

From Business Model Design to Environmental Scanning: the Way to a New Semantic Tool to Support SME's Strategy

Vincent GREZES¹, Zhan LIU², Olivier CRETOL³, Antoine PERRUCHOUD⁴
HES-SO Valais, Technopole 3, Sierre, 3960, Switzerland
Tel: +41 27 6069001, Fax: + 41 27 6069000

¹Entrepreneurship & Management Institute, Email: Vincent.Grezes@hevs.ch

²Institute of Information System, Email: Zhan.Liu@hevs.ch

³Institute of Information System, Email: Olivier.Crettol@hevs.ch

⁴Entrepreneurship & Management Institute, Email: Antoine.Perruchoud@hevs.ch

Abstract: This paper presents a first accomplished state of our researches fulfilling the purpose of creating an assistance medium to the definition of strategic orientations for small and medium enterprises (SMEs) and an assistance medium to the definition of environmental scanning axes based on semantic technology. Our proposition sets out a link between the elaboration of a business model, which requires precise knowledge of the environment, and the setting up of scanning system, which itself requires precise definition of the strategic guidelines of the organisation. Our research aims at creating synergies between business model design and environmental scanning.

1. Introduction

According to Porter [1], “strategy is the creation of a unique and valuable position, involving a different set of activities.” Consequently, Porter [2] described the “valuable position” as the situation where customers are willing to pay a price for a product or service that exceeds the cost of its production. For its part a business model “describes the rationale of how an organization creates, delivers, and captures value.” [3].

Developing the idea of Magretta [4], which points out that new strategies seem to be emerging in terms of business models, Seddon [5] defines the relationship between strategy and business model such as: “a business model is an abstract representation of some aspect of a firm’s strategy; it outlines the essential details one needs to know to understand how a firm can successfully deliver value to its customers”.

In order to improve the reasoning about strategy, “environmental scanning” is an activity, which consists in acquiring and using “information about events, trends and relationships in an organization’s external environment, the knowledge of which would assist management in planning the organization’s future course of action.” [6]. At the business model elaboration stage, environmental scanning provides a precognition of the environment of the project necessary to the elaboration of strong and competitive business models [3]. When the business model is confronted to the market, the involvement of scanning takes on another dimension: it is the insurance of the business model’s continuity by its redesign according to the environmental changes [7].

In practice, this process of environmental scanning is meeting implementation difficulties in small and medium enterprises (SMEs), because its results depend on the managers’ ability to define their objectives and their strategy [8]. Moreover, the execution of a strategic diagnosis prior to the definition of the environmental scanning axes

constitutes a key support to SMEs, which rarely dispose of a formal and explicit strategy. SMEs also encounter difficulties in the transformation of the strategic orientations into concrete scanning axes [9].

The company census held in 2008 revealed that the proportion of SMEs was of 99.6% out of all the Swiss companies, which represent the category of trading companies of less than 250 employees [10]. This motivated our decision to consider an online application in order to reach a wide audience. However, we believe our solution will have better results in organizations carrying out an entrepreneurial strategy because of the manager's ability to adapt to new opportunities [11].

Recently, dynamic solutions in the business sector, such as systems based on semantic web technology [12, 13], opened new opportunities for business model designing and environmental scanning. Unlike traditional web technologies, which are based on a syntactical information mark-up (of information), semantic web technology provides semantic search and additional features like knowledge-based, or context aware information based. It enables machines to understand data, exchange it, and makes information more meaningful to people. Although Kim and al. [14] argue that it creates a potential risk because of the way environmental information is managed, we believe this technology could offer high value added services without sacrificing its safety features. Moreover, in order to score the results, we will use a semantic Bayesian network to simulate the interaction between information and its probable impact on the business model [15].

The idea of introducing semantic-based technology into business process is not new and its importance has been widely discussed [16, 17, 18]. Despite of the increasing interests in the semantic-based technology support for business process, there is still a low degree of the usage in business model. Furthermore, several researches have considered the environmental scanning for SMEs through the World Wide Web [19, 20, 21], its adoption in relation with IT maturity in SMEs [22], as well as the state of commercial solutions [23]. Another important research direction consists in the field of alignment between environment, strategy and information systems, considering their relative impacts [24, 25, 26]. However, so far, no research combined the environmental scanning results into the business model design process with semantic technology. Then, our research question is:

How can semantic web technology be used to bring together the business model design and environmental scanning in order to support the strategic reflection of SMEs?

