Product Innovation Paradigm of Modern Entrepreneurship

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ABSTRACT

Purpose: The work is devoted to quantifying the main dependencies and contradictions between the introduction of innovation and corporate development of modern entrepreneurship forms.

Methodology/Approach: In this study, the main analysis method is the use of fuzzy knowledge bases to select the best management practices. The research allows one to understand the impact of innovation on the effectiveness of business models and what ways in management can be used to increase resilience to the influence of external factors.

Findings: The creation of new combinations of practices based on the knowledge base makes successful management of an enterprise's innovative development. To form a base, the results of global surveys and ratings of enterprises-leaders of innovative development became the basis.

Research Limitation/Implication: The study examines some aspects in the innovation management of enterprises in Canada. Canada's own specificity of innovative activity management caused the interest of research. Namely, an innovative society is being formed there based on a high level of education and knowledge, allowing higher rates of the country's development.

Originality/Value of paper: The paper examines the current economic and financial condition of innovative enterprises in Canada and the need to change the financial and economic policy to form a strong competitive position, in times of crisis and further economic growth. The results of this study can be applied in modern entrepreneurship, regardless of the scale of business.

Category: Research paper

Keywords: business incubators; business accelerators; small and medium-sized businesses

1   INTRODUCTION

Innovative development is the basis of competitiveness of modern economies and provides an opportunity for accelerated growth at the macro- and micro-level based on the creation and strengthening of intellectual potential in a global business environment (Zhao and Zeng, 2011).

The scientific groundwork of the early XXI century on innovative development management of an enterprise is based on:

- the concept of innovation ecosystem;

- open innovations;

- enhancing innovative development in the context of economic globalization;

- the use of the latest mechanisms of technology transfer;

- priorities of value-oriented management of enterprises;

- implementation of innovative business models;

- optimization of business processes of enterprises aimed at ensuring the productivity of innovation;

- implementation of successful management practices of the leaders of global innovation development (Seidler-de Alwis and Hartmann, 2008; Gernego, Dyba and Petrenko, 2019).

Today, the total scientific potential, covering innovation development management of enterprises, as well as methodological tools for the research processes of entities' innovation development, is large (Bousmah, 2021; Zarzewska-Bielawska, 2012; Maiti et al., 2020; Stepanova, Sibiryatkina and Sukhova, 2015; Gromova, Timokhin and Popova, 2020). However, the debate continues in academic circles, caused by the dynamics of innovative development and the need for its permanent scientific rethinking. In particular, the development of digital transformation and Industry 4.0, including big data, cloud computing, artificial intelligence, Internet of Things, robotics, etc., is most significant in today's environment. This led to new phenomena (in particular, digital innovation platforms, innovative business models) and new opportunities for managing enterprises' innovative development based on big data (data mining, business intelligence, machine learning, artificial neural networks) in conditions of fuzzy and incomplete data (Lüdeke-Freund, 2020; Ferreira, Fernandes and Ratten, 2017; Kuratko, 2017; Zhu, Liu and Xu, 2009).

The relevance of the research is determined by the fundamental place of innovation processes in business, often reflected in the complex and turbulent dynamics of modern economies. The study examines some aspects in the innovation management of enterprises in Canada. Canada's own specificity of innovative activity management caused the interest of research. Namely, an

innovative society is being formed there based on a high level of education and knowledge, allowing higher rates of the country's development.

Canada is making a fundamental change in its education, science, and technology, with the goal of embracing all societal structures and creating a new capacity for innovation. In fact, this is about changing values in Canadian society and the creation of a knowledge-based economy (Knubley, 2021; Kalu and Okafor, 2020). Thus, the study purpose is to quantify the main dependencies and contradictions between the introduction of innovation and corporate development of modern entrepreneurship forms.

Achieving this goal led to the following tasks:

1. systematize the methodological foundations of innovation as a theoretical category,

2. analyse the relationship between innovation and corporate development of various entrepreneurship forms,

3. study the dynamics and structure of investment in innovation at the level of a country and individual enterprises,

4. determine the specifics of innovation management in Canada, its trends and contradictions of development.

