

6. Tax discounts on venture expenditures related to adopting precise agriculture or other types of agricultural innovations when buying machinery, resources or attracting talents.

7. Tax discounts on investments into research and development for agricultural enterprises.

8. Tax discounts for enterprises on non-research and development investments related to agricultural innovations.

9. The government subsidies for agricultural enterprises for them to provide Information Communication Technology (ICT) skills training for their employees.

10. Tax exemption for any product or process innovation in the agricultural for small and medium-sized enterprises (SME).

11. Tax discounts for agricultural enterprises if they introduce at least one marketing or organisational innovation.

12. The government subsidies for any enterprise innovating in the field of the agriculture in-house.

13. Creating an industrial zone that may help to organise cooperation between agricultural producers while adopting new technologies as remote sensing.

14. Tax discounts for any small and medium-sized enterprises (SME) that provide knowledge-intensive services for the agricultural sector.

15. Tax exemption for medium and high-technology enterprises that would produce machinery, tools and resources for the precise agriculture and remote sensing.

16. Tax discounts for sellers of agricultural products that are innovatively new-to-market or new-to-firm.

Innovations have significance for the agricultural sector of the Republic of Kazakhstan by bringing the potential of the long-term growth of the economy [10]. The developed countries have high level of innovations in the agriculture partly due to long-term investments that are both public and private [11].

The agricultural innovations should cover wide range of fields: products and services, as well as systems and processes. Innovations in the field of agriculture are possible in two different forms:

- creating new products and services that has never existed before in the Kazakhstani market;
- upgrading existing processes, systems, products and services in the agriculture of the Republic of Kazakhstan.

The democratic form of the government in the Republic of Kazakhstan creates the potential of spreading agricultural innovation across borders (e.g. the globalisation made companies more mobile, so they can come to set up an innovative agricultural firm in Kazakhstan), processes, industries, sectors of the economy, public and international organisations.

The first steps towards bringing new technologies and innovation to the agrarian sector may include the following steps:

- creating science and information infrastructure competitive at the global knowledge market;
- making the financial centre in Astana more attractive for foreign investors;
- creating the reserves of highly qualified specialist demanded in the agricultural sector;
- supporting enterprises that provide with intangible assets the agricultural market.

The Global Innovation Index is another indicator which illustrates how successful are different countries in the field of innovations. The figure below illustrates the value of the Global Innovation Index for the top 30 countries in the world.

