International Journal of Knowledge, Innovation and Entrepreneurship
Volume 2 No. 2, 2014, pp. 51—65

Transforming Canvas Model: Map versus Table

TATIANA GAVRILOVA, ARTEM ALSUFYEV
& ANNA-SOPHIA YANSON
Graduate School of Management, Saint-Petersburg State University, Russia
Received 28 January 2014; received in revised form 17 February 2014; approved 31 July 2014

ABSTRACT The paper provides a new framework for visualizing business models, guided by well-shaped visualization based on hypergraph technology, specifically, mind mapping. Our approach presents the future evolution of Ostervalder's ideas. To evaluate the efficiency of the proposed framework we conducted a pilot study involving an experiment with 22 experienced top-managers of Russian companies and examined their perception of three business models description approaches involving linear text, Canvas business model by Alexander, and business model mind mapping template. Results reveal that the developed mind mapping visualization framework can be considered as cognitive scaffolds and is positively associated with improved perception and understanding of the business model by managers allowing them to communicate, share and manipulate business model knowledge easily.

Keywords: business model, mind mapping, visualization, business model canvas

Introduction

The paper discusses the results of an experiment aimed on comparison of different forms of business modeling. The stress is put on graphical information representation as a growing body of theoretical literature and empirical evidence shows that visual representations help to improve the understanding of business relationships. The development of new business models presents a critical and demanding task for organizations (Chesbrough, 2006; Christensen & Raynor, 2000) because the need for a new business model often emerges from a serious crisis concerning the firm and its current business model, which in turn threatens its survival in a changing market (Johnson, Christensen, & Kagermann, 2008; Meehan & Baschera, 2002). Developing business model ideas is not an individual task. Idea generation tasks are generated in both formal and informal group collaborations (Garfield, Taylor, Dennis, & Satzinger, 2001; Maccrimmon & Wagner, 1994), which makes idea generation both a cognitive and a social process (Dennis, Aronson, Heninger, & Walker, 1999; Garfield et al., 2001; Nagasundaram & Dennis, 1993). Successful business model idea generation requires knowledge sharing, creating, and integrating knowledge (Gavetti & Levinthal, 2000).

One of the main challenges in the modeling of business problems is to enhance group collaboration and creativity while overcoming social and cognitive challenges related to business model development process. Efficiency of perception of a business model is enhanced dramatically when it is associated with graphical notations. As an example, a new tool, in the form of a business model innovation template, has been specifically developed for the generation of such ideas by Osterwalder and Pigneur (Osterwalder & Pigneur, 2009). It has gained attention and recognition among practitioners and scholars (Chesbrough, 2010). Despite evidence that the template is applied in practice, its effectiveness has not yet been scientifically investigated.

For this reason, based on existing theories of knowledge engineering, cognitive sciences and Gestalt psychology, this paper provides a new framework for visualizing business models, guided by well-shaped visualization based on hypergraph technology, specifically, mind mapping. Our approach presents the future evolution of Ostervalder's ideas (Ostervalder, Pigneuer & Tucci 2005) into the visual framework. Specifically, the paper poses the following research question: "*Does business model mind map template allow managers to create common meaning regarding business ideas and better understand the logic of business processes within company?"* In other words, we studied the effectiveness of visual modeling versus traditional text or matrix definitions for facilitating the business model understanding with the aim of future adoption.

Business model studies: state-of-the-art

The term "business model" (BM) was first used in the context of data and process modeling (Ostenwalder, Pigneur et al 2005), and it became the established expression among those working in the emerging new technologies sphere at the end of the 1990s. Later this definition was extended to managerial and academic spheres. A whole set of definitions found in literature show that a firm's business model explains how a firm creates value. Generally speaking, business models (BM) define how the pieces of a business fit together (Magretta 2002).

The increased usage of the BM term is highly correlated with the emerging of Internet related business, globalization and contract manufacturing (Bellman et al. 1957, Osterwalder et al. 2005). The mutations that were responsible for its development are not only technological, but there are also economic factors such as searching for shareholder value creation and also regulatory factors, especially the deregulation of the telecom sector, which had a significant influence and led to the emergence of new businesses, creating revenue models, and complexity of inter-firm relations (Redis, 2007).

Scholars advocate use of BM as a representation tool for explicating a firm's current or future value creation and value-capturing logic (Shafer *et al*. 2005), as a structured template for how to transact with business partners (Amit and Zott 2001), as a cognitive framework for translating technological input into economic output (Chesbrough and Rosenbloom 2002), and as a narrative device for structuring discourses throughout new venture creation processes (Doganova and Eyquem-Renault 2009).

