Master Class

Modern Notation of Business Models: A Visual Trend

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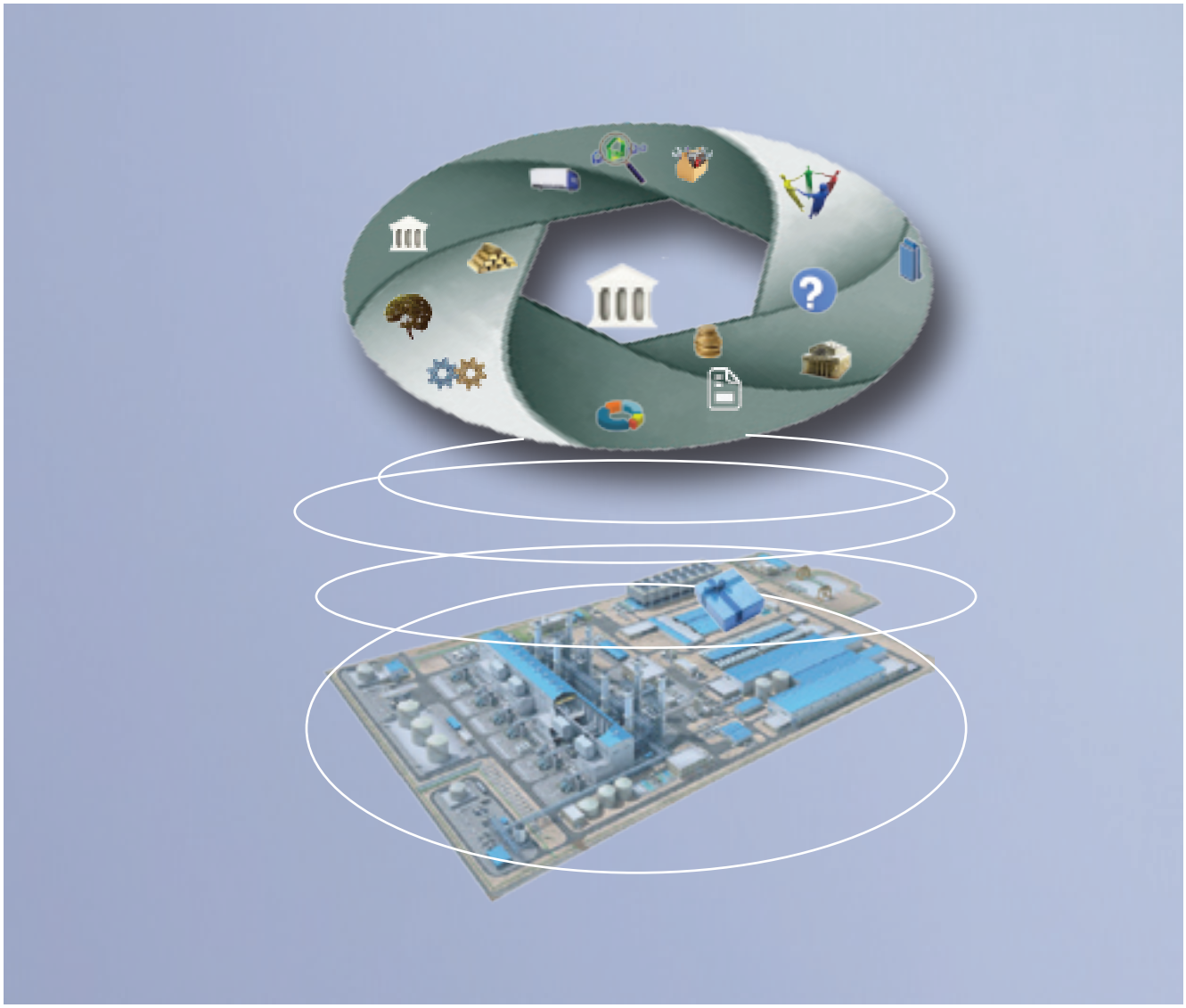

Information overflow and dynamic market changes encourage managers to search for a relevant and eloquent model to describe their business. This paper provides a new framework for visualizing business models, guided by well-shaped visualization based on a mind mapping technique.

Due to the simplicity of perception, this approach has a positive impact on managers and employees' understanding of companies' business models and promotes a productive exchange of ideas and knowledge. The mind-mapping visualization framework is 'cognitive scaffolding' and is positively associated with managers' and employees' improved perception and understanding of the business model, which allows them to communicate, share and manipulate business model knowledge easily.

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In recent years the concept of a business model has become widespread. In essence, every company follows some sort of business model which has come about either spontaneously or as a result of deliberate efforts. The concept's popularity is connected to the development of innovations. By 'innovation' we mean an activity that extends beyond an organization, which, as has been noted by several authors, requires the development of new, relevant, and flexible tools for management and business modeling [*Zaytseva, Shuvalova*, 2011] in the context of 'models of open innovation' [*Chesbrough*, 2003]. The new challenges presented to companies by a rapidly growing environment impel them to adapt their own strategies to deal with expanding global competition, which is becoming increasingly knowledge-based [*Guinet, Meissner*, 2012].

New technologies require novel business models that allow companies to convert technological innovations into commercial successes. The business models themselves undergo constant changes, so the main task of entrepreneurs and managers is to adjust the overall direction of their company's development and, in particular, their chosen model [*Voelpel et al*, 2005]. In this sense, business models become constantly and spontaneously evolving systems, with their own structure and internal behaviour [*Mason, Spring*, 2011].