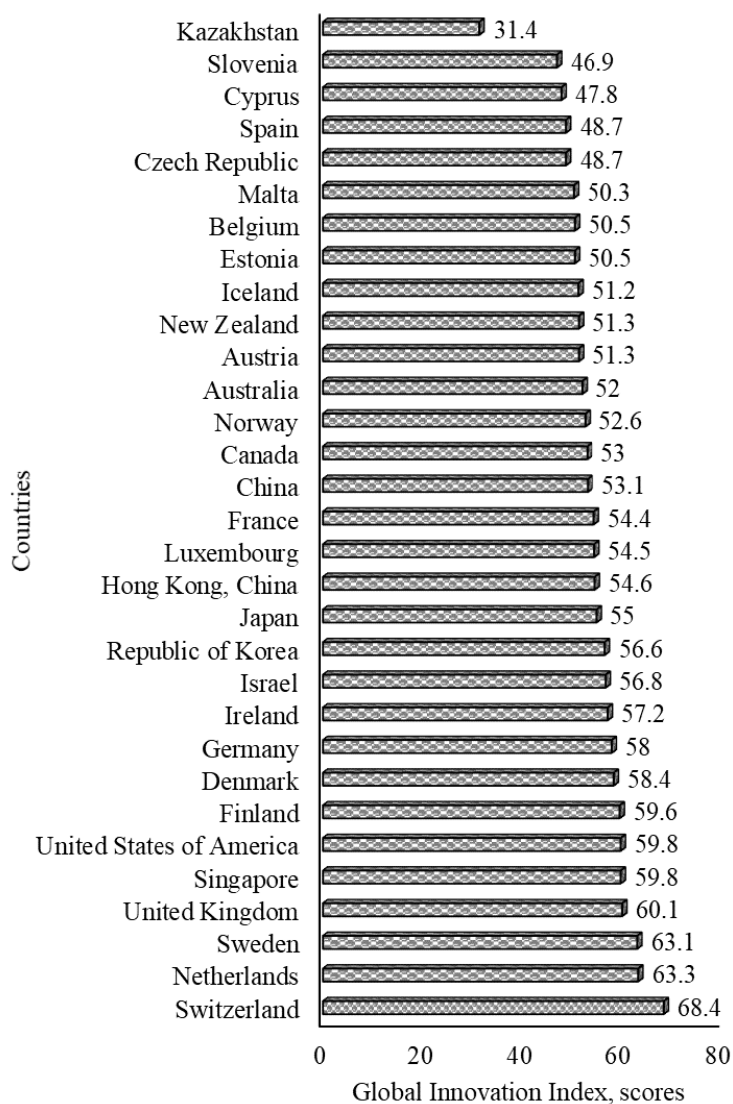


Figure 4 – The Global Innovation Index for the Republic of Kazakhstan and the top 30 countries in the world in 2018, scores [12]

The figure above demonstrates that the highest Global Innovation Index score of 68.4 belongs to Switzerland. The Republic of Kazakhstan is ranked 74th among other countries in the world with 31.4 scores of the Global Innovation Index value according to the research made by Dutta et al. (2018) [12]. In order to understand how far Kazakhstan from the top 30 market leader the figure below illustrates the interval plot graphical analysis.

The figure above defines that the mean value of the Global Innovation Index for the leading 30 countries in the world equals to 54.917 scores which is 23.517 scores or 74.895% bigger than Global Innovation Index score of the Republic of Kazakhstan. Moreover, the trimmed mean value for the same indicator and for the same countries equals to 54.658 scores.

The variance value for the Global Innovation Index scores among 30 top countries equals to 26.299. This indicator measures how far the scores of the mentioned countries in the figure above are spread from the average value [13, 14].

The first quartile for the countries mentioned in the figure above equals to 51.025 scores which is 19.625 scores higher than the Global Innovation Index score for Kazakhstan. Therefore, the summary can be made that the current state of the innovations in the Republic of Kazakhstan is far from the world leaders. The first quartile is known as the middle number value which lies between the minimum value and the median value [15].