Osterwalder (2004) provides a detailed analysis of business model literature and gives the following definition: a business model is a conceptual tool that contains a set

of elements and their relationships and allows expressing a company's logic of earning money. His full definition includes such important parameter as the "network of partners".

Business model describes the logic of a "business system" for creating value, which lies behind the actual processes. Capturing, storing, and following business models in a company are a form of knowledge management that will increasingly gain importance. The first step in managing business model knowledge is describing a company's model explicitly. In knowledge management this externalization is known as the process of articulating tacit knowledge into explicit knowledge (Nonaka et al. 1995). Conceptualizing business models plays an important role in externalizing business models. An important advantage of capturing and storing business model knowledge is that it can be visualized, communicated, shared, and manipulated easily.

The diversity of approaches to defining business model has been described in (Sabir, Hameed, Rehman, & Rehman, 2012). It is logical that such diversity leads to multiplicity of visualization approaches towards business models (Chang, Wills, & De Roure, 2010; Osterwalder, Pigneur, & Tucci, 2005; Osterwalder & Pigneur, 2010; Osterwalder, 2004; Sabir et al., 2012; Samavi, Yu, & Topaloglou, 2008; Schütz, Neumayr, & Schrefl, 2013). Still the major form of business knowledge capture is linear text. The main advantage of linear text is that it is the most familiar, traditional and easy form of representing ideas. However, it misses many tools available to the cerebral cortex of the human brain, which diminishes it efficiency.

One of the most popular practical tool for visualizing and developing business model is Canvas model developed by Alexander Osterwalder (Osterwalder & Pigneur, 2010).

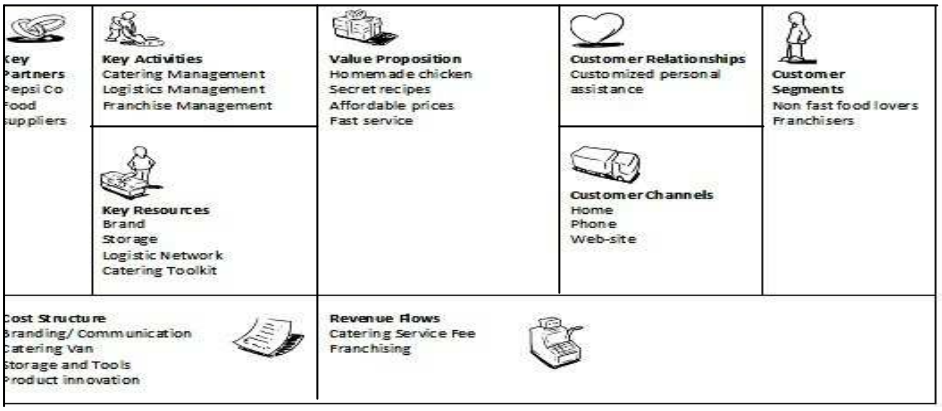

Table 1: Canvas business model for KFC Company

Canvas model consists of nine blocks that represent the underlying logic of business processes. Firstly, a company is operating with the orientation on particular *customer segment* of group of segments. Meeting customer needs is achieved by forming *value propositions*. These value propositions are delivered to customers through communization *channels*, distributors and sales channels. *Customer relationships* are established and maintained with each customer segment. Company gains *revenue* streams resulting from

value propositions successfully offered to customers. *Key resources* are the assets required to offer and deliver the previously described elements by performing a number of *key activities*. Some activities are outsourced and some resources are acquired outside the enterprise by turning to *key partners*. The business model elements result in the *cost structure*.

Modern management models have tried to reduce complexity of the world by considering ideas into different forms of matrix or tables. This was heavily influenced by spreadsheet programs. BM Canvas by Alexander Osterwalder presents in essence a table which is strengthened by some visual elements. But it, firstly, includes pretty many elements from the standpoint of short-term memory capacity. Secondly, it has rather specific logic in placement of these elements. Thirdly, it is characterized by disconnection of the elements within the main framework. Mind mapping could help to overcome some of these issues.