In particular, the success or failure of a corporate strategy frequently depends on the business model, which forces companies looking for sources of growth to make innovative changes to their processes and products. This in turn determines the interest in researching ways to create new business models and adapt existing models to a dynamic market environment. A 'business model' is a relatively new concept of modern business and strategic management, so it has many unsolved questions and problematic areas. Its study is also relevant due to the lack of a unified approach to understanding business models and the undeveloped conceptual and methodological foundations for creating and analyzing business models. Despite broad academic discussions, today there are still very few systematic investigations of these problems. The question of the extent to which various business models are distributed throughout the economy and their relative financial efficiency has not been adequately studied.

Most of the existing scientific research has addressed the business models of information- and communications technologies (ICT) companies. A survey of professionals confirms the lack of a common opinion as to the definition of the term 'business model.' Nevertheless, it is possible to identify the primary areas of research in this field. In particular, business models are regarded as new analytical units, which are used to describe how companies operate their business, and finally are about *how value is created* rather than only how this value is preserved and multiplied.

Thus, a business model acts as an important point for the application of organizations' efforts [*Chesbrough*, 2006; *Christensen, Raynor*, 2000]. Of special interest is the development of new business models, which is dictated by changes in the market or an internal crisis within a company in general or a current business model in particular [*Johnson et al*, 2008; *Meehan, Baschera*, 2002].

Most research in this area has been focused on companies' interaction with their network of partners, since corporate management using business models is by no means performed in a competitive vacuum [*Hamel*, 2000]. Experts have noted that the business models themselves are a point of competition between players [*Casadesus-Masanell, Ricart*, 2010]. In other words, they are a potential source of advantages in the market [*Markides, Charitou*, 2004]. In recent years the emphasis of research has shifted to studying innovative business models that companies have used to essentially commercialize breakthrough ideas and technologies.

Moreover, the business model itself frequently becomes the object of innovative activity, complementing traditional forms of cooperation and interaction and proposing new forms of collaboration.

In today's economy, a company's success depends on developing new products, introducing new processes in production and management, and marketing innovations [*Prazdnichnykh*, 2013]. By analyzing the results of IBM's 'Enterprise of the Future' global research, Kirill Kornilev underscores the fact that a successfully functioning firm in the future must not only constantly change but also offer the market innovations that surpass customers' and partners' needs [*Kornilev*, 2009]. In management that imperative finds expression in the various ways in which business processes are organized, for example, in business groups [*Avdasheva*, 2005], online collaboration between companies [*Rumyantseva, Tretyak*, 2006], and integrated business models [*Zinin*, 2008]. The creation of an entrepreneurial orientation in Russian companies (i.e. the creation of organizational characteristics aimed at finding new market opportunities) is also a motivation to change the logic of business operations [*Shirokova, Sokolova*, 2013; *Shirokova*, 2007].

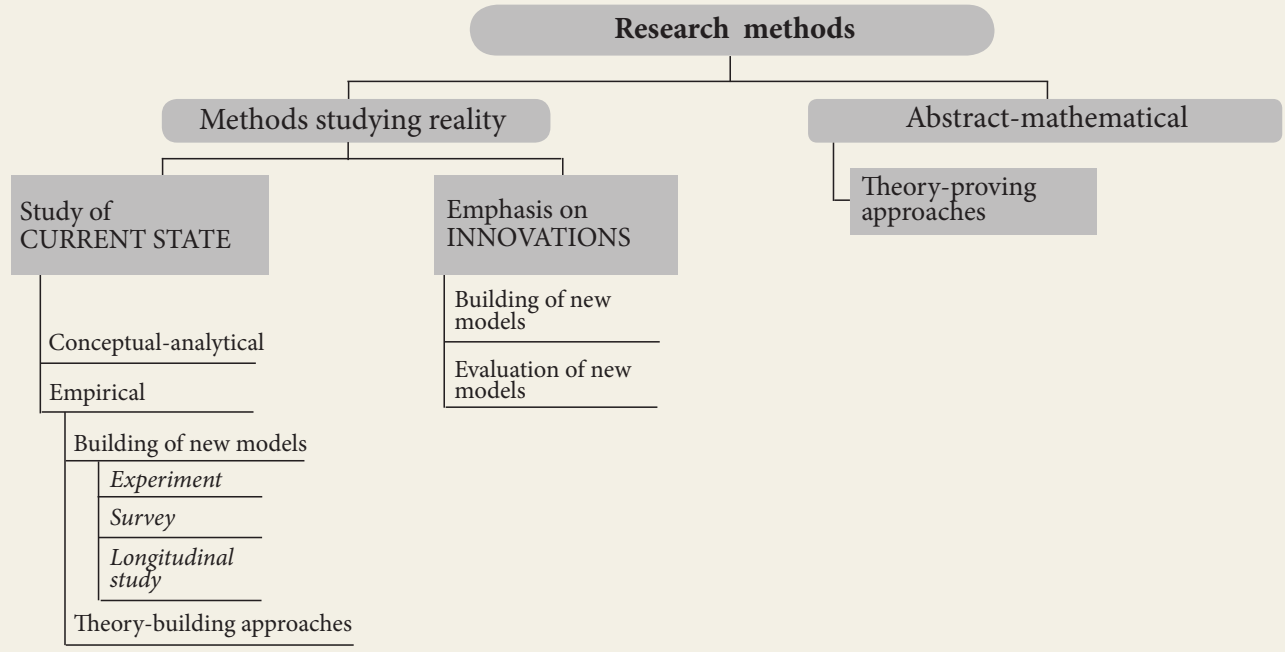
This paper presents the results of research that compared various ways of describing and presenting business models. In the presentation of business models, we have emphasized the graphical presentation of information because researchers' general opinion is that visualization facilitates the comprehension of business processes [*Card et al*, 1999; *Eppler*, 2006]. For example, one of the world's most influential experts in information design, Edward Tufte of Yale University, asserts the effectiveness of visualization when working with both qualitative and quantitative data [*Tufte*, 2006].