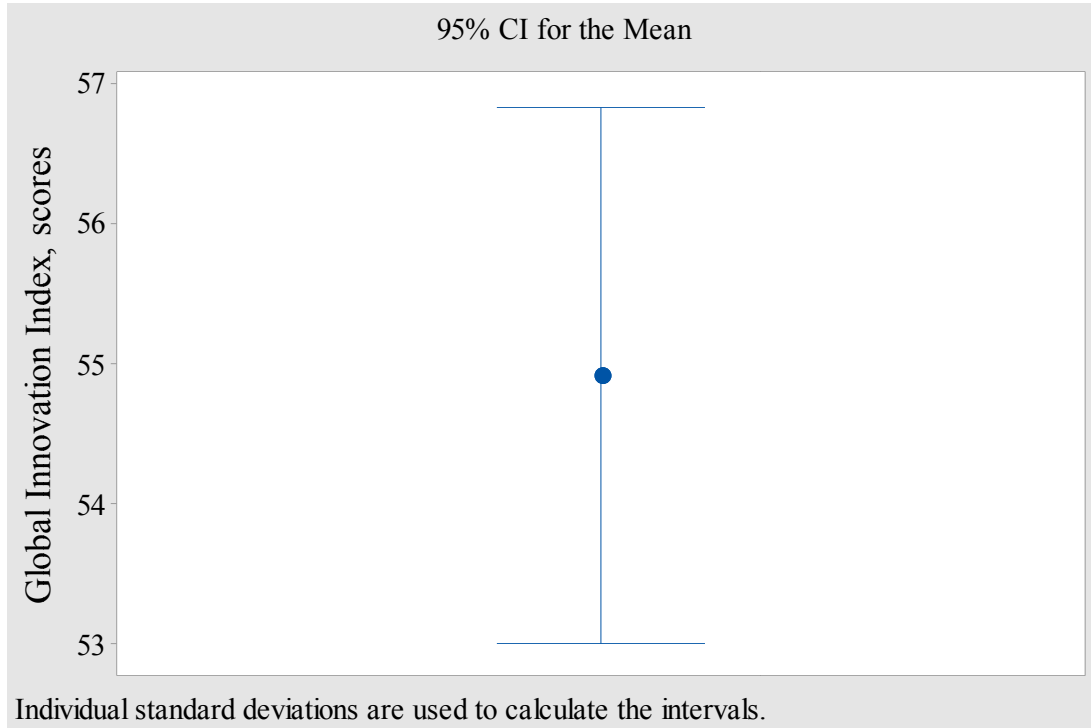


Figure 5 – The interval plot depiction of the graphical analysis for the Global Innovation Index scores of the top 30 countries in the world in 2018 at the 95% confidence interval for the value of the mean.

Note: calculations are made by the author.

The third quartile defines the middle number between the maximum value and the median value [15]. The analysis of the figure above defines that the third quartile for the Global Innovation Index in 2018 equals to 58.7 scores. Therefore, the interquartile range for the Global Innovation Index score of 30 top countries equals to 7.675.

Another indicator to consider is the Innovation Efficiency Ratio which defines how much a country is getting from its inputs out of its innovation output [16]. Therefore, the figure below illustrates the graphical comparison of Kazakhstan’s Innovation Efficiency Ratio versus top 5 countries worldwide.

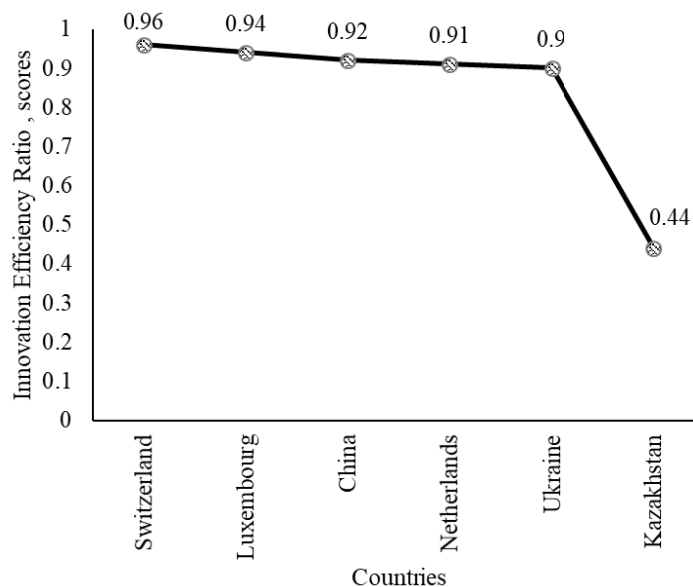


Figure 6 – The graphical comparison of the Innovation Efficiency Ratio scores in 2018 of the Republic of Kazakhstan with top 5 leading countries in the world [16]

The figure above illustrates that the highest level of the Innovation Efficiency Ratio in Switzerland – 0.96. The Republic of Kazakhstan is ranked 111th with 0.44 scores for the Innovation Efficiency Ratio value [16]. This indicator for Kazakhstan is more than twice lower than any of other countries shown by the figure above. Therefore, Kazakhstan is not expected to become the leading power based on its own value of the Innovation Efficiency Ratio score. The significance for high level of innovation indicators is defined by the fact of its correlation with economic growth [10, 17]. There are different models that may define how innovation and growth are related. The figure below demonstrates the Crepon-Duguet-Maires model on how enterprise growth and innovation activities are related.

