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THE EVALUATION OF INNOVATION IN THE IT SERVICE SECTOR: METHODOLOGICAL AND EMPIRICAL ASPECTS

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Abstract

Purpose *— Nowadays services are comprehended as the key factor for economic activity, growth and employment. Developed economies are service-dominated though little is known about the innovation details in the service sector and this study field has been neglected for a while. The innovation in service sector activities needs to be thoroughly evaluated because innovation is an interconnected process and cannot be defined using one or few indicators. IT services are an integral part of contemporary life, particularly for business. It can be introduced and implemented in all fields, especially when the world is becoming more multidimensional. Innovation performance in the IT sector has been under-researched, despite the fact that IT service sector plays the innovation disseminator role in other sectors by appliance of IT products.*

Design/methodology/approach *— Based on scientific literature and methodological aspects analyses, an empirical research methodology was designed and the qualitative research on innovation in information technology service sector was accomplished.*

Findings *— The article presents methodological aspects of innovation evaluation in service sector and empirical aspects on innovation implementation and development in the IT service companies in Lithuania.*

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Research limitations/implications *— For more comprehensive understanding of innovation in service sector, especially in IT services, the theory of service innovation is necessary. Deeper understanding and perspectives on how innovation benefits the information technology sector should be revealed in further researches and the multi-country analysis is needed.*

Practical implications *— The finding of the paper can be used to improve the development of innovation in information technology service companies and create a model for more exhaustive multi-country empirical researches.*

Originality/value *— The impact of innovation and its development in information technology service sector has not been analyzed thoroughly in previous researches.*

Keywords *— innovation, service sector, information technologies, social technologies, innovation development.*

Article Type *— research paper.*

1. Introduction

Service sector and service innovations within contemporary economies play a significant role in the creation of gross domestic product, contribute to employment and cooperate intensively with other sectors of country's economy (Van der Aa and Elfrig, 2002; Cainelli et al., 2006; Conway and Steward, 2009). The development of services is the main source of country's productivity growth which facilitates the development of new business models. Despite economic and social importance of it, the service sector as a research object has been neglected for some time and has received little attention compared to the manufacturing sector. It is now recognized that technological change and promotion of technological innovation are the main drivers of economic growth and tools to promote a competitive advantage, whereas the service sector is getting more interconnected and uses different types of knowledge gain and sharing. According to Jarrahi and Sawyer (2013), modern-day organizations gain advantage in employing social technologies as a tool of communication and knowledge sharing. Social media is seen as potential of organizational knowledge diffusion, cooperation and interpersonal exchange. Moreover, the use of the social media enables organizations to carry out innovative ideas and influence the circulation of the ideas to multiply and strengthen ties in organizational network, as well (Sutcliffe et al., 2011).

Companies are encouraged to develop more innovative products rather than to increase the volume of existing products, according to the fact that innovation is considered to be a critical factor for companies to survive in the rapidly changing business environment. The innovation of goods and services is seen as an important organizational mechanism through which companies develop, improve and transform own organizational resources, improve competencies and increase company's competitiveness in the market (Danneels, 2002).

According to Damanpour (2009), service sector companies are able to receive greater benefits from developing innovation in all areas rather than focusing on existing knowledge in one area. Strong ties between different units of organization and good organizational relationship characteristics are essential for company's success. The implementation and development of different innovation types would assure the ability to integrate company's internal and external capabilities to withstand changes in the environment and remain efficient over time.

The Government of the Republic of Lithuania by its work program committed to accelerate science and technology progress as well as the development of information and knowledge society. It is stated that the development of information and knowledge society is one of the strategic objectives and priorities of country's budget planning. In order to achieve the strategic objectives, the information and communication technology (ICT) sector is being strengthened and promoted in all sectors of economy[1].

While performing the evaluation of innovation development in the service sector companies, it is important to develop appropriate research methodologies and determine the evaluation indicators. In order to take the advantage of previous innovation in services evaluation experience, it is useful to review methodological and innovation evaluation aspects of previous researches. *The research object* is innovation in the service sector. *The purpose* is to present methodological and empirical aspects of innovation development evaluation in services. *The scientific problem* of the paper focuses on the question which methodological aspects of innovation evaluation in the service sector identify the variety of innovation evaluation. *The objectives* of the paper include to characterize the criterion of innovation evaluation in services, present empirical research methodology and reveal the results of empirical research of innovation evaluation in the IT service companies in Lithuania.