We again underscore the fact that the development of a business model is a complex corporate task requiring the participation of several top managers and business analysts. Ideas are generated in groups interacting formally and informally [*Garfield et al*, 2001; *Maccrimmon, Wagner*, 1994], which gives the work social and cognitive dimensions [*Dennis et al*, 1999; *Garfield et al*, 2001; *Nagasundaram, Dennis*, 1993]. The formation of these groups, which are a source of dynamic changes, is an important initial stage of work [*Chanko*, 2008]. The productive development of a business model requires the creation of new knowledge, and the exchange and integration thereof [*Gavetti, Levinthal*, 2000]. Thus, one of the fundamental tasks in initially designing a company's business model is to improve the effectiveness of group interaction, develop the creative potential of employees, and overcome certain social and cognitive problems. Using the terminology of Bentsion Milner, knowledge must be identified, extracted, and formalized to create a social and scientific strategy of training and innovation [*Milner*, 2004].

As mentioned above, the effectiveness with which a business model is comprehended grows substantially if it, or parts thereof, is presented graphically. This explains in particular the success and wide circulation of a new and innovative tool known as the business model canvas, which was developed by Alexander Osterwalder and Yves Pigneur [*Osterwalder, Pigneur*, 2010]. The template has been recognized by both business model theorists and practitioners [*Chesbrough*, 2010]. However, despite the numerous examples of successful application, its effectiveness remains unclear and hence needs to be analyzed in depth.

In this paper, we attempt to extend the business model canvas [*Osterwalder et al,* 2005] to achieve the most compact, most information dense, and most abstract template. The proposed approach to visualization of business models uses modern theories of knowledge engineering, cognitive sciences, and Gestalt psychology [*Adeli*, 1994; *Solso*, 2001; *Gavrilova*, 2002]. In developing our approach, we employed techniques for building hypergraphs, particularly *mind maps* [*Buzan*, 2003].

Figure 1. **Järvinen's taxonomy of scientific research methods**



Source: [*Järvinen*, 2004].

The question we sought to answer was: 'Does a new visual template of a business model in the form of a mind map help more fully reflect the ideas and logic of a company's business processes?' In other words, we explored the potential of visual modeling for the purpose of facilitating comprehension of business models in comparison with traditional textual and tabular formats.

Research Methodology

Management theory is one of the youngest fields of knowledge. From the start, its main source was applied management practice, i.e. chiefly empirical knowledge. Even today specific management experience remains an important source of learning and growth for management theory.

Thus, the traditional approach to scientific research in this field is underpinned by empirical models, usually based on the results of statistical analysis of data samples [*King et al*, 1994; *Lysov*, 2006; *Mangeym, Rich*, 1999; *Shchedrovitsky*, 1981]. The data come from surveys, observation, questionnaires, focus groups, and other methods of gathering primary information [*King et al*, 1994; *Lysov*, 2006; *Mangeym, Rich*, 1999; *Shchedrovitsky*, 1981]. Secondary information is also useful. Here, the research started from a set of several hypotheses, which were then subsequently proven or refuted.

Other methods of research also exist. Fig. 1 illustrates the approach of the Finnish methodological school under the leadership of Pertti Järvinen [*Järvinen*, 2004, 2008], who proposed a taxonomy of scientific research methods based on the ideas of a number of western scientists [*Gregor, Jones*, 2007; *March, Smith*, 1995; *Yin*, 1989].

As Fig. 1 shows, our approach is part of a group of innovative methods that attempt to understand reality by building new conceptual models and evaluating them based on specific criteria. Such an approach facilitates the quick development of an organization's business model with the help of a mind map template (see below). The results obtained have confirmed our hypothesis that the concept of business model visualization we have developed using a mind map may be a real innovative tool for optimizing business communications. Such a form of presentation has a positive im-

pact on managers' and employees' comprehension and understanding of the business model. It promotes effective interaction between them, the exchange of ideas, and the use of knowledge embedded in the business model.

State of modern research on business models

The term 'business model' originated in the field of data and process modeling [*Osterwalder et al*, 2005], entrenching itself among researchers and practitioners of new technologies in the late 1990s. Later the concept began to be used in management and educational circles. Authors of the definitions in the literature note that a company's business model, in essence, explains how the firm creates value and how the different parts of a company interact with one another [*Magretta*, 2002].

The prevalence of the word 'business model' came about largely through economic globalization and the development of online business [*Bellman et al*, 1957; *Osterwalder et al*, 2005]. The term's multiplicity of meanings is explained by the fact that at various stages the concept of 'business model' included many different economic factors, such as ways to create shareholder value, elements of industry regulation, new forms of income and income models, as well as complex intercompany relations [*Redis*, 2007].

