

The approach to detection and application of the company's technological competences to form a business-model

A A Chursin¹, A I Kashirin^{2,3}, V V Strenalyuk^{2,3}, A S Semenov^{2,4*},
A A Ostrovskaya¹ and T V Kokuytseva¹

¹ Institute of Space Technologies, People's Friendship University of Russia (RUDN University), Moscow, 17198, Russia

² Department of Innovative Management and External Economic Activity in Industry, the Institute of Space Technologies, People's Friendship University of Russia (RUDN University), Moscow, 17198, Russia

³ «Rostech» State Corporation, Moscow, 119048, Russia

⁴ Moscow Technological Institute, Moscow, 119334, Russia

E-mail: semenov.venture@mail.ru

Abstract The most important condition for increasing the competitiveness of business is the formation, retention, and development of key competences of the organization, which reflect the competitive advantage. This problem is especially urgent for high-tech industries, which are the most sensitive to all kinds of changes and innovations. The ways of applying the company's technological competences to form a business model, the proper form of competence description and analysis on the example of the company "Teplolux" are considered. The following from is recommended to use in IT solutions for competence databases.

1. Foreword.

The issue of applying the company's technological competences to form a business model is quite popular. On the one hand, the idea of competences is so widespread that there is no need to be an expert in any narrow field in order to become familiar with it, and many researchers offer their own approaches, classifications, methodologies, models. In the domestic practice, psychologists, teachers, sociologists, lawyers, economists and representatives of the rarest professions are engaged in the study of competences. Over the last two decades the issue of competences has been filled with a huge number of diverse studies, which, despite their academic weight and statistical justification, did not clarify the main issues from which the theory of competences began in the 1970s. Also, the way of the best competence management is still in discussions.

There is no definite answers to issue of the nature of competences, their structure and dynamics, interrelationships and interdependencies. The issue of diagnostics of competences remains open, especially in cases when it is impossible to assess, basing on the previous experience, what will be necessary in the near future. The more knowledge about competences we have, the more questions, concerning the realities, standing behind this notion arise. Therefore, the danger of any study of the problem of competence lies in the fact that it can answer some narrow, private question and leave aside the main difficulties of this theme. The authors' approach to competences is described in [1-6].



The study of the field of managerial competencies involves a special difficulty. This field excites interest for several reasons, which contributed to its popularity. Most experts believe that managerial competencies are the same in different areas of management, and differences are determined rather by position than the organization's activities. Obviously, both technological and managerial competences must be considered in business-model building tools, described in [7–9].

Managing the actions of employees is recommended for replacement with the management of characterizations of competences, and the introduction of such concepts as "strategy", "vision", "mission" gives a signal that changes in activities evaluation criteria are required. In this regard, the definition of "competences" and "competency" as special constructs which make possible to discover the content characteristics of this new quality of professional activity [10-11]. The article will deal with the application of the company's technological competencies to form a business model.

2. Introduction.

JSC "Special Design Bureau of the Cable Industry" (SDBCA) was founded in 1956. The company has key technological and marketing competences to develop and manufacture a wide range of cable products:

In 1970 - 80s the SDBCA participated in all popular aviation, space and military projects - such as 'Mars', 'Venera', 'Lunokhod', 'Salyut', 'Buran-Energia', 'Vega', ABM and SMF systems. The first optical communication line in the country, launched in Zelenograd in 1977, was made on the optical cable SDBCA. An important government order was executed for the Olympic Games 1980 in Moscow. In 1991, the socio-political and economic situation in the country has dramatically changed. The team of key employees engaged in cable electric heating starts to realize this business idea within the framework of the newly organized enterprise - LLC "Special Systems and Technologies", founded in 1991. Then the industrial production of electric underfloor heating under the brand name "Teplolyux" started. Today the group of companies "Special Systems and Technologies" (GC "SST") is the largest Russian developer and supplier of integrated solutions in the field of industrial electrical heating, including in the sphere of competence of the parent company. The total length of pipelines, which are heated by their systems, exceeds 20 thousand km. The length of super long systems of electrical heating based on the skin effect is more than 500 km. In the national rating of the Russian fast-growing technological companies (national champions) "Tekhuspekh-2016", the group of companies "Special Systems and Technologies" took the 26th place among the large companies (the revenue is over 2 billion rubles). Revenue in 2015 was 3 964 million rubles, the growth rate of the indicator for 2010-2015 is 17%, the number of employees is 1144 people.

3. Stages of formation and development of the company's business

Let's consider the stages of the company's development from the point of view of business organization in order to determine the reasons for the success of the company and evaluate the opportunity to apply positive experience to build successful businesses. By the example we show our approach to competence description in the proposed format.