2. Review of Service Innovation Measurement Criterion

The recent development of advanced economies which is predominated by services has increased the importance of the service sector innovation. The innovation in service sector activities needs thorough evaluation because innovation is an interconnected process and cannot be defined using one or few indicators. In addition, services are basically distinguished from goods by four key features: intangibility, heterogeneity, inseparability and perishability (Lovelock and Gummesson, 2004).

Povilaitis and Čiburienė (2008) have analyzed Milbergs and Vonortas (2005) paper where they explore the evolution of service innovation measurement. Milbergs and Vonortas emphasize that the assessment of innovation activities are still based on industrial economics paradigm and innovation input and output indicators. For a long time services were not embraced to the assessment of innovative activities, therefore it

1 Žinių visuomenės kūrimas [interactive]. [accessed on 2013-03-31]. <http://distance.ktu.lt/livun/91203.html>.

was oriented to manufacturing sector and not to the services (Povilaitis and Čiburienė, 2008).

Milbergs and Vonortas (2005) have represented innovation measurement evolution as developing through the following four stages: input indicators, output indicators, innovation indicators process indicators (Povilaitis and Čiburienė, 2008) (see Table 1).

Table 1. Evolution of innovation evaluation criterion and its indicators

First generation **Input indicators (1950–1960)**	***Second generation*** **Output indicators (1970–1980)**	***Third generation*** **Innovation indicators (1990–2000)**	***Fourth generation*** **Process indicators (2000 – till now)**
• R&D expenditures • Science and technology personnel • Capital investment • Technological intensiveness	• Patents • Publications • Products • Change of quality	• Innovation analyses • Indexing • Measuring innovation efficiency	• Knowledge • Intangibles • Networks • Demand • Clusters • Management methods • Risk/return • System fluctuation

Source: Povilaitis and Čiburienė, 2008.

According to Milbergs and Vonortas (2005), first generation indicators represent linear innovation concept which focus on input. Output indicators enhance input indicators by adding results of personnel activities, such as science and technology products. Third generation – innovation indicators – targets at a more advantaged set of innovation activities indicators and indexes which are based on analyses, surveys and statistical and public data. Process indicators are based on the most recent and relevant indicators of economies: knowledge indicators measure knowledge and development; networks oblige companies to innovate in cooperation with other companies; economic demand, infrastructure and society are crucial factors for sustainable and successful innovation process (Povilaitis and Čiburienė, 2008).

Rose et al. (2009) measured innovative company's activities through the framework of intangible capital which is assumed to result into the innovative process. The intangible capital was divided into human capital, intellectual property and organizational capital and they are expected to derive into innovations in the future:

- Human capital indicates intelligence and skills owned by persons and it can be used by companies when employing such skilled workforce. Persons invest in their human capital pursuing education and improving their knowledge and skills and they expect this investment to buy off being paid a salary by the company. Meanwhile, the companies invest in the human capital when training their staff or providing opportunities to improve their knowledge outside the company.

- Intellectual capital demonstrates technical contribution to the innovative processes which results in the outcome of R&D, databases, trade secrets, patents and licenses.
- Organizational capital represents ICT infrastructure, alliances and networks, business models, marketing and design. The interchange of information among the participants of the business may result in innovation.

However, researchers exclude "brand" from this intangible assets framework because they assume it is not directly or materially connected to innovation activities. Rose et al. (2009) conducted a research on intangible capital evaluation that could lead to innovative activities. The research represents the composition of intangible capital categories and how intangible capital can be measured, as well the sources of the findings in the U.S. market. The researchers believe that intangible capital framework is significant as its measurement enables to investigate the connection between innovation and growth as well as to predict the significance of innovative processes and activities (Rose et al., 2009).

Scientific research shows that new product success evaluation is based on factors such as profitability and sales indicators, market share, appreciation and satisfaction of consumers and indicators reflecting product lifecycle. Commercial benefits from services improvement include elements such as profitability increase of other products, attraction of new customers, the increase of existing customers' loyalty, opportunity for new service products to access new markets and improved image of the company (Čiburienė, Povilaitis, 2008).