Most researchers understand a business model to be one of the following:

1) a tool for representing the value created by a company [*Shafer et al*, 2005];
2) a systematic description of the mechanism of interaction with partner businesses [*Amit, Zott*, 2001];
3) a cognitive tool for converting technological developments into economic returns [*Chesbrough, Rosenbloom*, 2002];

Osterwalder and Pigneur conducted a detailed analysis of the literature dedicated to business models and propose the following definition:

'A business model is a conceptual tool that includes a set of parts and their interconnections, and that enables the representation of how a company makes money' [*Osterwalder, Pigneur*, 2010].

Osterwalder and Pigneur's full definition includes important parameters such as 'partner network.' A business model describes the logic of a value-creating system, which forms the basis for actual corporate processes. Formation of and compliance with a company's business model is one form of knowledge management [*Mustafa, Werthner*, 2008; *Hajiheydari et al*, 2012; *Rajala, Westerlund*, 2005; *Lopes, Martins*, 2006], a field that has recently attracted the attention of business researchers and practitioners. An important characteristic of companies turning to knowledge management is *knowledge intensity*, a property that is rather ambiguous and difficult to observe and operationalize [*Doroshenko*, 2007; *Doroshenko*, 2011]. An important step in the optimization of the knowledge management process is to clearly create the model itself. In the field of knowledge management, this process is known as externalization or the conversion of tacit knowledge into explicit knowledge [*Nonaka et al.*, 1995]. It is also important that most of a business model's parameters can be visualized, compactly described, and lend themselves to various manipulations and adjustments.

Various approaches to defining 'business model' have been often proposed [*Sabir et al*, 2012]. A natural consequence of such diversity is a multiplicity of approaches to the visualization of business models [*Chang et al*, 2010; *Osterwalder et al*, 2005; *Osterwalder, Pigneur*, 2010; *Osterwalder*, 2004; *Sabir et al*, 2012; *Samavi et al*, 2008; *Scütz et al*, 2013]. However, the primary form of presenting corporate knowledge is still the familiar linear text in natural language. The main advantage of text is its well-established,

Table 1. **Canvas business model for KFC**

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
Pepsi, food suppliers	Management of a chain of fast food restaurants, logistics system, franchising, catering services	Secret recipe, affordable prices, fast service	Focus on customers' needs: individual and standard contracts	Young people (16-25 years old), students, Early career workers, franchisees
	Key resources Brand, sales and logistics network, facilities to support the catering service		**Channels** Fast food restaurant chain, home service, online stores	
Cost structure Costs of the fast food restaurant chain, branding/communications, fleet of catering vehicles, food innovations		**Revenue streams** Revenue from the fast food restaurants and catering service, franchising		

Source: prepared by the authors.

predictable, and simple format. However, understanding text is associated with activity in the left (logical) hemisphere of the brain and does not use the cognitive resources of the right (creative) hemisphere, which means it is not sufficiently effective.

As we mentioned above, one of the most popular practical tools for visualization and development of business models is the business model canvas. An example of one is shown in Table 1, which is a variation of a business model developed for the company KFC.

The business model canvas traditionally consists of nine blocks that reflect the structure of business processes. First, with the help of *key partners* and *key resources*, a company performs certain types of activities. These *key activities* meet customers' needs by creating a *value proposition* that is sold through *sales channels*. In each *customer segment, customer relationships* are established. Using a value proposition that has been successfully delivered to the customer, a company generates *revenue streams*, which must exceed the organization's *costs* to perform these activities.

A 'canvas model' is essentially a blank table that can be completed. To improve comprehension, visual elements are added to the table, whose relevance and effectiveness require separate research.

Mind maps as a tool for developing a business model

The primary cognitive benefit of visualization is the simplicity of extracting and synthesizing information. Any form of graphical representation is effective thanks to:

1) the message's high capacity and ability to be understood by users;
2) minimal effort required to find information;
3) the ease of conveying certain inferences;
4) an attention switch mechanism;
5) the encoding of information [*Schneiderman*, 1996].

Visualization's social benefits include the ability to integrate different points of view, which promotes mutual understanding and facilitates interaction between people in a team. The emotional benefits are in turn associated with feeling involved in the team's work and — controversially for some authors — the development of creative potential and the strengthening of relations between employees.

Regarding the cognitive advantages of different types of information, many researchers have noted a substantial increase in the effectiveness of comprehension when using a visual form of communication [*Larkin, Simon*, 1987; *Tversky*, 2005]. According to Iris Vessey, visualization helps solve complex tasks by compressing information [*Vessey*, 1991]. When processing large amounts of information, visualizing the data makes it more easily analyzed and makes patterns more easily identifiable [*Card et al*, 1999; *Tufte*, 1991]. Empirical studies have confirmed the advantage of visual solutions over verbal (textual) solutions in a wide spectrum of applications [*Bauer, Johnson-Laird*, 1993; *Glenberg, Langston*, 1992; *Larkin, Simon*, 1987]. Visualization frees up additional working memory in humans [*Norman*, 1993], thereby simplifying memorization and retention of details [*Lurie, Mason*, 2007].

Visualization helps information to be assimilated well through the use of graphical metaphors [*Morgan*, 1986]. By simplifying extraction and synthesis, it makes it possible to process larger volumes of data without the risk of overload. Graphical presentation of data induces hidden mental schemas used in decision making and fosters the integration of the views and ideas of a team of employees. In the process of developing a business strategy, visualization is used when generating various scenarios and possible actions. These actions may include potential strategic objectives, stages of implementation, and a forecast of the flow of the company's resources.