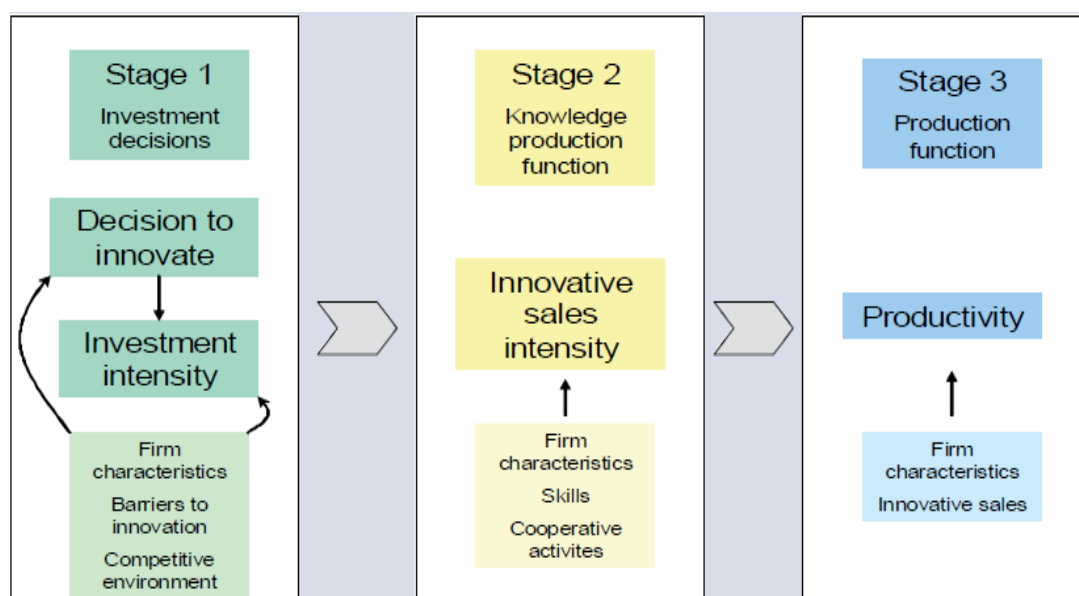


Figure 7 – The three-stage analysis based on Crepon-Duguet-Maires model which illustrates how innovation and growth are linked to each other [17, 18]

The figure above illustrates that innovation has correlation with sales [17, 18]. The innovations may also have different dimensions which is illustrates by the figure below.

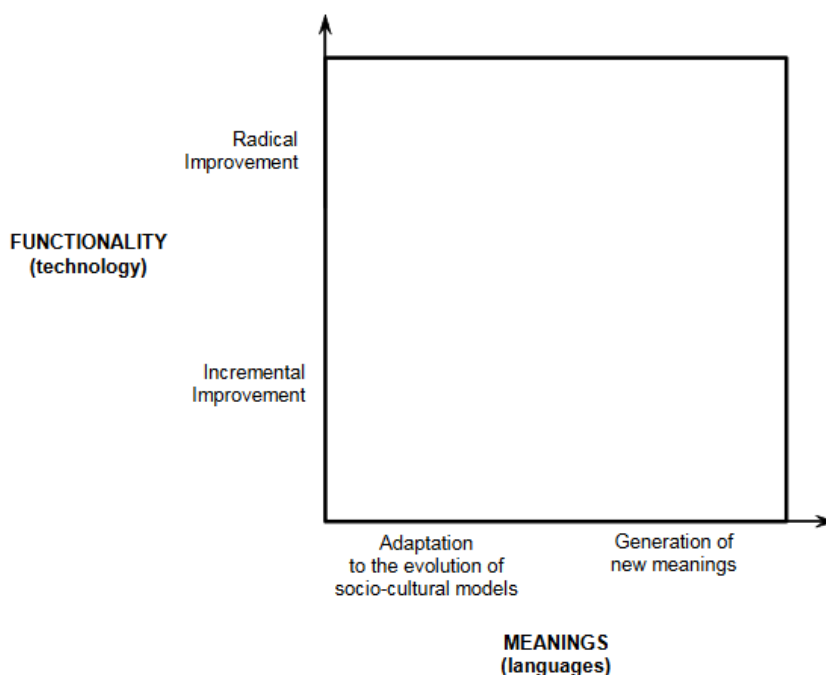


Figure 8 – Possible dimensions of adopting innovations in the agricultural sector of Kazakhstan [19, 20]

The figure above illustrates that the changes in the socio-cultural models may require innovations. For instance, the rise of the social media and internet technologies may require adaptation of using informational technologies in the agricultural sector. Moreover, as shown in the figure below an innovation strategy may differ depending on a mode of innovation.