2   METHODOLOGY

The methodological basis of the work is a set of principles and methods. The systematization of dynamic abilities necessary for successful innovative development of enterprises was carried out. Global ratings were also investigated. A case study gave the opportunity to study management practices of enterprises-leaders of innovative development for their further generalization. For this purpose, a sample of enterprises was made, which was formed from the Canadian enterprises for 2016 and 2020, which produced innovative products (according to the statistical data).

Further, fuzzy logic and multiple fuzzy knowledge bases were used to select the best management practices and create their new combinations needed to successfully manage the innovative development of an enterprise in conditions of incomplete information. In further identifying the underlying trends and patterns in the development of innovative leaders, big data analysis was used (data mining, business intelligence, machine learning, artificial neural networks).

Innovative development management of enterprises based on dynamic capabilities can be represented as coordinated managerial actions on resource, process, and value aspirations. Innovation resource management includes a planning system and a sub-system of information support, which in today's environment is based on information technology (IT), big data, and analytical support.

To ensure comparability and homogeneity of indicators, the data on Canadian companies were studied in the context of separate groups formed on the basis of industry affiliation and the main direction of enterprises' activity. This allowed taking into account the industry peculiarities of their income and expenses formation and the influence of their innovative activity on the results of entrepreneurial activity.

The array of input data for Canadian enterprises was formed in the form of generalized indicators for the main industries. The impossibility of testing the proposed approach on specific enterprises in Canada is due to the lack of official statistical information about the indicators of their innovation activities.

The study of intra-industry trend of innovative development of enterprises in Canada was carried out in three stages. On the first – means of descriptive statistics in the context of each enterprise implementing innovative products were used. The analysis of the industries revealed (by interviewing stakeholders and processing statistical data) a significant differentiation in the trends of their development. At the second stage, to identify trends in the innovative development of enterprises, data mining methods were used as a tool to analyse the accumulated big data, especially relevant for decision-making in conditions of uncertainty. These methods are based on the classical principles of exploratory data analysis and model building. At the third stage, using the case study method, management practices of enterprises' innovative development were investigated.

The next step in the study of the relationship between innovation and business performance is to prioritize the identified factors and identify the main ones by ranking the impact of implemented innovation on changes in relevant indicators.

It is known that enterprises' innovative development is risky, poorly structured, and insufficiently formalized process but relevant to modern challenges. The essential feature of such development is its cyclicality associated with periodic changes in the basic innovation.

The paper proposes the use of approaches to the definition of linguistic terms and the formation of fuzzy knowledge sets to solve problems of this type.

The system of fuzzy logical equations is based on the knowledge matrix or isomorphic system of logical statements; it makes it possible to calculate output membership functions with fixed management system inputs:

1. Rules (N): linking inputs and output using vectors of type $V_k = \langle x_1, x_2, \ldots, x_n, y \rangle, k = \overline{1, N}$, distributed according to the principle:

$$N = k1 + \ldots + kj + \ldots + km, \tag{1}$$

where m – the total number of values of the output variable; kj – the number of rules in the knowledge base corresponding to the output

variable *y*, identical to the value of *dj* (in the general case, $k1 \neq ... \neq kj \neq ... \neq km$).

2. Forming fuzzy knowledge sets (finding linguistic evaluations of variables and membership functions necessary for their formalization).

3. Applying the rules: U (The universal set of problem domain), a fuzzy subset of which F, $F \subset U$, is defined by the membership function $\mu^F(u)$, where $u \in U$ – set element$U$.

4. Fuzzy knowledge base:

$$\bigcup_{p=1}^{k_j} \left[\bigcap_{i=1}^{n} (x_i = a_i^{jp}) \right] \rightarrow y = d_j, j = \overline{1,m} \tag{2}$$

The scale of the knowledge base and algorithms for permanent selection and search for new combinations will avoid the trap of 'following the leader', because a new combination of independent leadership practices is, in fact, a managerial innovation, which creates the potential for new leadership (Gernego, Dyba and Petrenko, 2019). Based on the data from the enterprises, this method will be applied.

It is the proposed design that achieves the purpose of the study, as it allows one to assess the influence of variables and evaluate the degree of innovation in different enterprises.

3 RESULTS

Innovative enterprises are active, independent market entities that perform specific actions to directly search for new or diversify existing industries, thereby actively attracting financial capital and intellectual potential in this process.

