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Korpysa Jaroslaw

University of Szczecin, Jaroslaw.korpysa@usz.edu.pl

Lopatka Agnieszka

University of Szczecin, jkorpysa12@gmail.com

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# The role of information systems in creating technological entrepreneurship of Polish high-tech companies

*Emergent Research Forum (ERF) Papers*

**Jaroslav Korpysa**  
University of Szczecin  
jaroslaw.korpysa@usz.edu.pl

**Agnieszka Lopatka**  
University of Szczecin  
agnieszka.lopatka@usz.edu.pl

## Abstract

The conceptualization of the contemporary paradigm of entrepreneurship is based on the functional and process approach to operations that are focused on the companies' use of existing market opportunities. Thus, entrepreneurship is a process constituted of entrepreneurial activities of the innovator and other members of the organization. This process is characterized primarily by creative, cooperative-oriented activities, innovativeness, willingness to take risks as well as the creation of value and benefits for the information society. In this regard, technological entrepreneurship, understood as the process of creating new high-tech products and the application of modern technologies by companies, is becoming increasingly important. The literature emphasizes that technological entrepreneurship could not have developed in modern organizations without a well-functioning information system, which is supported by an IT system. Thus, the information system becomes an important determinant of the creation and functioning of technological solutions to be used within an organization that are based on technological entrepreneurship.

In view of the above, it seems reasonable to diagnose the impact of the information system on the formation of technological entrepreneurship in Polish high-tech companies. The theoretical contribution of the article is to systematize knowledge of the role of the information system on technological entrepreneurship. The practical part presents some determinants which influence the shaping of technological entrepreneurship in business.

## Keywords

information systems, technological entrepreneurship, high-tech companies

## Introduction

Technological entrepreneurship is reflected in the processes of exploring and exploiting modern technologies, through which the organization creates a system of value for stakeholders. In such a view, technological entrepreneurship is identified with the organization's development strategy and with the information systems existing in it. Thanks to these systems, a company can perceive and take advantage of technological opportunities. The measure of the effective use of emerging opportunities is the ability to transform new technological solutions into a stream of economic benefits. This transformation is not possible without an efficient information system that ensures the coordination of all activities carried out to create innovative high-tech solutions (Zachariadis et al. 2019). In this regard, the essence and role of information cannot be overestimated as, on the one hand, it is the basis of each decision-making process, and on the other hand is the essential for the construction and functioning of the company information system (Aydiner et al. 2019). Thus, in the process of forming technological entrepreneurship and seizing technological opportunities, the information system should be subordinated to the decision-making process, which is focused in the IT system (Abubakar et al. 2019). This thesis acquires special significance in high-tech businesses that deal with creating innovative technological solutions.

Taking into account the above relationships, it is appropriate to try to determine the role of the information system in creating technological entrepreneurship of high-tech companies. In order to show this relationship the paper will present theoretical and empirical considerations on the problem defined above.

## Literature review

Being a paradigm of agile entrepreneurship, technological entrepreneurship has no single universal definition. In the literature, technological entrepreneurship is often seen as the process of using innovative solutions by the entrepreneur to offer technological benefits to the customer (Parameswar et al. 2019). There is also a group of researchers who define technological entrepreneurship as a style of business leadership that embraces recognizing key commercial opportunities, the application of advanced technologies, and the accumulation of technological resources (Wright 2014). In addition, technological entrepreneurship is analyzed through the prism of knowledge and technology transfer between scientific centers, capital market institutions, business environment and companies (Xie et al. 2018). Other authors propose that technological entrepreneurship should be treated as an element of innovative entrepreneurship, thanks to which creative solutions from the area of high-tech are generated (Chen 2018). Another approach, differing from the one presented so far, describes technological entrepreneurship as the R&D activity by a company (Chukhray et al. 2019). Technological entrepreneurship is also seen as the process of creating new products and services in the high-tech sector, the application of state-of-art technologies, flexible response to the evolving technological market, as well as the introduction of technological innovation into the company operation (Martin-Rojas et al. 2019). Some authors describe a technological entrepreneurship as a creation of economic activities embodied by a digital technologies (von Briel et al. 2021). T. Bailetti described some more important elements of technological entrepreneurship:

1. management company bearing of a technology solutions,
2. creating of a new technology venture by entrepreneurs,
3. using a technology opportunities (internal and external) by entrepreneurs (Bailetti 2012)

Another authors technology entrepreneurship analyzed as a process of creating new technologies upon a human agency (Garud et al. 2003). These definition is refers to the social construction of technology (SCOT) according a development of technologies development of technologies is outcome of negotiations between several social groups such as inventors, engineers, managers and users (Bijker 1987)

Thus, in further considerations technological entrepreneurship will be identified with a company that applies in its business operation new high-tech solutions being developed by its own R&D or the ones developed by other entities.