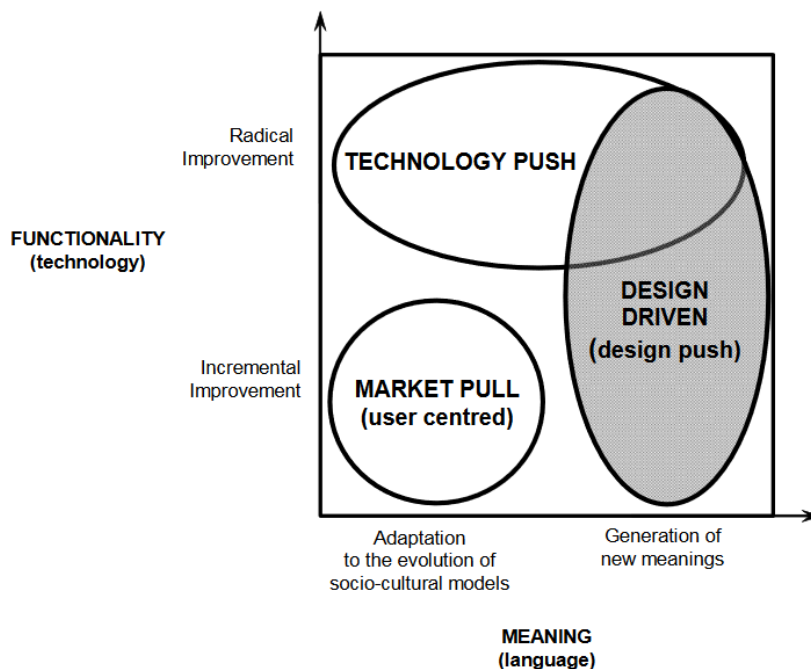


Figure 9 – Innovation strategies for enterprises in the agricultural sector of Kazakhstan [19, 20]

The figure above defines that there are three types of possible innovation strategies: market pull, design driven and technology push. The technological innovation depends on the nature of technological research [19, 20]. For instance, technologic improvements in the last century allowed the rise of precise agriculture and remote sensing. Models for user centred and design push innovations are illustrated in the figure below.

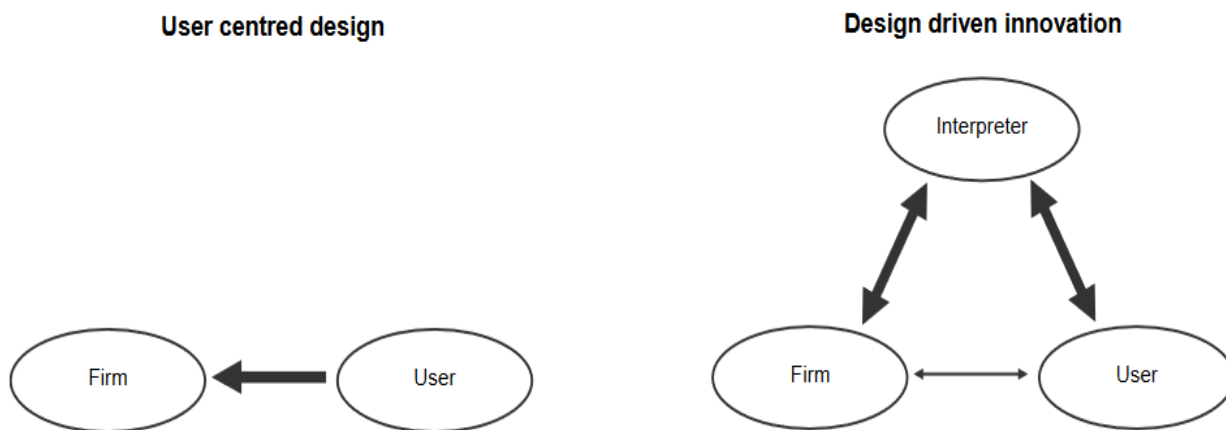


Figure 10 – Models for market pull (user centred) and design driven / push strategies [19, 20]

The figure above shows that a design driven model has connection both ways between firm and user. The mechanism of design driven innovation is shown by the figure below.