The conditions under which enterprises achieve innovation leadership are characterized by instability, uncertainty, and stochasticity. In general, the problem of selecting the best management practice can be defined as follows: according to the external conditions to find such states and managerial impacts, which would provide a certain criterion with a better (minimum, maximum) value. Methods based on the theory of fuzzy logic are suitable for solving the problems of selecting the best management practices and creating new combinations of them necessary for the successful management of enterprises' innovative development. They allow one to effectively investigate situations that cannot be solved with the apparatus of binary logic.
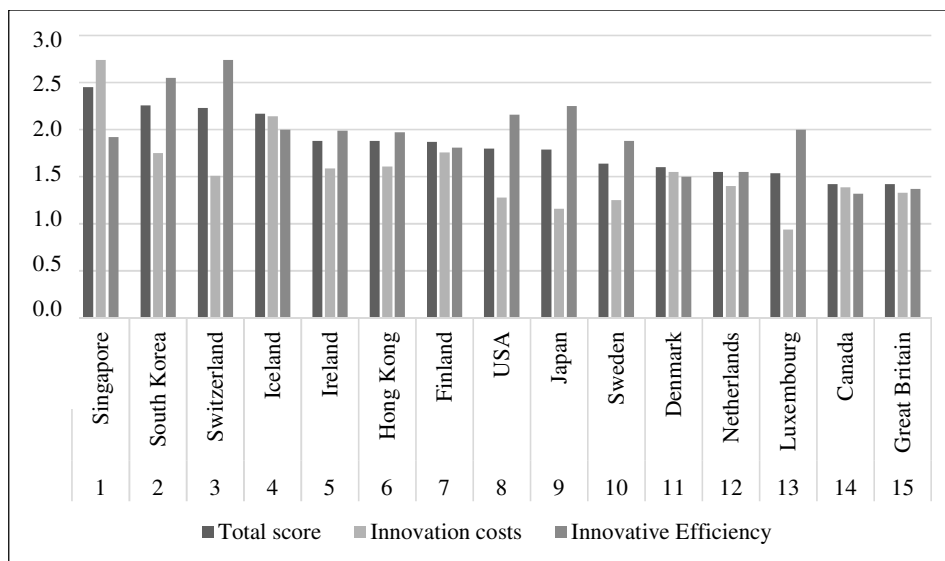
Such methods include, in particular, neural network, fuzzy, genetic algorithms, corresponding to a wide class of problems of enterprise innovation development

management. The basis of the theory of fuzzy logic contains definitions of the linguistic variable, the values of which are words or expressions of natural or artificial language, represented in the form of terms, methods of formation of fuzzy sets and inference rules.

Based on the way of organizing innovation process in an enterprise, one can distinguish three innovative enterprise models:

1. Innovation enterprise on the basis of internal organization. Innovation is generated within a firm by its specialized divisions based on planning and monitoring their interaction with the innovation project. To a greater extent it is characteristic of corporate type enterprises, which create internal venture.

2. Innovation enterprise based on external organizations with the help of contracts. The order for the creation and development of innovations is made between third-party organizations.

3. Innovation enterprise based on the external organization with the help of venture capital, when a firm to implement an innovative project organizes subsidiary venture capital firms, which attract additional funds.

One of the main objectives of a state in order to increase innovation activities among enterprises is the development of innovative entrepreneurship and infrastructure.

Notes: Index compiled by the World Intellectual Property Organization, Cornell University, and Insead International Business School. A total of 143 countries are represented in the ranking.

Figure 1 – Global Innovation Index 2020, Points

For innovative entrepreneurship it is important to have an entrepreneurial environment, which makes it possible to find appropriate organizational forms

for the implementation of ideas and innovations. Entrepreneurial environment is an environment that contributes to a search, preparation, and implementation of innovations. The elements of such an environment are: investors with free financial resources, commodity producers with free capacities that can be used to manufacture competitive products, and appropriate infrastructure.

At the same time, the practical implementation of legislative provisions encounters significant obstacles and does not always correspond to the approaches and principles established in international practice. The most common mechanisms of state support for innovation are presented in Table 1.