Business model: mind mapping approach

The cognitive benefits of visual representations include facilitating elicitation and synthesis of information, enabling new perspectives to allow better, more exhaustive comparisons and facilitating easier recall and sequencing; the social benefits include integrating different perspectives, assisting mutual understanding, and supporting coordination between people; and finally the emotional benefits include creating involvement and engagement, providing inspiration, and providing convincing communication. As for the cognitive benefits, Larkin and Simon (1987) and Tversky (2005) report that a human's input channel capacity is greater when visual abilities are used. Vessey 1991 reports that visualization aids in solving complex problems by compressing information. Visualization is instrumental in the analysis of data as it helps in identifying patterns and structures in data sets (Card et al. 1999; Tufte, 1990). Better, more exhaustive comparisons are proved by several empirical studies that show that visual representations are superior to verbal sequential representations in different tasks (Bauer and Johnson-Laird, 1993, Glenberg and Langston, 1992, Larkin and Simon, 1987). Visualization expands working memory (Norman 1993) and thus makes it easier to keep details about options in mind when comparing them (Lurie & Mason, 2007). Assisting mutual understanding is gained with visualization because graphic metaphors provide a visual means to assure mutual understanding by making basic assumptions explicit (Morgan, 1986).

On the whole, in the analysis stage, visualization is most valuable because of its cognitive benefits. It helps with the elicitation and synthesis of data, and specifically, its synthetic ability enables managers to process more data while avoiding information overload and the attendant mental shortcuts or cognitive biases involved. Visualization can also help to elicit managers' implicit mental models, and align a management team's assumptions. In the strategy development stage, visualization aids the generation of options for action. These options include potential strategic goals, milestones, activities and possible resource deployments. Visualizing many feasible options, together with their parameters, allows them to be more easily assessed, selected and made op-

erational in the subsequent planning stage. At the implementation stage actions, relationships and results need to be visualized. A great strength of a carefully constructed visualization is that it can employ engaging images and inspiring symbols to trigger positive emotions and motivate a workforce. Creative thinking is needed in order to develop images that will capture employees' attention and imagination and promote buy-in for new strategy through original and informative ways of communicating it.

One of the most complex stages of the strategic planning is the development of a new business model. Business model innovation triggers individual and organizational challenges. The former involves issues related to complexity, existing dominant logic and knowledge required whereas the latter includes issues resources, values and teams (Hoffmann & Eppler, 2011). Visualization can help to solve these issues by providing flexible and provisional, and at the same time accessible and persistent quality of visualizations. Visual tools help to overcome the challenges firms face when innovating their current business model by fostering strategic change through clarifying, organizing and uncovering relationships, dependencies and pointing towards successful strategies.

The above mentioned issues can be easily and straightly illustrated by applying to mind mapping as a tool for business model development. Mind mapping (MM) now is the most popular tool for handling big amounts of business information in big companies (Eppler, 2006; Mento, Martinelli, & Jones, 1999). Leading corporations across the world are beginning to mind map. For example, at the web-site of Novamind which is a popular mindmaping software there is a long list of companies that are using mind mapping in their activities. This list includes Microsoft, The Coca-Cola company, Deloitte, NASA, HP Company, University of Oxford, Cisco, Nestle and others (Visualize your information to get things done, n.d.). In order to enhance innovative performance companies usually turn to mind mapping (Cisco UK Uses Mindjet to Promote Innovative Startups, n.d.). This highly effective diagramming method was coined by Tony Buzan and illustrates thoughts, concepts, relationships, associations, and consequences all connected to a central hub representing the main idea (Buzan, 2003). The example of a mind map is presented on Figure 1.

Unlike any other diagrammatic method, mind mapping allows not only simultaneous organization of complex relationships, but also a clear, focused visual model of a central concept. Mind mapping works as cognitive scaffolds (Shneiderman, 1996):
(1) by increasing the memory and processing resources available to the users,
(2) by reducing the search for information,
(3) by using visual representations to enhance the detection of patterns,
(4) by enabling perceptual inference operations,
(5) by using perceptual attention mechanisms for monitoring, and
(6) by encoding information in a manipulable medium."

Companies as well as knowledge-intensive firms, business schools and universities in particular, are now using mind maps to challenge their employees to think creatively and in systemic structured way (Ashakiran, Murthy, Deepthi, Prabhavathi, & Ganesh, 2012; Davies, 2011; Evrekli, İnel, & Balim, 2011). Usually maps work in brainstorming sessions, presentations, strategic sessions and meetings (Maas & Burgess-Wilkerson, 2011; Somers et al., 2014). These maps are an excellent way to walk people through complex concepts and can be associated with cognitive, emotional and social benefits.