Well-executed modern visualization uses a broad set of computer graphics tools that are favourably understood by managers and analysts and have a motivating effect on employees [*Babkin et al.,* 2011]. Available software makes it possible to solve complex technical tasks and effectively coordinate the actions of many participants with relatively modest efforts and few resources [*Zaytseva, Shuvalova*, 2011; *Ivanov et al*, 2012]. ICT include organizational innovations in the interaction between economic entities, expanding the opportunities for information exchange [*Abdrakhmanova, Kovaleva*, 2009].

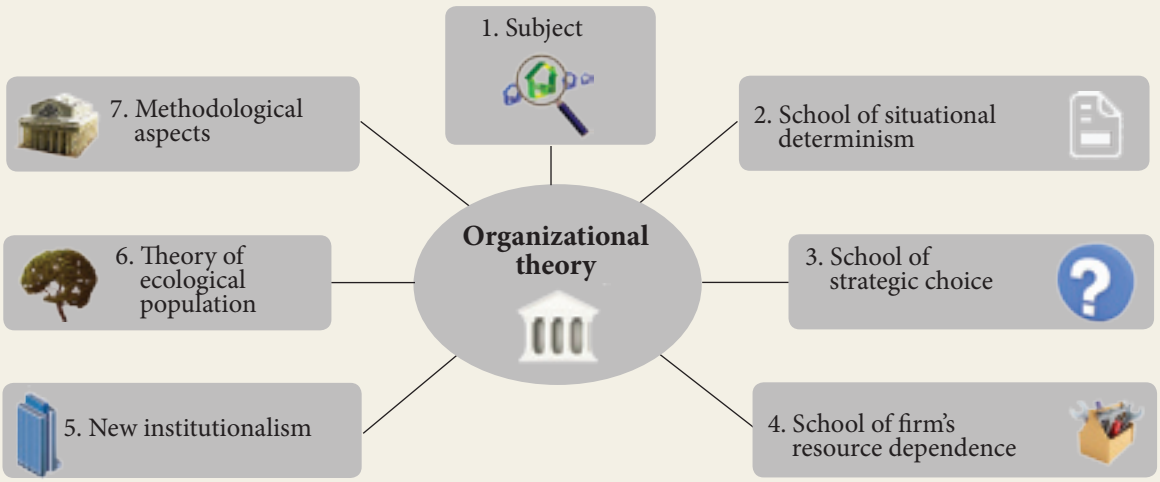
The noted merits of visually presenting business processes are also typical of mind maps as a simple and convenient visual tool for developing business models. Tony Buzan first proposed the term 'mind map' to designate round hierarchical diagrams [*Buzan*, 2003]. The heart of his idea was to visualize (illustrate) thoughts, concepts, relationships, and associations, by tying them to a central node — a graphical element that reflects the mind map's main idea. An example is shown in Fig. 2. Mind maps are remarkably popular today as a means of processing enormous volumes of business information in large companies [*Eppler*, 2006; *Mento et al*, 1999]. Leading global corporations use mind maps in both strategic and operational management. Mind maps differ from other similar tools in that not only do they simplify the structure of connections between elements, they also present a clear, visually-spacious model of the central concept, acting as a kind of cognitive framework for complex and massive concepts. Managers and professionals include mind maps in their presentations because a clear and vivid solution created using one of the many specialized software editors (MindJet, MapIt, Imind, Freeplane, Comapping, etc.) helps hold the audience's attention throughout the entire presentation.

A mind map is effectively comprehensible due to its three main elements:

- the use of colour to separate parts;
- the use of different-sized fonts for elements at different levels;
- the integration of images in order to attract attention.

More and more often companies use mind maps now to develop their employees' ability to think creatively and motivate them to systematize and structure the results of their work. Mind maps are most frequently used in corporate training systems [*Gavrilova et al*, 2011], brainstorming, presen-

Figure 2. **Example of a mind map about organizational theory**



Source: prepared by the authors.

tations [*Zhelyazny*, 2009], and at strategic briefings and meetings [*Müller*, 2009].

Mind maps make it possible to explain the substance of ambiguous concepts, such as a business model. In particular, a mind map is an effective tool for describing a specific business and presenting its basic and particular characteristics. It is also a means of placing the company's activities into a market context.

Research methods and main results

Does a mind map template improve managers' understanding of a company's business and logic? The latest research indicates that business model templates, such as the business model canvas previously mentioned [*Osterwalder et al*, 2005], significantly improve the overall comprehension of a company's business processes. However they decrease managers' creative potential and efforts to develop a business model. At the same time, the use of freehand drawings, sketches, pictures, and outlines has a noticeable positive effect on creative potential and the depth of work on a business model [*Eppler et al*, 2011].