Table 1 – Modern Mechanisms of Financial State Support for Innovation

Country	State support for innovation	
	Organizational structures of institutional support	Forms of incentives
USA	Small Business Administration, National Science Foundation, Federal agencies, National Innovation System, American Association for the Advancement of Science, National Research Council, National Institute of Standards and Technology, National Technical Information Service, Office of Science and Technology Policy	Preferential taxation; investment tax credit; preferential treatment of depreciation charges; subsidies; earmarks from the budget; deduction of R&D expenses related to core production and trading activities from the amount of taxable income
Japan	State funds to encourage R&D activities, Small and Medium Venture Fund, Small Business Finance Corporation, Enterprise Development Assistance Center.	Soft loans, preferential taxation, subsidies
France	A special government organization, the French Society for the Promotion of Venture Capital, the National Center for Scientific Research, and the National Agency for Research Implementation (Anwar).	Subsidies, long-term loans, tax credits, credit guarantees, preferential taxation
	The National Agency for Advanced Research, a public-private bank to finance small innovative businesses, a science and technology fund, etc.	
Germany	Consortia of small innovative businesses, state specialized banks – Bank for Recovery Loans and German Equalization Bank, Ministry of Economy, Ministry of Research and Technology, Federation of Industrial Research Associations, Patent Center	Targeted non-repayable subsidies, grants, payment of technical expertise costs, soft loans, credit insurance system, tax discounts and rebates, accelerated depreciation, targeted bank loans
Canada	Canadian Ministry of Innovation, Science and Economic Development, Business Development Bank of Canada, Canadian Federation of Independent Business, the Canada Foundation for Innovation, Canadian Venture Capital Association	Concessional loans, subsidies, technical assistance, tax credit, preferential taxation
United Kingdom	Council for Science and Technology, UK Research and Innovation, etc.	Preferential taxation, subsidies, deduction of R&D expenses (cost of products (services)), credit guarantees

Considering the above, it is quite reasonable to attract targeted investment resources from the banking sector for innovation. At the same time, it is necessary to accentuate that today the share of banking sector in financing of innovations in Canada is not high. One of the basic external sources of receiving investment is medium – and long-term credits of banks. In recent years, the situation has been worsened by the instability of economic and political conditions, the high risk of providing funds for a long-term period, the scarcity and high cost of credit in the banking system.

The crisis that came with the onset of the pandemic has slowed down the development of the venture capital market. This is a global trend. According to statistics, the volume of investments in high-tech companies in the global market in Q2 2020 was $50.2 billion, which is 13% less than the same figure a year earlier (OECD iLibrary, 2005; Wipo, 2022). Overall, the number of deals fell by 9%. Now the idea alone is not enough to interest investors. In 2020, they are already looking at product readiness to enter the market. In this situation, large cities that want to become innovation centres will have to focus on improving the entrepreneurial ecosystem.

To ensure comparability and homogeneity of indicators, the data on Canadian companies were studied in the context of separate groups formed on the basis of industry affiliation and the main direction of enterprises' activity. This allowed taking into account the industry peculiarities of their income and expenses formation and the influence of their innovative activity on the results of entrepreneurial activity. One may note that, in addition to industry specifics, the results of enterprises' innovative activity can be influenced by national and regional characteristics of their operating environment. The array of input data for Canadian enterprises was formed as generalized indicators for the main industries. The impossibility of testing the proposed approach on Canadian enterprises is due to the lack of official statistical information about the indicators of their innovation activities. Cross-industry analysis, using data from the [BLINDED], initially implies additional model error in the calculations associated with not taking into account the factor of industry affiliation of enterprises, which must be considered when analysing the results.

The study of intra-industry trends in the innovative development of Canadian enterprises was carried out in three stages. On the first – means of descriptive statistics in the context of each innovative enterprise were considered. The analysis of industries revealed (by interviewing stakeholders of innovative enterprises and processing statistical data) a significant differentiation in the trends of their development (Table 2).