That is why even high-level executives and professionals are including them in their presentations (Ashakiran et al., 2012; Maas & Burgess-Wilkerson, 2011; Somers et al., 2014) as clear slide of a well-designed MM (there are several software solutions for this) will keep the audience focused throughout the entire presentation.

Figure 1: Organization theory mind map

In this paper we argue upon the ambiguous idea of a BM. With a business model mind map, people clearly understand the specifics and idea of business and easily see how it relates to their work as a whole. Three main features of MM facilitate the general understanding. They are:

A. Using colours to underlay the parts,
B. Embedding different font sizes to stress the level of granulation,
C. Inserting images to attract attention.

Mind maps are not the only way for business visualizations. Concept maps are also effective for knowledge mapping (Novak, 2002; Eppler, 2006). Knowledge maps are node-link representations in which ideas are located in nodes and connected to other related ideas through a series of labeled links. The research on knowledge mapping in the last decades presented a number of interesting substantial findings. People recall more ideas when they learn from a concept map than when they learn from text and those with low verbal ability or low prior knowledge often benefit the most (O'donnell, Dansereau, & Hall, 2002). The use of knowledge maps also appears to amplify the benefits associated with scripted cooperation. Concept maps have, however, some shortcomings (Eppler, 2006) and they may not fit all types of cognitive styles of personalities, or business topics. They have the relatively strict formal rules that need to be adhered to when drawing a concept map. The stress on identifying concepts (and

their multiple relationships) do not make it a simple, seamless or very rapid visualization technique.

In addition, the general top-down structure of concept maps may not match for representing the structure of sequential content such as processes, time-lines, or developments. The boxes and arrows format may also make it rather difficult to efficiently represent a great number of related items in an accessible format.

That is why in this paper we propose to use mind mapping for visual compression of "canvas" business-model.

Also we want to underline another benefit of using visualization. That is its creative power.

Visual images facilitate creative thinking with a new way of looking at problems or situations from a fresh perspective that can help to produce unorthodox solutions. Almost all the gurus of creative thinking (Dacey, 1989; Sternberg, 1999; Mihalko, 2006) mention visualizing among its first important features. We can regret that there are quite a lot of pseudoscientific speculations now on the left/right brain hemisphere asymmetry. However, the fact that imagination, visual processing and creativity are "co -located" together in the right part of the brain is of no doubt now (Springer, Deutsch, 1998; Hugdal, 2005).

KFC business model: a case study

As it was mentioned in the introduction section we pose the following research question: *"Does business model mind map template allow managers to create common meaning regarding business ideas and better understand the logic of business processes within company?"* Recent studies in the field show that using business model templates (like business model canvas template by Alexander Osterwalder (Osterwalder et al., 2005) considerably enhances perceived collaboration but decreases perceived creativity and adoption of the development business model by managers whereas using objects and sketches has significant positive effect on perceived creativity and adoption level of designed business models (Eppler, Hoffmann, & Bresciani, 2011).

Based on the results of this study we assume that business model mind map template could combine benefits of Canvas template and sketches by providing more flexibility in software environment thus allowing managers to create common meaning regarding business ideas and better understand the logic of business processes within company. For this reason the business model template has been developed based on canvas template (presented in figure 1).

The Business Model mind map introduced in this paper extends Osterwalder's work, adding the flexibility of mind mapping and allowing for enhanced creativity. Like the Business Model Canvas, our MM template can be enlarged and printed out for an entrepreneur or business development team to mark up or apply notes.

The development of the business model map was in accordance with four stages recipe proposed by T. Gavrilova (Gavrilova, 2010): (1) goals, strategy, and boundary identification; (2) glossary development or meta-concept identification; (3) laddering, including categorization and specification; (4) orchestration.