3.1. Installation of an electric heating cable

At the first stage the specialists of the new company offered the installation of an electric heating cable (available in the warehouse).

This business model could be implemented by the company using the following team competences:

- general marketing competences for the organization of sales (distribution), including advertising, individual work to convince customers and enter into contracts;
- general organizational competences to ensure the work of the company, including the implementation of contracts - procurement, logistics, electrical wiring, interaction with builders, delivery of work;
- general and distinctive technological competences that ensure the core (main) activity of the company.

The general technological competence of the company is the production of electrical installation works. The team is able to perform most typical orders on electrical wiring.

The distinctive technological competence of the team in the market determines its market positioning, allocation among other electrical wiring organizations and the special sphere of activity:

- installation of an electric heating cable,

or, in a more general way:

- installation of electric "underfloor heating".

This definition of competence can be classified as a product (associated with the company's market product), and has the properties of marketing and technological competence. The properties of "marketing" show what task the customer is capable of and proposes to solve (with what tasks should be addressed - heating). The properties of "technology" is in what way the company solves the customer's task (electrical heating).

The "product" definition reflects the direction of the company's activities, but does not say anything about its competitive advantages.

Let us try to define the distinctive technological competences of the company (TC), which are components of its product competence, and provide its key activities and competitiveness. We propose the following format:

Competence No. 1:

Ability to do	Object	Object function	Supersystem	Providing the result
calculation	of cable type and size (length)	which is the resistant heating element	«underfloor heating» depending on the purpose and size of the premises	providing the necessary power of the main or additional (comfort) heating of the premises

Let us classify this technological competence.

Classification of competence No. 1:

Competence type: product, **process**

Creation stage: design, **execution or production**

Competitiveness assurance: unique, **exceptional**, standard

Competence No. 2:

Ability to do	Object	Object function	Supersystem	Providing the result
equipment configuration (selection according to characteristics and agreement)	thermostat, temperature sensor, mounting tape, coupling, mounting wire	which are the constituent elements	of the "underfloor heating"	ensuring operability

Classification of competence No. 2:

Competence type: product, **process**

Creation stage: design, **execution or production**

Competitiveness assurance: unique, **exceptional**, standard

It is possible to describe the competence for "cable muffing" and "commissioning of the system" the same way.

Possession of a complex of that data distinguishes it from a number of electrical wiring organizations and allows conducting an electrical installation business that has a greater marginality than other, simpler types of electrical installation work.

However, all the described competences are not unique (only distinctive) and therefore cannot provide the company with a stable and unconditional competitive advantage. Increased profitability of the business of installing "underfloor heating" motivates competitors to master the necessary solution. Competitive advantage of the company is determined by its preferential access to the heating cable.

The company continues to use its cable solutions for profit for some time, optimizes its expenses a little bit (for example, it starts to equip the system with its own temperature controllers and sensors, which require the corresponding solutions). Then, in an effort to expand the business in the chosen niche, goes on to the second stage of business development.

Besides "Underfloor Heating" the company offers ready-made sets for a number of heating systems:

- open areas,
- water and drain pipes,
- roof (to ensure anti-icing and snow melting).

In the market of heating systems for pipelines, the company "SST" has unique technological competences which now is assigned as core.

In the field of industrial solutions, a significant development was the development and commencement of the production of electric heating systems for super long pipes based on the SKIN effect. Serious scientific work was carried out both inside the company and in cooperation with leading research institutes. The emergence of SKIN-systems in Russia has seriously changed the vector of development of our industry, opened new prospects. "SST" is today the only Russian manufacturer of such systems and has all the necessary production and intellectual resources that allow solving the problem of electric heating with the use of SKIN-systems "on a turn-key basis". Besides "SST", the system for the electrical heating of super long pipes, based on the SKIN effect, is produced by four companies in the world, in Japan and the USA.

SKIN EFFECT is an induction-resistive system designed to maintain product temperature, protect against freezing and start-up heating of long-distance pipelines. SKIN EFFECT is the only system that allows you to heat the shoulder of the pipeline up to 30 km long with power supply from one end, without the accompanying network and the most effective and economically viable solution for heating unlimited length of main pipelines with the accompanying supply network.