The remainder of the paper is organized as follows. In the next section we introduce our practical goals. The third section considers the methodology that we adopted to achieve these objectives. The fourth section presents the technology we used in order to set out the accomplished first step of our research. The fifth section was dedicated to the details of the developed functionalities. Section 6 describes our results and the business benefits. Finally, section 7 concludes this paper by summarising its contribution and possible further developments.

2. Objectives

The conception of one or several business models participates to the strategy of the organisation as an abstract tool that can be multiplied according to the different value propositions of the firm [5] (Figure 1).

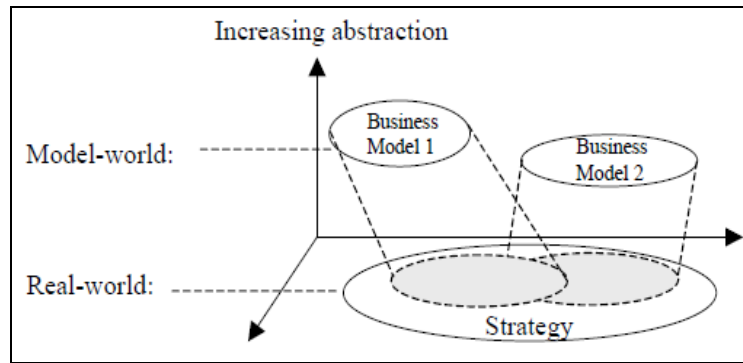


Figure 1: The Relationship Between the Concepts “Business Model” and “Strategy” [5]

Assuming this position, we seek to create synergies between the business model design and the environmental scanning in order to benefit from their complementarities as much in the definition phase of the strategy of the company as during its activities, which enable to challenge the viability of the business model and to foster it by its adaptation to the environment changes.

Considering this goal, we formulated 3 hypotheses:

H0 - The computer-assisted design of the business model allows to accompany the SME’s executives throughout the elaboration of their strategic orientations.

H1 - The elaboration of the strategic orientations coming from the reflection on the business model design allows to accompany the SMEs’ executives in the definition of their environmental scanning axes.

H2 - The semantic technology is able to simplify the use of these tools by giving a meaning to the processed data.

In order to reach this goal, we produce a software solution offering an extension of the user’s capacities as regards navigating, gathering and processing of a great volume of information coming from the World Wide Web.

Our approach aims at offering four principal advantages: (1) the platform assists the user in the formulation of his business model; (2) the user disposes of a platform which allows him to confront his vision of the organisation with that of his collaborators; (3) the platform provides and analyses external information related to the different elements of the business model; (4) the configuration of different business models allows to follow different scanning subjects.

Moreover, we do not seek to visualise the scanning results with regards to properties linked to the information itself (e.g. with information categories such as “competitive information”, “technological information”, etc.), but according to their impact on the user’s business model.

3. Methodology

This first step of our research deals with (1) assistance in formulation of the business model and (2) the functionality allowing the user to compare the business models of his team.

In order to assist managers through their strategic reflection, we chose to orient our research towards the business model design according to the method of the business model canvas (BMC) developed by Osterwalder [27]. This choice was motivated by the fundamental role of the business model design in strategic reflection, and by the similarity between the questions generated during the design phase of both the business model and the environment scanning process. Moreover, the canvas constitutes a simple visual dashboard illustrating the 9 building blocks of the business model: key activities, value proposition,

customer relationship, customer segment, distribution channel, key resources, key partners, cost structure, revenues (Figure 2).

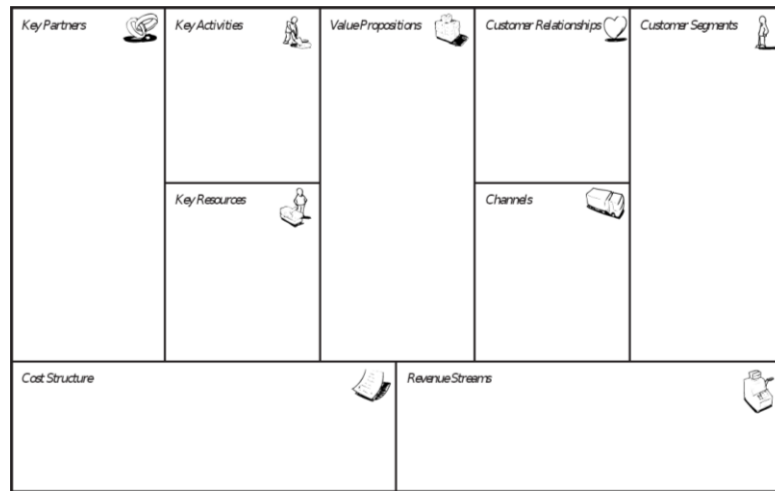


Figure 2: The 9 Building Blocks of the Business Model [3]

To reach our first assistance goal, we designed a web-based tool, which assists users without any precognition in strategy in the design of their business model through simplified quizzes.