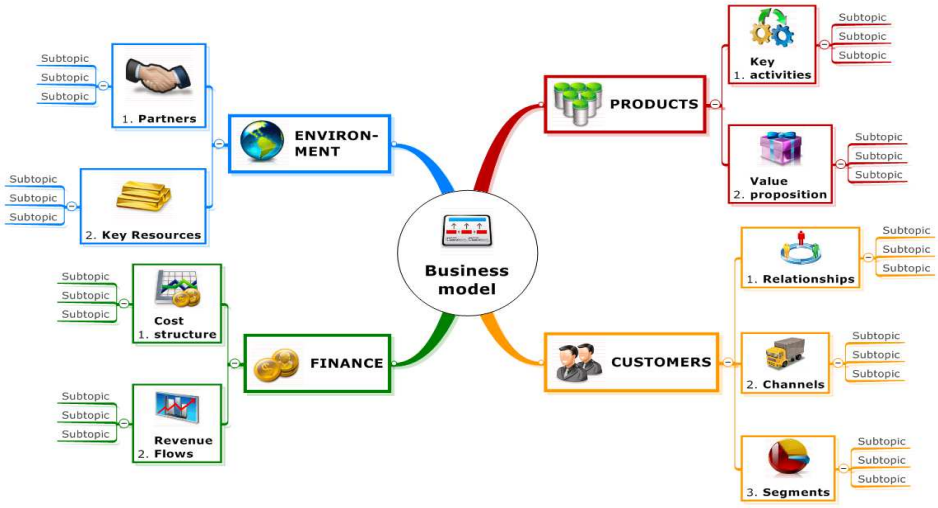

Figure 2: Canvas Business Model mind map

At the first stage goals, strategy, and boundary identification took place. The authors used Canvas model developed by Alexander Osterwalder (Osterwalder & Pigneur, 2010) as the basis for further modifications.

The second stage involved authors into conduction of main meta-concept identification and grouped nine canvas template blocks into *four* clusters: *products, customers, finance, and environment*.

The third stage was devoted to laddering, including categorization and specification. We categorized the business model blocks in the following way. "Products cluster" includes key activities and value proposition block. "Customers cluster" includes customer segments, customer channels and customer relationships. Authors formed "Finance cluster" that include revenue flows and cost structure. The fourth cluster "Business environment" included relationships with partners and key resources blocks.

The final stage of BM map development was related to updating the visual hierarchical structure by excluding any excessiveness, synonymy, and contradictions. The main goal of this final step is to create a beautiful or harmonious view (Gavrilova, 2010). For this reason at first every branch of the BM map was assigned its specific color. Then we had to attach an image to every block. For this reason we conducted a survey with top-managers of Russian companies and asked them to choose the most appropriate image from a palette of five icons related to every concept in the BM mind map.

To evaluate the efficiency of the developed MM template we conducted a pilot study involving an experiment with 22 experienced top-managers of Russian companies (Executive MBA programme participants) and examined their perception of three business models description approaches. As an example the KFC BM was taken. First, BM was presented as linear text since it is the most traditional, wide-spread and easy form of representing ideas. Second, we used Canvas BM by Alexander Osterwalder (Osterwalder & Pigneur, 2010) shown in Table 1. Finally, the developed BM MM template was used as presented at Fig. 3