Innovation evaluation by using various methods have been researched and portrayed in previous researches (Prajogo, 2006). Subramanian and Nilakanta (1996) pursuing to assess innovation influence to service sector developed an evaluation model based on four characteristics of innovation: the number of innovation at the company, innovation implementation speed, innovativeness level and the level of innovation aggressiveness in the competition with peers (Prajogo, 2006). In the assessment of the specific company's entrepreneurship results, Curkovic et al. (2000) chose to evaluate company's performance indicators such as sales growth, market share and profitability (Prajogo, 2006).

When determining service innovation assessment criteria, innovation process characteristics and relationships between them have to be established and the results need to be presented. Innovation evaluation process is complex because there are many different evaluation measures and it is difficult to define which of them is the most appropriate.

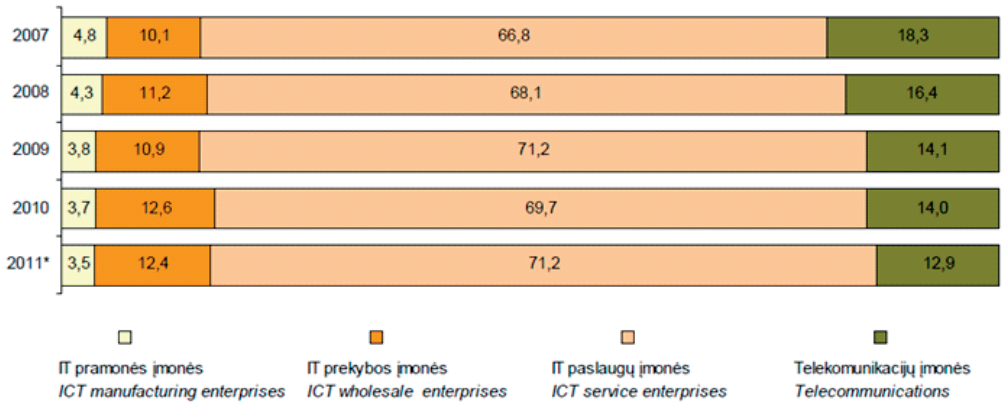
3. Empirical Research Methodology and Consistency

Research methodology facilitates the necessary data acquisition, systematization and evaluation. IT services are an integral part of contemporary life, especially for business and can be introduced and implemented in all fields. According to The Global Information Technology Report (2012), the world has become interconnected with various networks and relations over the last decade. The increasing usage and possibilities of the IT and

communications differently define the relationships between people, consumers and businesses as it eliminates any geographical boundaries and enables to communicate freely.

It is common to hear, read or see the innovations developed by the IT sector companies (Internet, e-banking, enterprise systems management, enterprise resource planning, customer relationship management, etc.) in order to meet the needs of individuals, business and society and to improve efficiency. However, the development of innovation and its impact on the results of the IT companies is not well known and has not been researched despite the fact that the IT service sector plays the innovation disseminator role in other sectors by appliance of IT products. This leads to the relevant objective to evaluate the innovation development in the IT sector companies and to find out what types of innovation are being implemented in addition to technological innovation. Therefore, the research of innovations in the IT sector companies contributes to the novelty of this research area and is relevant and significant in both theory and practice.

The IT sector has been chosen as the empirical research object because it occupies the largest part of information and communications technology sector (ICT) (see Figure 1), according to the number of companies and the number of employees.



Source: Information Technologies in Lithuania, 2012.

Figure 1. Enterprises distribution in the ICT sector, percentage

Many scientific studies (Damanpour et al., 2009; Hong et al., 2012; Ganotakis and Love, 2012) have been carried out by using surveys of competent staff who knows both the company's past and the present.

The research is based on the raw data which has been collected to solve the problem raised at the beginning of the article and implement the formulated objectives. The qualitative research has been selected since the aim of the research is related to the interpretation of the object and determination of connections. The most popular qualitative research is the survey method, which in a short time and at a low cost allows to interview representative quantity of the targeted population. Interview is one of the most important and the most effective qualitative research method to collect the data.