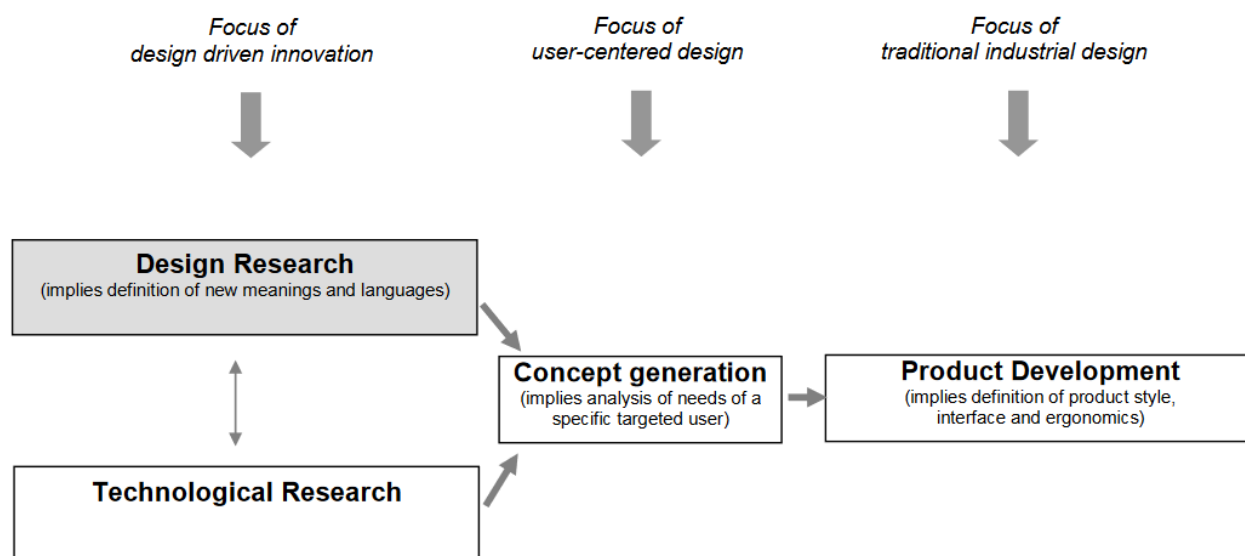


Figure 11 – A sample model for designing a research for design driven innovation for an agricultural enterprise in the Republic of Kazakhstan

The figure above demonstrates that design research should come before generating the concept.

In conclusion, Switzerland is the leader in the field of innovations based on the following indicators: the Summary Innovation Index, the Global Innovation Index and the Innovation Efficiency Ratio. Therefore, in order to adopt its practice of innovations in the agricultural sector of the Republic of Kazakhstan needs to focus hard on the following dimensions: human resources, research systems, firm investments, innovators.

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АУЫЛ ШАРУАШЫЛЫҚ ИННОВАЦИАЛАРЫНЫҢ ХАЛЫҚАРАЛЫҚ ТӘЖІРИБЕСІ

Аннотация. Мақалада ауыл шаруашылық инновациалар саласындағы халықаралық тәжірибе зерттелді. Сонымен қатар, Қазақстан Республикасының ауыл шаруашылық секторына инновацияларды тарту бойынша ұсыныстар түсіндірілген. Зерттеу жұмысының мақсаты – Қазақстандағы ауыл шаруашылық секторын дамыту үшін экономикалық механизмдерін қалай қолдануына қарасты ұсынымдарды анықтауға көмектесетін теориялық және практикалық негізін дамыту болып табылады. Зерттеу әдіснамасы эконометрикалық, сандық және салыстырмалы әдістерімен негізделген. Зерттеудің практикалық маңыздылығы дамыған елдердегі инновациялардың қазіргі жай-күйін сипаттау болып табылады. Зерттеудің нәтижелері Швейцария инновациялар саласында келесі салаларды өзінің жоғары өнімділігі арқасында жетекші күш болып табылғанын көрсетеді: инноваторлар, зерттеу жүйелері, адам ресурстары, корпоративтік инвестициялар.

Түйін сөздер: инновациялар, халықаралық тәжірибе, инновациялық жиынтық индексі, жаһандық инновациялық индекс, инновациялық тиімділік коэффициенті, ауыл шаруашылығы.