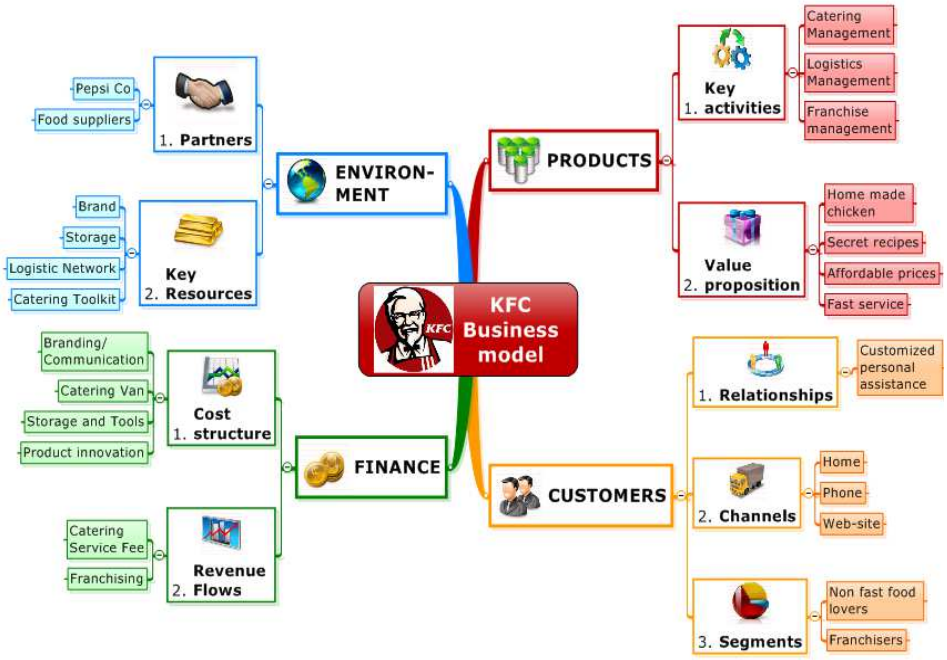

Figure 3: Business Model mind map KFC Company

During the experiment the main group of participants was divided into three sub-groups. Each of the sub-groups was offered one of the three mentioned above business models descriptions of KFC company. Each group had a limited amount of time to get acquainted with the company's BM after which they were asked to answer a set of questions related to the company's business processes. The results of the experiment show that BM description in the form of mind map has approximately the same efficiency as other methods. The experiment followed by the discussion session. It showed that participants preferred BM MM as the most *structured* and *comprehensive* one. Also they mentioned that text BM was a bit boring. They positively assessed Canvas matrix which despite being unique in its applicability to almost every business enterprise included too many elements from the standpoint of short-term memory capacity. Also it needed some cognitive effort to understand the logic in placement of main elements in the table. Some participants put stress on the disconnection of the elements within the main matrix. Since the pilot study was conducted with illustrative aims and not with the goal to generalize results, more thorough investigation of the BM mind map is required through enlarging the experiment sample and controlling for other factors related to motivation level, cognitive style and previous experience with mind mapping.

Conclusions

A considerable amount of research in the field of knowledge visualization has been devoted to the investigation of the role of graphical notations in management (Eppler & Burkhard, 2007; Eppler & Platts, 2009; Eppler, 2004). Many scholars paid particular

attention to the strategic planning process and how visual aids can help to overcome issues related to the process of strategic planning (Eppler & Platts, 2009). Overcoming theses issue lead to three groups of benefits: cognitive, social and emotional. Also such visual mapping is a first step to visual system thinking and it greatly contributes to effective company knowledge management.

The results of our pilot study indicate that using of a novel visual form of business model was positively assessed by management practitioners. Big group of participants mentioned the significant increasing of perceived understanding. The experiment reveals that the developed mind mapping visualization framework can be considered as cognitive scaffolds and is positively associated with improved perception and understanding of the business model by managers allowing them to communicate, share and manipulate business model knowledge easily.

Our approach to business model mapping can be a powerful tool in developing and evaluating business opportunities before a formal business plan is prepared. The methodology is broadly applicable—for new ventures or established business, for non-profit and for-profit organizations, for incremental adjustments to business strategy or major departures into new markets. Business model mapping can rapidly document and evaluate a large number of opportunities making it vital to firms in fast-moving markets or high-technology environments. Every participant has the opportunity to present their ideas, share them with others, and feel satisfied that it has received a fair hearing. After all maps are completed, leadership can begin the process of sifting through alternatives, setting priorities, laying out implementation stages and determining resource requirements over a realistic planning horizon. Coupled with the resources and new programs promoting and supporting entrepreneurs and entrepreneurship, business modeling, in general, and business model mapping, in particular, have the potential to speed development and shorten the time between conception and launch.

Also we want to underline another substantial benefit of using visual approach. Designing visual business models facilitates creative thinking with a novel way of looking at company problems, processes and actors from fresh perspective that can help to produce an innovative solutions.

Correspondence

Tatiana Gavrilova, Artem Alsufyev & Anna-Sophia Yanson
Graduate School of Management (GSOM)
Saint-Petersburg State University
E-mail: artyomalsufyev@mail.ru

References

Amit R. and Zott C. (2001). Value creation in e-business. *Strategic Management Journal*, 22, pp. 493– 520.

Ashakiran, S., Murthy, N. K., Deepthi, R., Prabhavathi, K., & Ganesh, G. (2012). Reinforcing Learning of Vitamins by mind Maps. *Journal of Research in Medical Education &Ethics*, *2*(3), 194–199.

Bauer M. I. & Johnson-Laird P. N. (1993). How diagrams can improve reasoning, *Psychological Review* 4(6), pp. 72-378.

Bellman R. et al. (1957). On the construction of a multi-stage, multi-person business game. *Operations Research*, 5 (4), pp. 469–503.

Buzan T. (2003). *The Mind Map Book*, BBC Active, London.

Card K. S., Mackinlay J. D. & Shneiderman B. (1999). *Readings in Information Visualization, Using Vision to Think*. Morgan Kaufmann, San Francisco
.
Chang V., Wills G. & De Roure D. (2010). A Review of Cloud Business Models and Sustainability. *IEEE 3rd International Conference on Cloud Computing*, pp. 43–50.

Chesbrough H. (2006). *Open business models: How to thrive in the new innovation landscape*. Boston, MA: Harvard Business School Press.