The advantage of structured qualitative interviews results in a more rational rather than emotional responses and the researcher can easier control the conditions and the process of the survey and eventually compare the results (Tidikis, 2003).

The structured personal (face-to-face) interview was selected according to the lack of time of respondents and the peculiar nature of information technology business. Respondents were chosen by the expert selection method. The expert interview is a conversation with a qualified professional of the research field who can give reliable and extensive information about the research object and problem (Tidikis, 2003). The expert selection method was chosen because it enabled to select and interview the executives of the IT companies who are familiar with the conditions at the company well and are able to evaluate the peculiarities of innovative activities at the company.

For this study, the expert interview is an optimal method to implement the research goals and objectives relating the features of innovation development in the IT sector companies considering the following reasons: first of all, such information is not publicly available or inadequate to assessment of the whole sector; secondly, experts are professionals in their field, therefore the information given by the experts is more reliable than a lacking external information.

The empirical research *object* is the innovation in the IT service sector.

The empirical research *purpose* is to analyze and evaluate innovation development in the IT service companies.

The objectives of the empirical research are to figure out the most important factors that influence the development of the innovation in the IT sector, identify obstacles for the development of innovative IT sector companies and to reveal which type of innovation dominates in the ICT sector and which type is lacking.

Four research hypotheses have been raised, which include:

H1: High cost of innovation is an obstacle to the development of the innovation in the IT service sector companies;

H2: IT sector service companies implement the least administrative innovations;

H3: Innovation helps to increase value added of the companies in the IT sector;

H4: Company's involvement in the networking and usage of social technologies gives a positive effect on company's performance.

The analysis was conducted by the research process scheme: first, the information needed was defined; second, the search of information sources was conducted and the method of data collection was chosen. After that, data collection was accomplished and finally data processing and analysis were performed.

The structured interviews were conducted in Vilnius during October and November in 2012 by interviewing twelve executives working in the Lithuanian IT service sector companies. Companies' executives had to meet criterion set for the interview: higher education not lower than Master's degree; the work experience as an executive at the company not less than two years; the ability to review the innovative activities in the company. After the identification of the necessary information, competent experts were selected who were determined to be able objectively and critically evaluate provided questions and give fair answers.

Interviews were formed of pre-formulated open, closed, and dichotomous questions. During the interview, an opportunity to expand answers was feasible that provided more detailed information related to the formulated questions. The study was supported by **undenominational** expert quantity which consists of a small number of elements and where the survey is attended by experienced and qualified experts. Even though **undenominational** expert quantity is simple, it provides reliable results.

The empirical research questionnaire consisted of subjects about the company, the company's performance results, factors affecting innovation, obstacles to innovate, the innovation types and frequency, the added value of the company, company's collaboration with others and innovation success measurement. Questions were presented in a logical and sequential order, from general questions about the respondent and the company to the objective questions about the characteristics of innovation at the company.

According to Rudzkienė (2005), qualitative expert interview reliability begins to remain stable when the number of experts reaches 12 or more respondents. The reliability of the interview is over 90% then. Therefore, to accomplish the research, 12 respondents were interviewed from different IT service companies located in Vilnius.

Kendall's concordance coefficient estimates the compatibility of expert opinions (when the number of experts is bigger than 2). When calculating the concordance coefficient, expert assessments are ranked. Afterwards, the hypotheses are formulated: H0: expert assessments are inconsistent (i.e. concordance coefficient equals zero); HA: expert assessments are comparable (i.e. the concordance coefficient is not zero) (Rudzkienė, 2005).

4. Empirical Research Results on Innovation Development Evaluation in Lithuanian IT Service Companies

This part of the paper represents the structured results of the interview with experts who work in the IT sector services and reveals the results of tested hypotheses.

The expert evaluation is based on a presumption of expert opinion compatibility which was determined by applying Kendall's concordance coeficient. The experts were asked to rank what type of innovations were most likely implemented and developed in the companies where they work in the order from 1 to 5. They were given orientational answers to choose from: service innovations, technological innovations, process innovations and administrative innovations. The results of the Kendall's concordance coeficient (W=0.642) proved that the hypothesis which stated that expert assessments are inconsistent could be eliminated. Therefore, it can be claimed that the expert opinion on the given question is sufficiently similar and comparable, experts' answers are reliable and the evaluation compatibility is confirmed.