The development of this application followed a two-steps methodology. At first, a theoretical approach consisted in the definition of the expected functionalities of the application through an exhaustive review of existing computer assisted solutions of business model design and the evaluation of their capacity to meet the need for simplification and support of the users. Then, we adopted a methodology responding to the Agile Manifesto (2001) in order to focus on the development efforts of pragmatic functionalities [28]. The adopted Scrum methodology is an Agile method dedicated to product development. Its advantages consist in dividing the development phases of the functionalities into short periods named “sprints”. This division allows developers to always be in contact with the end-user and his functional needs [29].

In the second step, a longitudinal case study will enable us to determine the efficiency of the global assistance tool in defining strategic orientations and environmental scanning.

4. Technology Description

In this section we will describe the implemented functionalities which deal with the assistance to business model design in designing business models without prior knowledge, and the collaboration of employees with the business model design.

To realise the first step of our project, the web application was hosted in a virtual environment within our university. We describe below the different technologies used to achieve the platform of the business model design.

The management of the users, the management of the canvases and the pages dedicated to the quiz were developed using the integrated development environment Microsoft Visual Studio 2010. The website is based on Microsoft ASP.NET technology and the programming language C#. In order to increase the ergonomics of the website, certain components come from AJAX Control Toolkit Framework. The display of the different canvases uses Flash technology and were developed using Action Script 3.0 language. The different pieces of information captured by the users are backed up in a database running under Microsoft SQL Server 2008 Engine.

For the second step, the further functions of assistance to the environmental scanning will include ‘smart’ and alert functions. In order to deal with the complexity of information

scoring which allows to stress the best element for each block of the business model, we consider developing Bayesian semantic network on account of its capacity to emulate complexes situations [15], to represent uncertain relationships [30], and to reason with those relationships among uncertain events in the field of information retrieval [31].

This probabilistic approach will allow us to develop an estimative model of impact of the information based on the different business model and environmental business ontologies [24, 25, 26], and, in fine, to score the information in order to return only the most relevant to the user. For the alert function, the web semantic technology based on GATE (General Architecture for Text Engineering) and OWLIM SE (semantic repository able to load huge quantity of RDF statements) shall allow notably to simulate an expert system because the integration of inference rules is liable to generate alerts in the case of the realisations of definite and evolving conditions. The anticipation of the vertical integration of a competitor of the user through the detection of information in commonly related to providers, key activities, key resources, value proposition and competitors of the users constitute, according to us, an opportunity of anticipatory scanning [32].

5. Developments

The application developed at this stage allows a manager to create his project and a users' group. Each member of the group can create a business model and the manager has at his disposal an additional interface of fusion of the business models generated by his group.

The standard process of use of the platform consists of (1) the creation of the firm and the users, (2) answers to quizzes by the users and (3) consulting of the canvases by the manager. The authentication process serves to bind together the users, firms and business models. The distinction between standard user and head of project is marked at the creation of the firm. When the role of the head of project is selected, the system offers the user to create a firm profile by capturing different information such as his name, activity sector, etc. The head of project will then be able to create as many users as necessary. These users will all be attached to the profile of the firm.

The generation of the business model is based on a succession of quizzes linked to each block: value proposition, customer segment, distribution channel, customer relationship, revenues, key resources, key activities, key partners, cost structure [3] (Figure 3).