Chesbrough H. (2010). Business model innovation: Opportunities and barriers. *Long Range Planning*, 43(2/3), pp. 354–363.

Chesbrough H. & Rosenbloom R. S. (2002). The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies. *Industrial and Corporate Change*, 11, pp. 529–555.
Christensen C. & Raynor M. E. (2000). Meeting the challenge of disruptive change. *Harvard Business Review*, 78(2), 66 – 77.

Cisco UK Uses Mindjet to Promote Innovative Startups. Available from: <http://www.mindjet.com>. [18 March 2009]
Dacey, John S. *Fundamentals of creative thinking*. Lexington, MA: Lexington books, 1989.

Davies, M. (2011). Concept mapping, mind mapping and argument mapping: what are the differences and do they matter? *Higher Education*, *62*(3), 279–301.

Dennis A., Aronson J., Heninger W. & Walker E. (1999). Structuring time and task in electronic brain- storming. *MIS Quarterly*, 23(1), pp. 95–108.

Doganova L. & Eyquem-Renault M. (2009). What do business models do? Innovation devices in technology entrepreneurship. *Research Policy,* 38, pp. 1559–1570.

Eppler M. J. (2004). *Knowledge Visualization-Towards a New Discipline and its Fields of Application*.

Eppler, M. J. (2006). A comparison between concept maps, mind maps, conceptual diagrams, and visual metaphors as complementary tools for knowledge construction and sharing. *Information Visualization*, *5*(3), pp. 202–210.

Eppler M. J. & Burkhard R. A. (2007). Visual representations in knowledge management: framework and cases. *Journal of Knowledge Management*, 11(4), pp. 112–122.

Eppler M. J. & Hoffmann F. (2012). Does method matter? An experiment on collaborative business model idea generation in teams Innovation*: Management, Policy &Practice* 14(3), pp. 388–403.

Eppler M. J. & Platts K. (2009). Visual Strategizing: The Systematic Use of Visualization in the Strategic Planning Process. *Long Range Planning LRP*, 2, pp. 42–74.

Eppler M. J., Hoffmann F. & Bresciani S. (2011). New Business Models Through Collaborative Idea Generation. *International Journal of Innovation Management*, 6(15), pp. 1323–1341.

Garfield M. J., Taylor N. J., Dennis A. R. & Satzinger J. W. (2001). Research report: Modifying paradigms – individual differences, creativity techniques, and exposure to ideas in group idea generation. *Information Systems Research*, 12(3), pp. 322–333.

Gavetti G. & Levinthal D. (2000). Looking forward and looking backward: Cognitive and experiential search. *Administrative Science Quarterly*, 45(1), pp. 113–137.

Gavrilova T. (2010). Orchestrating Ontologies for Courseware Design. *Affective, Interactive and Cognitive Methods for E-Learning Design: Creating an Optimal Education Experience* (Eds. by A. Tzanavari & N. Tsapatsoulis), IGI Global, USA, pp. 155–172.

Glenberg A. M. & Langston W. E. (1992). Comprehension of illustrated text: pictures help to build mental models, *Journal of Memory and Language* 31(2), pp. 129-151.

Hoffmann F. & Eppler M. J. (2011). Challenges and Visual Solutions for Strategic Business Model Innovation. *In Strategies and Communications for Innovations*, pp. 25–36.

Hugdahl K. (2005) Symmetry and asymmetry in the human brain. *European Review*, Vol. 13, Supp. No. 2, 119–133 .

Johnson M., Christensen C. & Kagermann H. (2008). Reinventing your business model. (cover story). *Harvard Business Review*, 86(12), pp. 50–59.

Larkin, J. H., & Simon, H. A. (1987). Why a diagram is (sometimes) worth ten thousand words. *Cognitive Science*, *11*(1), 65–100.

Leschke J. (2013). Business Model Mapping: A New Tool to Encourage Entrepreneurial Activity and Accelerate New Venture Creation. *Journal of Marketing Development and Competitiveness* vol. 7(1), pp. 18-22.

Lurie N. H. & Mason C. H. (2007). Visual representation: implications for decision making, *Journal of Marketing* 71, pp. 160-177.

Maas, J., & Burgess-Wilkerson, B. (2011). The Development of a Student Concept Mapping Guide for Business Communications. *International Journal of Interdisciplinary Social Sciences*, *6*(5).

Maccrimmon K. R. & Wagner C. (1994). Stimulating ideas through creativity software. *Management Science*, 40(11), pp. 1514–1532.