Table 2 – Descriptive Analysis of Innovative Enterprises (Calculated by the Authors Based on Galindo-Rueda, 2019; Canadian Business, 2022)

Industry	Period	Number of enterprises		Revenue, bln.		Revenue, mln			
		Analysed	Missed	Amount	Maximum	Mode	Standard error of the mean	Median	Standard deviation
Mechanical Engineering	2020	12,309	0	328.29	12.02	26.67	1.68	1.77	186.84
	2016	8,867	3,442	140.12	9.74	15.80	1.47	0.92	138.05
Manufacture of fabricated metal products, except machinery and equipment	2020	3,319	0	63.30	2.44	19.07	1.63	2.03	94.11
	2016	2,281	1,038	20.79	1.11	9.12	0.91	0.92	43.38
Production of computers, electronic and optical products	2020	672	0	19.61	1.93	29.18	4.80	2.91	124.33
	2016	523	149	7.99	1.35	15.27	3.31	1.63	75.62
Manufacture of electrical equipment	2020	977	0	45.15	5.85	46.21	7.92	3.21	247.58
	2016	684	293	19.68	1.87	28.77	4.77	1.82	124.72
Software Development	2020	2,023	0	75.89	5.67	37.51	4.39	3.99	197.61
	2016	1,446	577	38.13	2.82	26.37	3.93	2.31	149.32
Clothing and Footwear Manufacturing	2020	275	0	28.31	2.57	102.95	18.82	5.75	312.13
	2016	211	64	11.90	1.75	56.38	13.40	4.65	194.64
Businesses in the service sector	2020	337	0	48.31	12.02	143.34	41.91	3.74	769.38
	2016	234	103	23.10	9.74	98.70	43.73	4.26	668.89
Development of information and communication technologies	2020	4,468	0	44.38	2.20	9.93	0.90	0.94	60.18
	2016	3,328	1,140	17.03	1.15	5.12	0.58	0.48	33.69

In the second stage, to identify enterprises' innovative development trends, data mining methods were used as a tool to analyse the accumulated big data, especially relevant for decision-making under conditions of uncertainty. These methods are based on the classical principles of exploratory data analysis and model building. Therefore, their use opens up great prospects for managing enterprises' innovative development, determining the growth factors, performance evaluation, and forecasting innovative development.

The authors put forward the assumption that the rate of revenue growth combined with its volume may indicate the implementation of innovation. There is an assumption that significant differences in innovation development management can lead to constant growth or the formation of a 'broken' trend.

The results of applying data mining to identify innovative leaders among innovative enterprises by development trends and scale of activity allowed identifying six groups of them.

At the third stage, the management practices of enterprises' innovative development were investigated using the case study method (Table 3). Enterprises were selected so that each of the 6 types showed one most effective enterprise (with a level of profitability above 19%). It was proved that the scale of activity and pace of development significantly differ among enterprises applying different practices of innovation development. The empirical data were systematized in the context of different innovation types, as well as innovation protection by intellectual property means for enterprises of incremental and radical innovation types.

Table 3 – Qualitative Results of Canadian Enterprises' Innovation Activity, Obtained Using the Case Study Method

Type*	Enterprise	I1		I2		I3		I4	
		FI	II	FI	II	FI	II	FI	II
RB	A	m	m	h	h	l	l	l	m
IB	A1	m	m	h	h	l	l	l	m
RM	A2	h	h	m	m	m	h	l	m
IM	A3	m	m	l	l	m	m	m	m
RS	A4	h	h	l	m	m	m	m	m
IS	A5	l	m	m	h	m	m	m	m

Notes: According to the table results, the first letter – radical or incremental development, the other – the scale of businesses; I1 – product innovations; I2 – process (technological) innovations; I3 – marketing innovations; I4 – organizational innovations. FI – frequency of innovations; II – intensity of innovations; h – high; m – medium; l – low.

The mechanism of innovation impact on enterprises' financial results is mediated by the market, where competitive advantages are formed. The basis for the analysis of innovation as a source of enterprises' competitive advantage is the concept of dynamic capabilities, which developed on the basis of the resource approach. Dynamic capabilities, as organizational procedures for innovative development created by management, allow enterprises to create new ways (combinations) of using resources based on knowledge. They ensure the introduction of innovations and become a source of sustainable competitive advantage due to the inability of competitors to imitate them. One can note that large enterprises can introduce innovations by cooperating with startups or absorbing them. Applying the concept of dynamic capabilities relies on the human factor and is associated with the process of organizational learning.