Obstacles of innovation development. The experts were asked to specify what difficulties companies overcome during the process of innovation development. The results are indicated in the Table 2 below.

Table 2. Obstacles of innovation development in the IT sector service companies

Big obstacle	***Medium obstacle***	***Small obstacle***	***Not an obstacle***
• Economic environment • The lack of qualified personnel • Insolvent or late to pay clients	• Alternation of taxation law • Control of business conditions • Difficulties to acquire a loan/credit • Lengthy loan procedures at the bank • Expensive cost of innovation • Lack of financial resources to innovate	• Juridical environment • Bureaucratic barriers • Scarcity of business managerial competencies • Dominance of well known companies	• Political environment

The first hypothesis "H1: High cost of innovation is an obstacle for the development the of innovation in the IT service sector companies" was confirmed.

Innovation types in the IT service sector. It was essential to make a research on what type of innovations generally are implemented and developed in the IT service companies, so experts were asked to evaluate what type of innovations have been implemented most and least during the last three years. Choices, provided at the survey, were divided into four groups: service innovations, technological innovations, process innovations and administrative innovations. Table 3 represents the frequency of the innovation type being implemented in the researched IT service companies in Lithuania. The results showed that during the last three years companies have developed or implemented technological and service innovations the most and administrative innovations the least. The second hypothesis "H2: IT sector service companies implement the least administrative innovations" was confirmed.

Table 3. Innovation type frequency in the IT service sector in Lithuania

	Never implemented	**Rarely implemented**	**Fairly implemented**	**Often implemented**	**Mostly implemented**
Service innovations	0%	0%	0%	75%	25%
Technological innovations	0%	0%	0%	66,67%	33,33%
Process innovations	8,33%	0%	25%	50%	16,67%
Administrative innovations	16,67%	75%	0%	8,33%	0%

The value added. The third hypothesis "H3: Innovation helps to increase the value added of the companies in the IT sector" was tested and accepted after the results of the experts interview showed that innovations increase the value added of the companies (refer to Table 4).

Table 4. Does innovation help to increase the value added of the company?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Does not increase value added	1	8.3	8.3	8.3
	Increases value added	8	66.7	66.7	75.0
	Highly increases value added	3	25.0	25.0	100.0
	Total	12	100.0	100.0	

Participation in networking and usage of social technologies. The last hypothesis "H4: Company's involvement in the networking and usage of social technologies gives a positive effect on company's performance" has been tested when experts were asked to evaluate how networking, relations with other companies and usage of social technologies influence their company's performance. The experts revealed that the company's relations and collaboration with partners and other companies have increased their innovation results evaluating by the financial parameters and contributed to the wider range of innovations. The participation in networking and social media sites benefited in making new contacts and finding new business partners, fostered social interactions with other companies and exchange of knowledge. In addition, it contributed to the spread of innovative ideas and, moreover, some companies have started using improved and modern technologies. The participation in networking helped the companies to enter new, not yet fully occupied markets. Some companies have used networking to diversify the company's performance risk. The direct cooperation with higher education institutions and R&D institutes contributed to extend the knowledge and find potential or future employees. Furthermore, the companies have made business agreements to carry out projects together. After the assessment of the experts' answers, the fourth hypothesis has been accepted.

The experts have been asked to identify what criterion of innovation success evaluation they are using. Half of the experts have stated that to measure the innovation success they generally use financial parameters (profit or turnover, return on investment rate). One quarter of the experts measured innovation success by technical criterion, i.e. the functionality and proper performance of processes. The rest part of the respondents stated for innovation success measurement using strategic criterion (competitive ability against rivals) and the innovation adjustment to the market criterion (see Table 5).