Our results allow us to assume that the mind map template we have developed (Fig. 3), which includes elements of the business model canvas, makes it easier to understand the logic and specific characteristics of a business. We have included all nine elements of the business model canvas and combined them into four large groups (meta-concepts):

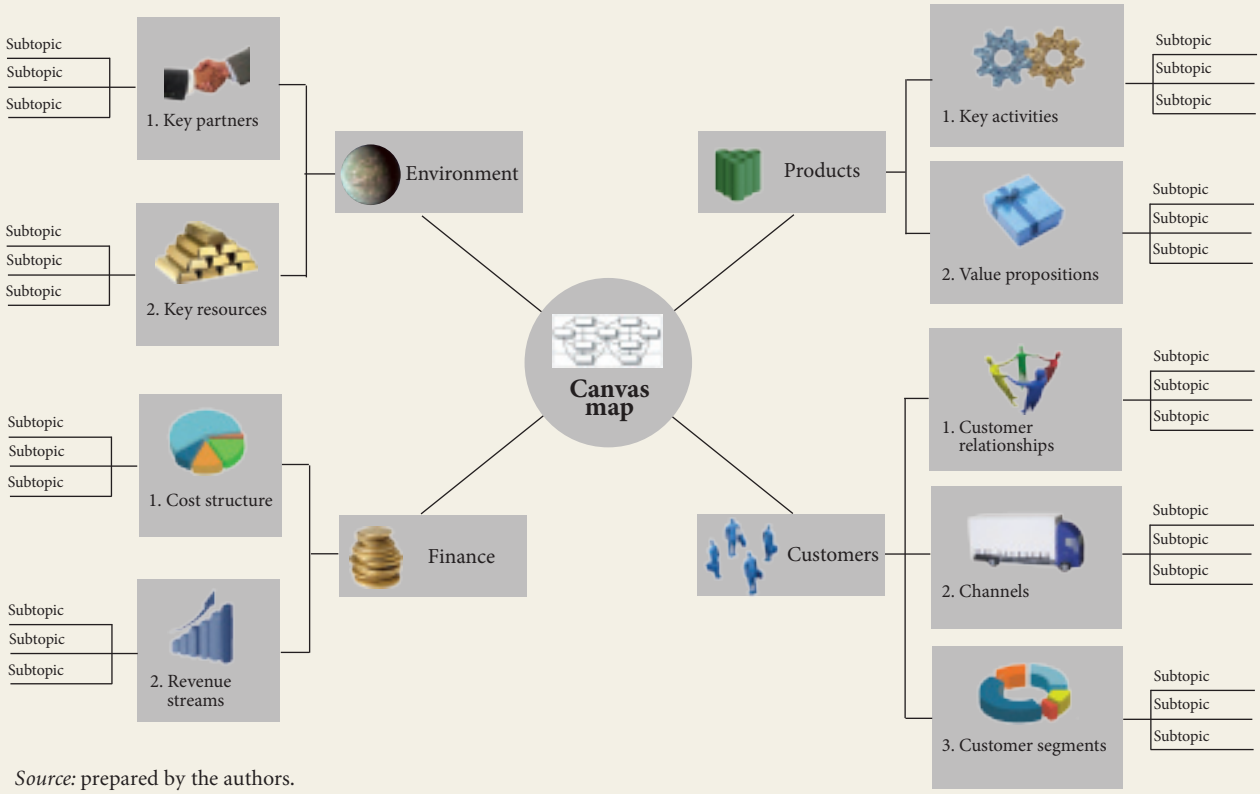
- products;
- environment;
- finances;
- customers.

Like the business model canvas, our mind map template (or canvas map) may be expanded and adapted to the needs of business leaders or groups in developing business ideas for individual or team work.

We propose a modified and simplified four-step algorithm to create such maps for companies' needs [*Gavrilova*, 2010], which includes the following stages:

1) definition of the business model's objectives;
2) creation of a glossary or identification of meta-concepts;

Figure 3. **Business model canvas as a mind map**



Source: prepared by the authors.

3) creation of a hierarchy of concepts;
4) revision as needed.

We followed this algorithm when creating a canvas map. Objectives were defined in the first stage. We used the business model canvas [*Osterwalder et al,* 2005] as the foundation for subsequent modifications.

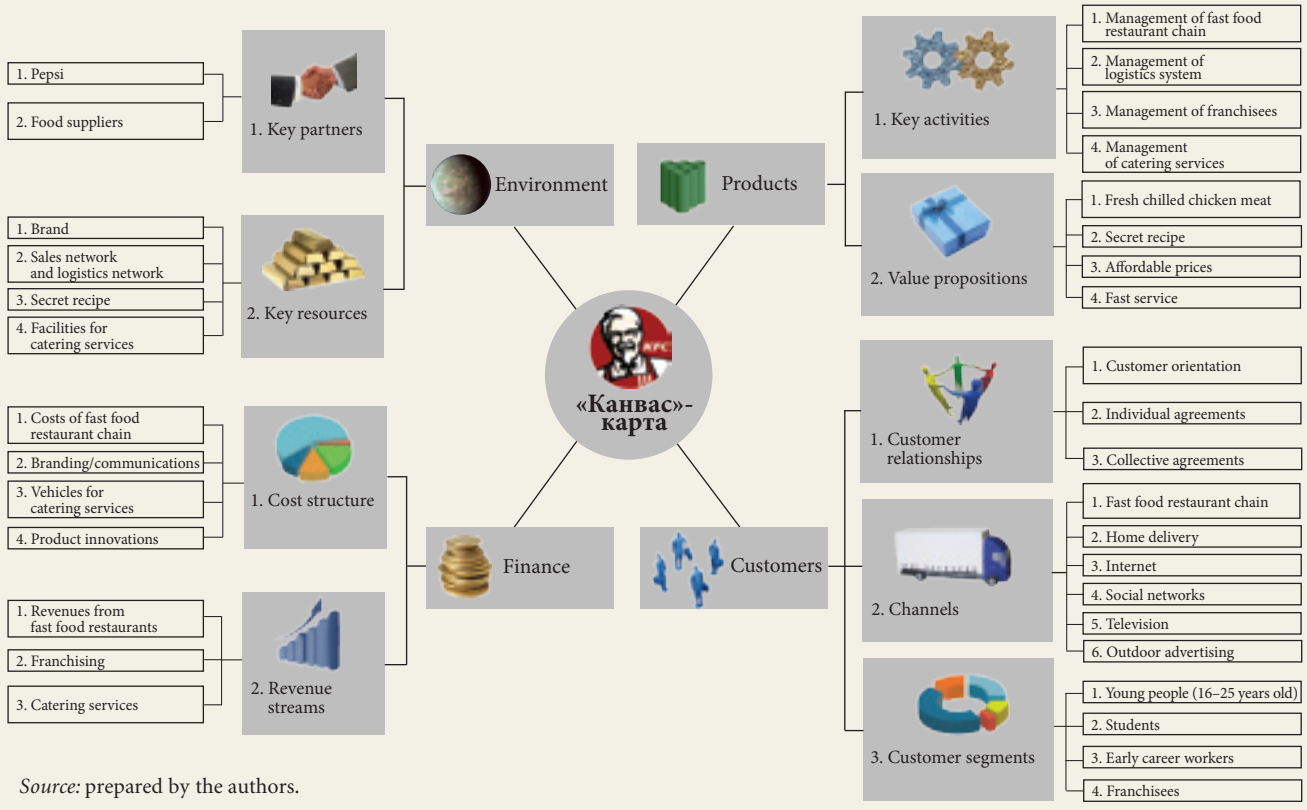
In the second stage we identified four meta-concepts (the clusters of 'products', 'customers', 'finances', and 'environment') and allocated the nine blocks of the canvas map to them as follows. The 'products' cluster includes 'key activities' and 'value propositions. The 'customers' cluster consists of 'customer relationships', 'channels', and 'customer segments.' The 'finances' cluster incorporates 'cost structure' and 'revenue streams.' The 'environment' cluster includes the 'key partners' and 'key resources' blocks.