Based on the analysis and combination of the resource theory and the theory of innovation, the key factors were identified. They influence the formation of competitive advantages of Canadian enterprises based on innovation in the knowledge economy. Such factors are:

- the intellectual component of human capital;

- state of corporate entrepreneurship;

- entrepreneurial behavioural characteristics (proactivity, innovativeness, and risk appetite) of management;

- ability to synthesize and apply current and acquired knowledge in pursuit of a business opportunity;

- ability to create, expand, and modify resources;

- ability to generate new knowledge based on a combination of experience and external sources, including communications with stakeholders.

Intellectual property rights protection has a significant impact on the strategy to protect innovation based on patents, copyrights, or trade secrets. In jurisdictions with a strong rights protection regime, an enterprise employs strategies of pure knowledge ownership; ownership of complementary or critical assets; and a strategy of focusing on R&D. An alternative to protecting an innovation by registering intellectual property rights is to protect it informally, which involves keeping the innovation secret. Intellectual property legislation is designed to strike a balance between incentives for creating innovations and using the results of inventions that have already been created. It is worth noting that the intellectual property protection procedure is lengthy within the life of a startup, and in many cases the process of active innovation can be more effective.

Innovation can affect various aspects of an enterprise, in particular its competitiveness, market share, the efficiency of fixed and working capital, labour productivity, and others. In accordance with this, the OECD recommendations 'Guidelines for collecting and interpreting innovation data' (Mazzucato and Tancioni, 2008) consider all factors reflecting the motives and results of innovation in 4 groups:

1. competitiveness, target market share, demand;

2. production and sales policy;

3. personnel and communication policy;

4. compliance with regulatory requirements and other factors.

Each of these groups includes a set of indicators, the change of which reflects a positive effect of enterprises' innovations in Canada. Groups of factors and innovation types are based on the data (Galindo-Rueda, 2019; OECD iLibrary, 2005) and are given in Table 4.

Table 4 – Factors Reflecting Motives and Results of Canadian Companies'
Innovation

Group of factors	Factors (indicators) of innovation implementation	The innovation type that is influenced by a certain factor			
		Product	Technological	Organizational	Marketing
Competitiveness, target market share, demand	Repositioning of products for which demand is declining	+			
	Expanding the range of goods and services	+			
	Developing environmentally friendly products	+			
	Increasing or retaining market share	+			+
	Entering new markets	+			+
	Improving product presentation and awareness				+
	Reducing the time to respond to customer inquiries		+	+	
Production and sales policy	Improving the quality of goods and services	+	+	+	
	Increased flexibility in the supply of goods and services		+	+	
	Increased ability to produce and deliver goods and services		+	+	
	Reduced labour costs		+	+	
	Reduced raw materials costs	+	+	+	
	Reduced costs for the design of new products		+	+	
	Reduced production downtime, optimized time for pre-production preparation		+	+	
	Compliance with technical industry standards	+	+	+	
	Reduction of operating costs in the provision of services		+	+	
	Increasing the efficiency and speed of raw material deliveries and shipment of finished products		+	+	
	Setting up information support		+	+	

Group of factors	Factors (indicators) of innovation implementation	The innovation type that is influenced by a certain factor			
		Product	Technological	Organizational	Marketing
Human Resources and Communications Policy	Establishing communications and interaction between business units			+	
	Activation of technology transfer and knowledge exchange processes with other institutions, enterprises			+	
	Increased ability to adapt to different consumer needs			+	+
	Developing close relationships with consumers			+	+
	Improving working conditions		+	+	
Compliance with regulatory requirements	Reducing the negative impact on the environment/increasing safety and usefulness	+	+	+	
	Compliance with regulatory requirements	+	+	+	

Product and marketing innovations are mainly reflected in the competitiveness of an enterprise, its market position, and demand for its products. At the same time, their role in improving the production and sales activities of an enterprise, as well as the organization of the work process, is insignificant. Product and marketing innovations are the only types of innovations through which Group 1 indicators (competitiveness, demand, and market share) can be improved.