Table 5. Measurement of innovation success

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Financial criterion	6	50.0	50.0	50.0
	Market criterion	1	8.3	8.3	58.3
	Technical criterion	3	25.0	25.0	83.3
	Strategic criterion	2	16.7	16.7	100.0
	Total	12	100.0	100.0	

5. Conclusions

The recent development of modern economies dominated by services has increased the importance of the service sector innovation. The need to evaluate the innovation activities in the service sector have emerged because innovation is an interconnected process and cannot be defined using one or few indicators. The exploration of the service innovation measurement showed that its evolution can be divided into four stages of criteria: input indicators, output indicators, innovation indicators and process indicators. It has been stated that the assessment of innovation activities are still based on industrial economics paradigm and innovation input and output indicators. Further researches have shown that the measurement of company's innovative activities is based on the framework of the intangible capital which is assumed to result into the innovative process. The intangible capital is divided into human capital, intellectual property and organizational capital and they are expected to derive into innovations in the future.

The research based on the IT service expert's interview has been accomplished in order to evaluate whether and how the IT service sector innovate. The assessment of 12 qualified IT service sector experts interview has shown that the IT service sector is an active participant in the implementation and development of innovations and oriented not only to the technological innovation. Experts have pointed out the significance of the innovation development in order to increase company's performance results and to maintain competitiveness in the market concerning fast global changes and uncertain economic conditions. The IT service companies have been developing and implementing not only common technological innovations, but also service innovations, process innovations and administrative innovations. During the last three years companies have developed or implemented technological and service innovations the most and administrative innovations the least. The biggest obstacles hindering the development of the innovation were economic environment, the lack of skilled workforce and insolvent clients. IT service companies' relations and collaboration with partners promoted financial results and resulted in the employment of wider range of innovations. The participation in networking and social media sites benefited in making new business contacts and partners, fostered social interactions and exchange of knowledge as well as contributed to the spread of innovative ideas. According to evaluation of the expert opinions, all four tested hypotheses have been confirmed.

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INOVACIJŲ VERTINIMO PASLAUGŲ SEKTORIUJE METODOLOGINIAI IR EMPIRINIAI ASPEKTAI

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Santrauka. *Inovacijos yra dažnai tyrinėjama tema ir šiuolaikinėje aplinkoje suprantamos kaip pagrindinis ekonominio augimo, klestėjimo ir užimtumo veiksnys. Išsivysčiusiose ekonomikose didžiąją ekonominio užimtumo dalį sudaro paslaugos, tačiau mažai žinoma, kokiais savitumais pasižymi paslaugų inovacijos ir kuo jos skiriasi nuo gamybos sektoriaus inovacijų. Nepaisant to, kad paslaugų sektorius užima pagrindinę efektyvios inovacijų sistemos dalį, inovacijų paslaugų sektoriuje tema yra mažai ištyrinėta. Dėl šių priežasčių kyla būtinybė išsamiai išnagrinėti ir įvertinti inovacijų paslaugų sektoriuje veiklos ypatybes, kadangi inovacijų procesas yra priklausomas nuo aplinkinių veiksnių bei negali būti įvertinamas tik vienu ar keliais rodikliais. Tuo tarpu informacinių technologijų sektorius neatsiejamas nuo tobulėjančios šiandieninio pasaulio veiklos, o šio sektoriaus sukuriami produktai diegiami visose ūkio šakose. Nepaisant informacinių technologijų svarbos ekonominiu ir inovacijų sklaidos kituose sektoriuose atžvilgiais, inovacijų įtaka informacinių technologijų sektoriaus veikloje nėra plačiai tyrinėjama tema. Šiuolaikinės organizacijos įgyja pranašumą savo veikloje naudodamos socialines technologijas kaip komunikacijos ir žinių mainų ir sklaidos priemonę. Socialinės medijos yra laikomos potencialiu organizacinių žinių, bendradarbiavimo ir tarpusavio mainų priemone. Taip pat socialinių medijų ir technologijų naudojimas leidžia organizacijoms atrasti novatoriškų idėjų, jas pritaikyti savo veikloje bei didinti organizacinių ir socialinių tinklų skaičių ir stiprinti jau turimus ryšius.*

Straipsnyje aptariama inovacijų paslaugų sektoriuje svarba, analizuojama inovacijų paslaugų sektoriuje vertinimo kriterijų įvairovė, pristatoma tyrimo metodologija bei atskleidžiami inovacijų vertinimo informacinių technologijų sektoriuje Lietuvoje empirinio tyrimo rezultatai.

Reikšminiai žodžiai: *inovacijos, paslaugų sektorius, informacinės technologijos, socialinės technologijos, inovacijų vystymas.*