There is no doubt that when analyzing technological entrepreneurship at the individual or institutional level, it is important to use the basic resource of entrepreneurship, i.e. information. In literature there are many definitions of the information system. Some researchers analyze the system as a set of information streams related to the sphere of management, production and communication processes in the organization (Abrahams et al. 2013). Others define the system as a multilevel structure of the decision-making chain that allows, by means of appropriate procedures and models, the user to transform the input information into the desired output information (Zahng et al. 2018). It can be clearly seen that the core of the information system is the processes of circulating, processing, collecting, presenting and storing information inside the organization. Due to these processes companies can recognize and take advantage of technological opportunities. At the same time, they support the development of technological entrepreneurship in the organization (Wibowo et al. 2018). The exponent of the importance of information systems in the formation of technological entrepreneurship is the support for technological processes occurring both in the company itself and in its relations with its environment. In this regard, the support to information processes are information technological solutions that relate to regulatory processes and enable the remote collection and processing of information. These solutions are usually employed in IT systems (Goher et al. 2021). These systems can be defined as a system for organizing, defining and standardizing business processes necessary for effective planning and control of an organization. Through them, a company's tacit and explicit knowledge and experience can be used to seek and exploit technological opportunities. In addition, information systems, through the use of mobile devices, reduce the barriers hindering transmitting, processing and availability of data in the company,

which is extremely important from the point of view of creating technological solutions. It is worth noting that IT systems, in particular the ERP system, are becoming one of the key tools for modern business management, as it integrates information, synchronizes processes and enhances the competence and creativity of employees (Imamuddin, A. 2021).

To recapitulate, it should be stated that the importance of IT systems to the formation of technological entrepreneurship is fundamental. Of particular importance are technological solutions that enable data mining and contribute to the managers' potential creativity in the field of technology and innovation. In addition, these systems provide datasets for modeling future technological solutions, as well as lay the foundation for an organizational culture oriented toward seeking new technological solutions. Not without significance is also the fact that information systems provide opportunities to collect a substantial amount of data from different sources, and also help to code knowledge, create knowledge maps, thesauri and libraries in the process of developing a new technology.

Taking into account the above characteristics, it seems justifiable to present the preliminary results of the research focused on showing the impact of the information system on the development of technological entrepreneurship in Polish high-tech companies.

## Methodology and Results

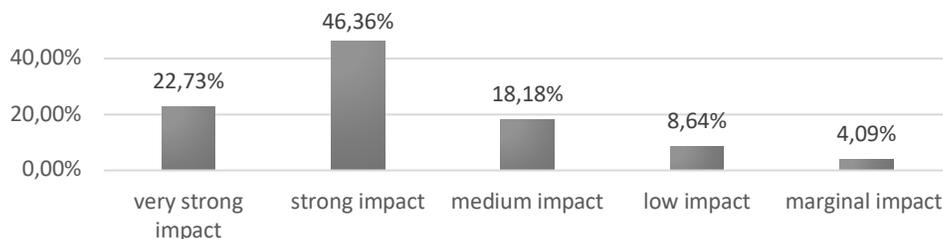
The 2021 pilot study covered 22 high-tech companies. The sample was selected according to specific criteria, i.e., a company was considered to be high-tech when it:

- used up-to-date production and service technology,
- obtained a high level of innovation,
- was characterized by rapid diffusion of technological innovations,
- applied R&D achievements in its operations,
- used state-of-the-art ICT technology.

Having an ERP system was also a prerequisite for a company to participate in the study.

At the initial stage of the research procedure, a questionnaire was sent out to 100 enterprises in order to establish their affiliation to the high-tech industry and to confirm they had implemented an ERP system. Basing on that information, it was found that 40 companies met the boundary conditions of the study, i.e. belonged to the high-tech industry and had implemented an ERP system. The survey was reduced to those companies and 22 questionnaires were returned. At this point it should be stated that the surveyed companies represented only the ICT industry. All of them had research and development departments that dealt with product innovation.