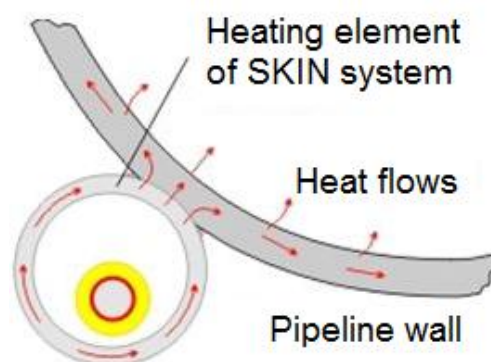


Figure 1. The principle of the SKIN-EFFECT

The SKIN SYSTEM uses special heating elements, applying the phenomenon of skin effect and the proximity effect in conductors made of ferromagnetic materials at an alternating current of the

industrial frequency. The heating element is a pipe made of low-carbon steel with an external diameter of 20-60 mm and a wall thickness of at least 2 mm, inside of which there is a conductor made of a non-magnetic material (copper or aluminum) of 25-50 sq. mm section. The conductor at the end of the heating arm is securely connected to the steel pipe, and an alternating voltage is applied between the pipe and the conductor at the beginning of the arm, the value of which is calculated on the basis of the necessary heat release and the length of the heating section.

The alternating current flows through the entire section of the inner conductor, since there is no noticeable surface effect at an industrial frequency in a nonmagnetic material with good conductivity. In a ferromagnetic outer conductor (steel pipe), the skin effect is clearly pronounced and all the current flows through the inner layer of the tube with a thickness of about 1 mm, and the potential of the outer surface of the pipe remains practically zero. Due to the small thickness of the skin layer, the main heat release (up to 80%) occurs in the steel pipe.

The induction-resistive heating system (skin-system) based on the skin effect is invented in Japan (Ando Masao's patent - Ando Masao. Apparatus for maintaining liquid being transported in a pipe line at elevated temperature. Patent USA No. 3293407, published on 20.12.1966, claimed on 07.11.1963.).

This system is applied for heating long and very long pipelines (up to 6-8 km, and today - up to 15 km). By 1971, in Japan, the length of pipelines heated with the use of such devices was 120 km at the power of 15 MW. Skin-systems of electrical heating of pipelines are characterized by such positive properties as high reliability, safety, absence of the accompanying power supply network. We should note the demand for skin systems in our country, which is determined by large distances and climatic conditions. Since 2002, the company "SST" has installed and successfully used skin heating systems in dozens of facilities, both in Russia and abroad (South Korea, the United Arab Emirates). The length of super long heating systems based on the skin effect, supplied by the firm "SST" is more than 1000 kilometers.

In order to protect business, the company conducts patent work. In particular, the firm "SST" has a patent: Strupinskiy Mikhail Leonidovich. HEATED CABLE BASED ON SKIN EFFECT, HEATING DEVICE AND HEATING METHOD. Patent RU2589553C1, published on 10.07.2016, claimed on 12.03.2015.

It is interesting to note that, despite the great time spent by world manufacturers on research and development and the considerable age of the first patents, only 4 companies in the world are capable of producing such heating systems. So, we see that right and proper competence management lead to the steady development of a set of unique technological competences and keep it across time.

4. The conclusion.

The key role in building an effective innovative business is played by the distinctive "key resources" of the business model or unique competences that the "key activity" of the enterprise relies on. The competence management is the useful tool to develop the competitiveness advantages. The brief format of unique technological competence description and classification as we presented here can be used.

Acknowledgments

The article is created within the grant works financed by Russian Foundation for Humanities (order № 16-02-00711).

References

- [1] Kashirin A, Semenov A, Ostrovskaya A., Kokuytseva T. 2016 *Solutions Journal of Internet Banking and Commerce* JIBC-AD 01.
- [2] Kashirin A., Semenov A, Strenalyuk V, Ostrovskaya A, Kokuytseva T 2016 *International Journal of Research* **8** 50
- [3] Kashirin A, Semenov A, Ostrovskaya A, Kokuytseva T, Strenaluk V 2016 *QUALITY – access to success* **17**154

- [4] Kashirin A, Semenov A, Strenalyuk V, Ostrovskaya A, Kokuytseva T 2016 *Vestnik of the Academy of Military Sciences* **4**
- [5] Chesbrough H W 2003 *Open Innovation: The new imperative for creating and profiting from technology* (Boston: Harvard Business School Press)
- [6] Chemezov S, Volobuev N, Koptev Yu, Kashirin A 2017 *J. Innovations* **4**222
- [7] Blank S 2013 *The Four Steps to the Epiphany* (K&S Ranch Press)
- [8] Chan Kim W, Mauborgne R 2015 *Blue Ocean Strategy, Expanded Edition: How to Create Uncontested Market Space and Make the Competition Irrelevant* (Harvard Business Review Press)
- [9] Rodionov I, Semenov A, Gosteva E, Sokolova O 2015 *International Journal of Social, Behavioral, Educational, Economic and Management Engineering* **4** 9
- [10] Nikulchev E., Ilin D and Mateshuk E 2017 *Procedia Computer Science* **103** 44
- [11] Nikulchev E, Ilin D, Bubnov G and Mateshuk E 2017 *International Journal of Advanced Computer Science and Applications* **8** 9