Technological innovations can have a small impact on some indicators of other groups, in particular the reduction of time to respond to customer requests (Group 1) and improving working conditions for workers (Group 3). An interesting feature of organizational innovations is that their implementation can have a positive impact on a large number of studied indicators compared to other innovation types.

The next step in the study of the relationship between innovations and business performance is to prioritize the identified factors by ranking them by the innovations' impact on them. In practice, the real impact of innovations on Canadian enterprises will have its own peculiarities in each specific case. However, it is possible to highlight the general patterns characteristic of the vast majority of enterprises, having determined the totality of factors of innovation activity. For this purpose, it is relevant to consider research on scientific, technological, and innovative development in the world and Canada in particular (Wipo, 2022). The results of such research, reflecting the main motives of innovative activity of Canadian enterprises in various industries, are shown in Table 5.

Table 5 – Priority of Innovation Performance Factors (Other Than Organizational) According to the Study Conducted on the Basis of Canadian Enterprises

Factor in decreasing order of priority	Percentage of surveyed enterprises	Group to which the indicator belongs	Innovation type
Improving the quality of goods and services	38%	Production and sales policy	Technological, product
Expanding the range of goods and services	34%	Competitiveness, demand, market share	Product
Increasing or maintaining market share, entering new markets	29%	Competitiveness, demand, market share	Product, marketing
Increased flexibility in the delivery of goods and services	24%	Production and sales policy	Technological
Increased ability to supply goods and services	24%	Production and sales policy	Technological
Compliance with regulatory requirements	18%	Compliance with regulatory requirements	Technological, product
Reduction of labour costs	18%	Production and sales policy	Technological
Reducing the negative impact on the environment/increasing safety and usefulness	14%	Compliance with regulatory requirements	Technological, product
Reducing the cost of raw materials	10%	Production and sales policy	Technological, product
Other factors	<10%	×	×

It should be noted that the survey included innovation-active enterprises that implemented product, marketing, or technological innovations. Organizational innovations, as a result of their specificity, were placed in a separate group in this study. From Table 2 one can conclude that the main plane of innovation activity of enterprises in Canada is product and technological changes, because these types of innovations correspond to main factors of innovation.

The first three factors of innovation performance, defined by enterprises as the main ones are associated with revenue (income) from the sale of products. The quality and range of products are related to price parameters, and the market share is a reflection of the number of sold products. The impact of innovation on these characteristics was determined as 'most important' by 38%, 34%, and 29% of surveyed enterprises.

It is advisable to emphasize the fact that only a small part of enterprises in the study identified reductions in the cost of raw materials as an important effect of innovation activities. This can be explained by the fact that the level of technological equipment of most enterprises at the present stage is characterized by a fairly high level of energy and raw material efficiency, and therefore the

introduction of technological innovation in this direction can give only a small effect. At the same time, for Canadian businesses, the role of this factor in adding value and improving operational efficiency is one of the leading.

4 DISCUSSION

When studying the impact of innovations on enterprises' efficiency, researchers use a comprehensive approach to the analysis of the problem. They apply the method of comparative analysis and expert evaluations; methods of empirical research; interviewing; observation; expert survey; statistical data analysis.

These methodological recommendations do not take into account some important features of the development and implementation of new technologies. Increasing the effectiveness of innovative projects is achieved by analysing the possibilities of maximizing the results, the prospects of innovations, their feasibility, and the diffusion of technology (Reznik and Kourdova, 2013).

It is more appropriate to consider formation of modern basic methodological aspects of introducing new technologies. The identified trends can serve as a conceptual basis for the formation of ways of enterprises' innovative development in modern economic conditions (Ganushchak-Efimenko et al., 2020; Doroshenko et al., 2016).

Some researchers believe that the integration concept is most acceptable for the analysis of enterprises' innovative development. It considers an enterprise as a relatively stable, holistic, and independent socio-economic system of an open type, integrating the processes of production and sales (Salope and Mlikota, 2020).

Enterprises' innovative development depends on how the technological system of an enterprise is ready to accept this or that innovative task and correctly assess it. The perception of the innovation task can take the form of:

- recognition of innovations, when the production system is interested and prepared to implement them;

- rejection of innovation, when it contradicts the interests of an enterprise, or when the production system is not ready for its implementation, and the controlling subsystem lacks effective leverage (Balcerzak, 2009; Hustič, 2009; Colombelli et al., 2020).