Magretta J. (2002). Why business models matter. *Harvard Business Review*, 80(5), pp. 86 -93.

Meehan S. & Baschera P. (2002). Lessons from Hilti: How customer and employee contact improves strategy implementation. *Business Strategy Review*, 13(2), p.31.

Mento, A. J., Martinelli, P., & Jones, R. M. (1999). Mind mapping in executive education: applications and outcomes. *Journal of Management Development*, *18*(4), pp. 390–416.

Mihalko M. (2006) Thinker toys: A Handbook of Creative-Thinking Techniques (2nd Edition), random House, NY.Morgan G. (1986). *Images of Organizations*, Sage Publications, Beverly Hills, CA.

Nagasundaram M. & Dennis A. R. (1993). When a group is not a group – the cognitive foundation of group idea generation. *Small Group Research*, 24(4), pp. 463–489.

Nonaka I. & Takeuchi H. (1995). *The Knowledge-Creating Company: How Japanese Companies create the Dynamics of Innovation*, Oxford University Press, New York.

Norman D. A. (1993). *Things That Make Us Smart: Defending Human Attributes in the Age of the Machine*. Addison Wesley Publishing Company.

Novak J.D. (2010) *Learning, Creating, and Using Knowledge: Concept Maps as Facilitative Tools in Schools and Corporations*, Routledge, NY.

O'donnell, A. M., Dansereau, D. F., & Hall, R. H. (2002). Knowledge maps as scaffolds for cognitive processing. *Educational Psychology Review*, *14*(1), 71-86.

Osterwalder A. (2004). *The business model ontology: A proposition in a design science approach*. Institut d'Informatique et Organisation. Lausanne, Switzerland, University of Lausanne, Ecole Des Hautes Etudes Commerciales HEC.

Osterwalder A. & Pigneur Y. (2010*). Business model generation–a handbook for visionaires, game changers, and challengers*. New York Wiley.

Osterwalder A., Pigneur Y. & Tucci C. L. (2005). Clarifying Business Models: Origins, Present, and Future of the Concept. *Communications of the Association for Information Systems* (AIS), Vol. 16. Artcle 1, pp.1-25.

Rédis J. (2007). Le Business model: notion polymorphe ou concept gigogne? *5ème Congrès de l'Académie de l'entrepreneuriat*, Sherbrooke, Québec, pp. 1-35.

Sabir M. S., Hameed R. M., Rehman K. & Rehman I. (2012). Theoretical Foundation of Business Model and Their Building Blocks. *Journal of Management Research*, 4(4), pp. 160–179.

Sahut J. M., Hikkerova L. & Khalfallah M. (2013). Business Model and Performance of Firms. *International Business Research*; Vol. 6, No. 2; pp. 1913-9012.

Samavi R., Yu E. & Topaloglou T. (2008). Strategic reasoning about business models: a conceptual modeling approach. *Information Systems and E-Business Managemen*t, 7(2), pp. 171–198.

Schütz, C., Neumayr, B., & Schrefl, M. (2013b). Business Model Ontologies in OLAP Cubes. In *Advanced Information Systems Engineering* (pp. 514–529). Springer.

Shafer, S. M., Smith, H. J., & Linder, J. C. (2005). The power of business models. *Business Horizons*, *48*(3), pp. 199–207.

Shneiderman B. (1996). The eyes have it: a task by data type taxonomy for information visualizations, *IEEE Symposium on Visual Languages*. IEEE Computer Society Press, pp. 336-343.

Somers, M. J., Passerini, K., Parhankangas, A., & Casal, J. (2014). Using mind maps to study how business school students and faculty organize and apply general business knowledge. *The International Journal of Management Education*, *12*(1), 1–13.

Spector Y. (2011). Theory of constraint methodology where the constraint is the business model. *International Journal of Production Research* Vol. 49, No. 11, 1 June 2011, pp. 3387–3394.

Springer, S. P., & Deutsch, G. (1998). *Left brain, right brain: Perspectives from cognitive neuroscience*.
Sternberg, Robert J., ed. *Handbook of creativity*. Cambridge University Press, 1999.

Tversky B. (2005). Visuospatial reasoning, in K. Holyoak and R. G. Morrison (eds.), *The Cambridge Handbook of Thinking and Reasoning*, pp. 209-240.

Vessey I. (1991). Cognitive fit: a theory-based analysis of the graphs versus tables literature. *Decision Sciences* 22, pp. 219-241. *Visualize your information to get things done*. Available from: <http://www.novamind.com>. [18 March 2009]