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МЕЖДУНАРОДНЫЙ ОПЫТ СЕЛЬСКОХОЗЯЙСТВЕННЫХ ИННОВАЦИЙ

Аннотация. В статье исследован международный опыт в области сельскохозяйственных инноваций. Кроме того, описаны рекомендации для привлечения инноваций в сельскохозяйственный сектор Республики Казахстан. Целью исследования является разработка теоретической и практической основы, которые могут помочь определить рекомендации о том, как применять экономические механизмы для развития сельскохозяйственного сектора в Казахстане. Методология исследования основана на эконометрических,

количественных и сравнительных методах. Практическая значимость исследования заключается в описании современного состояния инноваций в развитых странах. Результаты исследования показывают, что Швейцария является ведущей силой в области инноваций благодаря ее высокой производительности в следующих аспектах: новаторы, исследовательские системы, человеческие ресурсы, корпоративные инвестиции.

Ключевые слова: инновации, международный опыт, сводный индекс инноваций, глобальный индекс инноваций, коэффициент эффективности инноваций, сельское хозяйство.

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REFERENCES

- [1] The European Commission (2018). European Innovation Scoreboard. Available: https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en [Accessed: 1 October 2018].
- [2] The European Commission (2018) European Innovation Scoreboard 2018: Methodology Report. Available: <https://ec.europa.eu/docsroom/documents/30081/attachments/1/translations/en/renditions/native> [Accessed: 1 October 2018].
- [3] The European Commission (2018) EIS 2018 Database. Available: <https://ec.europa.eu/docsroom/documents/30282/attachments/1/translations/en/renditions/native> [Accessed: 1 October 2018].
- [4] DasGupta A. (2008). Asymptotic Theory of Statistics and Probability. New York: Springer Science & Business Media.
- [5] Smith G. (2014). Standard Deviations: Flawed Assumptions, Tortured Data, and Other Ways to Lie with Statistics. New York: The Overlook Press.
- [6] Johnson R., Bhattacharyya G. (2010). Statistics: Principles and Methods, 6th edition. Hoboken, NJ, USA: John Wiley & Sons.
- [7] The European Commission. (2018). European Innovation Scoreboard 2018 – Database. Available: <https://ec.europa.eu/docsroom/documents/30083> [Accessed: 2 October 2018].
- [8] Schroeder R. (2018). Social Theory after the Internet: Media, Technology, and Globalization. London: UCL Press.
- [9] Zhao J. (2008). The Internet and Rural Development in China: The Socio-structural Paradigm. Oxford: Peter Lang.
- [10] Gatignon H., Gotteland D., Haon C. (2015). Making Innovation Last: Volume 1: Sustainable Strategies for Long Term Growth. Berlin: Springer.
- [11] The World Bank. (2012). Agricultural Innovation Systems: An Investment Sourcebook. Washington, D.C.: World Bank Publications.
- [12] Dutta S., Lanvin B., Wunsch-Vincen S. (2018). The Global Innovation Index 2018: Energizing the World with Innovation, 11th edition. Geneva: World Intellectual Property Organization (WIPO).
- [13] Turner J., Thayer J. (2012). Introduction to Analysis of Variance: Design, Analysis & Interpretation. London: Sage Publications Ltd.
- [14] Tulsian P., Pandey V. (2006). Quantitative Techniques: Theory and Problems. Delhi: Bukprint India.
- [15] Lind-Marchal-Wathen A. (2006). Basic Statistics for Business & Economics, 5th edition. Singapore: McGraw-Hill.
- [16] The Global Innovation Index. (2018). Explore the interactive database of the GII 2018 indicators. Available: <https://www.globalinnovationindex.org/analysis-indicator> [Accessed: 30 September 2018].
- [17] Crepon B., Duguet E., Mairesse J. (1998). Research, Innovation, and Productivity: An Econometric Analysis at the Firm Level. Cambridge, MA, USA: National Bureau of Economic Research.
- [18] Loof H., Mairesse J., Mohnen P. (2018). CDM 20 years after // Economics of Innovation and New Technology. 26. P. 1-2.
- [19] Verganti R. (2009). Design Driven Innovation. Boston, MA, USA: Harvard Business School Press.
- [20] Verganti R. (2008). Design, Meanings, and Radical Innovation: A Metamodel and a Research Agenda // Journal of Product Innovation Management. Vol. 25, Issue 5. P. 436-456.

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