In order to show the relationship between the ERP information system and technological entrepreneurship, the respondents were asked to define the degree of impact that the ERP system had on the creation of new technologies in the company (graph 1)



**Graph 1. Impact of ERP system on the process of shaping new technological solutions**

According to the data obtained, more than two-thirds of the surveyed companies stated that the ERP system had a strong impact on the process of creating new technological solutions. One in six indicated a moderate influence and one in five diagnosed the influence as low or marginal. If the majority of companies indicated a strong relationship between the surveyed variables, it was reasonable at a further stage to diagnose the most important features of the ERP system used in the process of creating new

technologies. In this regard, a Likert scale was used, where 1 represented the lowest and 5 meant the strongest influence. In the course of analysis, it was found that among the most important features of the ERP system are validity (4.82), integrity (4.77), extensiveness (3.87), completeness (3.53), timeliness (3.21) and accuracy (3.02). In addition, the research process diagnosed the ERP system measures that had the greatest impact on the creation of technological entrepreneurship. In this regard, three basic categories of the system were identified, i.e. ERP system quality, ERP system information quality and ERP system service quality. In each category, the selected variables conditioning the particular areas of ERP system were verified. In the case of system quality it was availability and effectiveness, as regards information quality - accuracy and relevance have been examined while in the case of service quality it was reliability and responsiveness. Detailed data are presented in the table below

	Coeff.	Standard error	T Stat	P Value	r(Pearson)
system quality					
availability	0.0309	0.0003	1.3612	0.0002	0.5243
effectiveness	0.0052	0.0632	0.3082	0.0011	0.8013
information quality					
accuracy	0.3451	0.0517	0.0039	0.0031	0.8161
relevance	0.5392	0.0049	8.9291	0.0371	0.9093
quality of service					
reliability	0.0031	0.0049	5.3881	0.0001	0.3252
responsiveness	0.0332	0.0049	4.2633	0.0422	0.4016

**Table 1. Stochastic relationships between ERP components and technological entrepreneurship**

On the basis of the obtained data it should be stated that all the variables i.e. system quality, information quality and service quality, are the explanatory variables depicting the impact of the ERP system on the formation of technological entrepreneurship of high-tech companies ( $p < 0.05$ ). It is worth noting that the process of recognizing and exploiting a technological opportunity is most strongly influenced by the accuracy of information, relevance of information and system effectiveness. Accessibility to the system is of moderate importance. Technological entrepreneurship is least influenced by the reliability and responsiveness of the system.

## Conclusion

The presented results of empirical research helped verifying the thesis that the information system of high-tech companies conditions the formation of technological entrepreneurship in organizations. In the course of the research, it was established that the validity, integrity and extensiveness of the ERP system significantly determines technological entrepreneurship. Furthermore, it was found that all three measures of the ERP system i.e. system quality, information quality and service quality influence the way technological opportunities are seized by companies. The results confirm that modern processes of creating innovative solutions are not possible without implementing new technology which is and will be based on information systems. Thus, companies should focus on building an information system that not only organizes the company's vast, sometimes useless data resources, but also enhances workers' creativity. Moreover, there is no doubt that information systems provide substantial support for technological entrepreneurship, as they influence the way business is run. Under this influence, organizational changes take place, i.e., businesses transform into more technological, innovative, dynamic, flexible and development-oriented ones. These systems are constantly improving and developing, which boosts the development of new forms of technological entrepreneurship.

For future research authors plan to conduct qualitative and quantitative researches among Polish high-tech companies and test if and how a system ERP system influence on technological entrepreneurship. The results should be interesting especially after a pandemic crisis.

It is worth emphasizing that the study presented above has certain limitations, as it is based on a small sample of companies operating in Poland, thus making it impossible to generalize the survey results onto the entire population of business entities. An additional shortcoming is the fact that conclusions are based on subjective declarations of company owners. Nevertheless, the presented results may become a valuable contribution to future broader research, including e.g. strategies and business models of high-

tech companies. Moreover, this study may also be a good starting point for research into the use of information systems in creating and exploiting technological opportunities.

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