The third stage entails these separate blocks being sequentially filled out based on the conditions, interests, and objectives of a specific company (KFC in our example).

The final stage of developing a mind map of a business model consists of enhancing the diagram graphically by removing redundancies, tautologies, and contradictions. The main purpose of the last stage is to achieve a streamlined and harmonious design [*Gavrilova*, 2010]. To accomplish this, each branch of the business model map is assigned an individual colour and an illustrative icon is placed in each separate block. In our research, respondents were asked to select the most relevant of five icons that had been associated with each business model's blocks. The selected icons were subsequently used.

To evaluate the comprehension of the mind map template we conducted a study with 22 top managers (financial directors, heads of marketing and sales departments, deputy directors, and employees) at Russian companies that participated in the Executive MBA program run

Figure 4. **Canvas map for KFC**



Source: prepared by the authors.

by Saint Petersburg State University's Higher School of Management in 2011–2013.The objective of the study was to assess the managers' comprehension of three methods of representing KFC's business model. The first method included a textual description, the most widespread and traditional form of presenting ideas. The second method was the business model canvas presented in Table 1. The third method of representing a business model involved a template of a business model canvas in the form of a mind map, or 'canvas map' (Fig. 4).

During the experiment participants were divided into three subgroups (Table 2).

Each subgroup was presented with one of the three representations of KFC's business model: textual, business model canvas, and canvas map. The groups were given 10 minutes to familiarize themselves with the business model. Then the participants individually had to answer in written form a series of questions about the company's business model:

1. What does the company do?
2. Who are the main customers?
3. What are the characteristics of the main customers?
4. What are the main advantages of the company's products?
5. Where does the company's revenue come from?

The examples of questionnaires with participants' responses to the questions (Table 3 below) confirm that all three ways of representing a cor-

Table 2. **Makeup of test groups**

No.	Group name	Artefact	Number of respondents
1	Group A	Text	6
2	Group B	Business model canvas	8
3	Group C	Mind map	8

Source: prepared by the authors.

porate business model, namely, text, a canvas, and a mind map, contain sufficient information about the company's activities. The greater degree to which participants in Group C filled out their questionnaires compared to the other two groups allows us to conclude that the business model represented as a mind map is more informative and possibly more understandable.

The respondents' answers were analyzed by four experts in the area of business modeling, who are researchers at Saint Petersburg University's Higher School of Management. They were asked to assess how well the test subjects' answers corresponded to the information about KFC on a scale from 1 to 5, where 5 means 'fully corresponds to the information presented about the object' and 1 means 'in no way corresponds to the information presented about the object.' Next, three samples of the experts' assessments were generated for each of the subgroups of test subjects.

To compare the three methods of representing a business model, single-factor analysis of variance was performed with a p-value of 0.05 for the three samples (Table 4). The differences in the assessments of the participant groups turned out to be significant for all the questions. We may assert that as a way of representing a business model, a mind map is more effective than a business model canvas or textual representation in terms of information comprehension.

The research was accompanied by a discussion that showed that participants had identified the mind map as the most structured and understandable representation of a business model. Respondents noted that the textual description of a business model is monotonous and uniform ('boring to read'). They rated the classic business model canvas favourably, although it contains many elements that are often superfluous. Quite a lot of cognitive effort was also required to understand the logic behind the arrangement of the basic elements in the table. Some participants viewed them as unrelated to one another. The use of mind maps made it possible to overcome many of the difficulties that have been described.