The existing methods for assessing companies' innovative development are usually difficult to apply. A significant disadvantage of these methods is the lack of a systematic approach to the selection of evaluation indicators. The list of indicators proposed by different authors to solve the problem in question is quite significant, but they are usually not mutually coordinated and duplicate each other. The simplest methodologies, which use a small number of assessed indicators, do not allow for a comprehensive solution to this problem (Petrenko

and Karnaushenko, 2020; Ihnatenko et al., 2020; Gorączkowska, 2021; Nimer, 2016; Testa, Szkuta and Cunningham, 2019).

The research methods chosen in the present study give an opportunity to assess innovative sphere more objectively, as they give an opportunity to estimate the influence of factors which are difficult to predict. That makes it possible to make an in-depth analysis of the results and carry out predictive development.

It became clear that one of the prerequisites for the development of innovation in Canadian enterprises is the presence of entrepreneurial culture. According to modern global trends, it is formed in society by universities based on their interaction with enterprises.

Creating an innovative entrepreneurial environment in Canadian companies should include the following areas:

- Promoting the values of the knowledge economy and innovation as the foundation of modern Canadian entrepreneurship;

- Concentration and use of relevant knowledge about innovation and entrepreneurship based on active international interaction; intensification of interaction with all persons, groups of persons, and organizations interested in the activities of a university (stakeholders) and cooperation with enterprises;

- motivation and development of leadership and entrepreneurial qualities of future professionals by involving students in entrepreneurial and innovative activities during their studies at Canadian universities.

5   CONCLUSIONS

The results of this study are of practical importance for innovative areas of business, can be used as a basis for management decisions in enterprises. As for the scientific sphere, the methods of fuzzy logic have shown their rationality in decision-making in all forms of modern entrepreneurship.

According to the Global Innovation Index, Country RepTrak, and Global Sustainable Competitiveness Index (based on correlation and regression analysis of relevant factors for 55 countries according to 2019 reports), the paper identified a positive impact of national reputational characteristics on sustainable competitiveness of innovative development factors. This suggests that businesses/countries seeking a sustainable competitive advantage should focus resources on strengthening reputation in conjunction with their innovation development management.

The work substantiates a set of parameters, the impact of innovations on which determines the achieved effect of their implementation. These parameters are grouped into four groups: competitiveness of an enterprise, the share of the target

market, demand; production and sales policy; personnel and communication policy; compliance with regulatory requirements.

Based on the analysis of innovation activity factors, it was found that product and marketing innovations are mainly reflected in the competitiveness of an enterprise, its market position, and demand for products. Technological innovations are reflected in production and sales. Organizational innovations affect the very number of performance indicators of an enterprise, but their impact is weak compared to other innovation types.

However, in some cases, the introduction of organizational innovation is a prerequisite for the effectiveness of technological, product, or marketing innovation.

The study empirically confirmed the hypothesis that there is a direct relationship between the level of enterprises' innovation activity and their efficiency, according to the results of innovation activity ratings.

Business incubators and accelerators are among the key entities for financing and stimulating the development of small and medium-sized enterprises (SMEs) in Canada and around the world. Moreover, they are an effective tool for attracting not only financial resources, but also information capital and expertise, which are especially valuable for SMEs at the initial stage. At the same time, it should be noted that not all SMEs have a startup orientation, which means that business incubators and accelerators are only a partial solution to the problem of SMEs' financing. Therefore, it is necessary to introduce professional and university education programs to train specialists in small business management.

A large number of different types of risks and the complexity of their planning were the limitations of this study. The study results are of applied value, which shows a number of key factors influencing the formation of competitive advantages of different enterprises based on innovation in a knowledge economy.

To date, the problem of finding ways to combine innovation and enterprises' strategic development goals remains unresolved. In addition, an important issue remains the proper combination and integration of these factors in the interaction of large companies and startups. Today in the scientific environment there are works where this issue is considered separately for large companies and for startups. These and other problems indicate that further research is needed, which would be based on the ways, forms, and methods to increase innovation activity, taking into account the current conditions of economic development.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.