Conclusion

Today's interest in visualization is not just another fad but rather the result of cognitive overload caused by the immense density of the information field surrounding humans. The results of the majority of interdisciplinary studies in the field of management point to this conclusion. Visualization enables information to be compressed and simplifies com-

Table 3. **Examples of participants' responses to questionnaires categorized by the three groups**

	Group A (text)	Group B (business model canvas)	Group C (mind map)
What does the company do?	• Fast food • Franchising • Catering	• Delivers food • Offers franchises • Logistics	• Fast food restaurants • Catering • Franchising
Who are the main customers?	• Young people up to 25 years old	• Young people - students • People starting their careers • Franchisees	• Young people • Students
What are the characteristics of the main customers?	• They are starting their careers • They sit at home • They love chicken	• Youth	• Young people with low incomes
What are the main advantages of the company's products?	• 42% of the market • Know-how	• Low price	• Fresh chilled chicken meat • Secret recipe • Logistics • Warehouses • Vehicles for catering • Focus on customers
Where does the company's revenue come from?	• Warehouses • Logistics	• Catering service • Fast food restaurants • Franchising	• Fast food restaurants • Catering • Franchising

Source: prepared by the authors.

Table 4. **Results of single-factor analysis of variance**

		Sum of squares	Degrees of freedom	Mean square	F	Significance
What does the company do?	Intergroup	8.218	2	4.109	5.318	**0.015**
	Intragroup	14.680	19	0.773		
	Total	22.898	21			
Who are the main customers?	Intergroup	12.632	2	6.316	8.583	**0.002**
	Intragroup	13.982	19	0.736		
	Total	26.614	21			
What are the characteristics of the main customers?	Intergroup	5.076	2	2.538	4.578	**0.024**
	Intragroup	10.534	19	0.554		
	Total	15.610	21			
What are the main advantages of the company's products?	Intergroup	6.305	2	3.153	4.209	**0.031**
	Intragroup	14.232	19	0.749		
	Total	20.537	21			
Where does the company's revenue come from?	Intergroup	5.752	2	2.876	3.586	**0.048**
	Intragroup	15.240	19	0.802		
	Total	20.991	21			

Source: prepared by the authors.

prehension, which reduces cognitive stress and facilitates more effective mental activity.

A significant number of studies in information design and data visualization are dedicated to the role of graphical methods in management [*Eppler, Burkhard*, 2007; *Eppler, Platts*, 2009; *Eppler*, 2004]. Experts have given special attention to strategic planning and the difficulties that can be overcome by visually representing information [*Eppler, Platts*, 2009]. They have noted three groups of advantages of the visual approach: cognitive (clarity, order, ease of comprehension), social (ease of communication), and emotional (interest, motivation to work). Visualization reveals the vast opportunities to generalize and systematize data, which promotes effective management of corporate knowledge.

The results of our research demonstrate that using a new visual representation of a business model gets a positive reaction among management practices. Most participants in our study noticed a significant improvement in recall. The testing has established that the visualization tool with a mind map may be considered a graphical template for a cognitive framework that positively affects the comprehension and understanding of a business model.

The structure of the information and the qualifications of the specialists who create the visualization are subject to specific requirements. For example, business information must be sufficiently specific and the specialists must have experience creating mind maps. Due to the study's experimental nature, the proposed method has a number of unavoidable limitations. We found that some people understood the traditional textual format better. This question requires special research into visual representations of business knowledge.

Despite our positive results showing that a business model in the form of a mind map is better understood by managers than a business model canvas and a textual representation, a comprehensive study that includes more factors would be beneficial. First, when analyzing comprehension we propose accounting for respondents' cognitive traits, their motivations, and their experience in working with mind maps. Second, to get more reliable test results it would be necessary to increase the number of respondents and the sample size. Third, we believe that in addition to assessing the comprehension of the visual data in mind maps, it would be relevant to also measure the level of creativity exhibited by managers in

the process of developing a business model. The expert analysis aimed at the determining the creativity of the models produced may be used to measure the visual component's contribution to the effectiveness of teamwork on a business model. Finally, the use of experts' objective assessments of the comprehension of information may not reflect the cognitive characteristics of working with information visually. In other words, using respondents' subjective opinions together with experts' objective assessments may collectively provide a deeper understanding of how effectively managers comprehend visual representations of a business model.

Other necessary issues that further research should address include a careful interpretation of the collected data and additional research into visualization in management to prepare more detailed practical recommendations and to be able to make generalizations from the results obtained. In our work we tried to demonstrate that visual templates for creating business models and solving business problems have huge potential to simplify information processing, and we anticipate more research on the topic.

An approach based on using business model templates may become an effective tool for assessing a business's potential before a business plan has been formally developed. This methodology is widely applicable both for new enterprises as well as established businesses, for-profit and non-profit organizations, and for adjusting business strategy or planning entry into new markets. Developing a business model based on a mind map requires relatively little time. This tool makes it possible to assess and compare many potential representations of a business model, which makes it a highly effective tool for maintaining a company's activities in the long-term and for monitoring the business environment amid conditions of rapidly changing markets and explosive high-tech growth.

Through the exchange of ideas, the described tool helps maintain an atmosphere that fosters creativity in a company, which is especially valuable during brainstorming when every person has the opportunity to put forward his or her ideas, share them, and be heard and understood by the other participants of the process. After creating several mind maps company management may select an option, choose priorities, define the stages of implementation, and meet the needs for any given resource at the different planning stages. In combination with modern mind-mapping software, visual business modeling has significant potential to simplify the development of business models and reduce the time between conceptualization and implementation. F

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