The screenshot shows the 'BUSINESS MODEL DESIGNER' interface. At the top, it says 'BIENVENUE Vincent!' and 'LOGOUT'. Below that, there are navigation links for 'HOME' and 'AIDE'. The main section is titled 'QUESTIONS' and asks the user to answer the following questions. The first question is 'Value Proposition' and the second is 'CARACTERISTIQUES'. The 'CARACTERISTIQUES' question asks: 'Parmi les caractéristiques suivantes quelles sont celles qui justifient que vos clients préfèrent vos produits/services à ceux de vos concurrents ?'. The options are:

- Entreprise privée
- Nouveauté
- Personnalisation (possibilité de personnaliser le produit / service au goût du client)
- Performance
- Fidélité (au produit / service ou à l'entreprise)
- Exclusivité (accès à un groupe restreint, impression d'être un client exclusif)
- Différenciation (par rapport à ses concurrents)
- Design
- Ergonomie (facilité d'utilisation)
- Marque (par exemple Hestie, Chanel, etc.)
- Qualité
- Réputation
- Offre diversifiée

Figure 3: General Questions Interface & Questions About Value Proposition

The ease of use is apprehended as a users' adhesion factor and as a support to the construction of the business models for people who do not have prior knowledge on the subject. The interface made of a basic quiz is easy to understand and allows the automatic generation of the business model canvas. The input assistance allows several options such as the quiz allowing to write an unlimited number of ideas and then to select only the best

ones, the Tag-Clouds harbouring elements of the answers related to the selected blocks and which come from the database fed by other users, the word completion modules displaying an unfolding list of elements of answers taken from the answers of other users.

After having tested the modelling of business models of several companies, we soon realised that the competition dimension lacked, a fortiori with regard to our goal to integrate the results of environmental scanning. So, we have integrated this dimension liable to bring in complementary information to the strategic reflection.

Once the filling in of the quiz is over, the system generates the business models. Then, the manager can access the different business models of his collaborators through the answers collected through the quizzes. The different elements are displayed as post-its with which the user can interact. A concept that is close to reality and hence easy to apprehend. The new block “competitors” appears in our application under the block “Cost” (Figure 4).

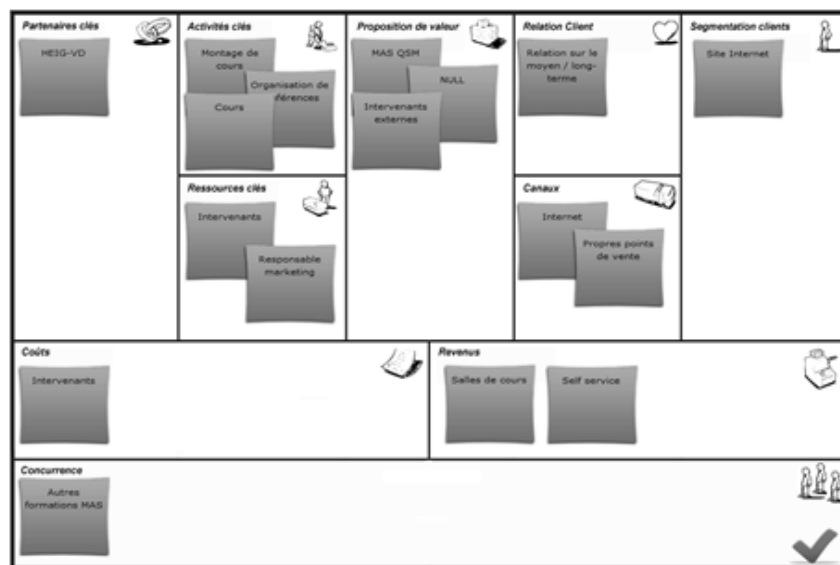


Figure 4: Interface Illustrating the BMC Visualization on the Manager-Side

6. Business Benefits

Our intermediary platform is able to assist firms and/or managers in generating their business models and in confronting the business models created by a group of collaborators. This contribution enables the generation of ideas in a restricted group with a web-based tool allowing to think over a business model without any prior knowledge and to take advantage from the experience and ideas of the collaborators of the firm, practitioners, members of the board, as well as venture capitalists.

The process of the virtual platform is modelled on project management with predefined roles (project manager & users). However, the use of the platform could be adapted to any type of management as the roles of the stakeholders can be “ad hoc” distributed, without any imperative correlation with the reality. Even a unique project holder could take advantage from the quiz process and the assistance functions in building its business model.

Moreover, depending on the direction given by the manager to steer the reflection of the business model, different modes of creativity can be organised. For example, the ideal future method compels the collaborators to share and develop a vision of the organisation. According to this direction, each employee is invited to describe his vision of the organisation and his improvement leads. The manager has thus the possibility to confront these different visions, between them as well as with his own vision of the organisation. This method constitutes an idea generating tool as well as a teambuilding tool [33].

The proposed platform takes part, at its level, to our global goal considering that our intermediary solution allows to support SMEs' managers in the definition of their strategy with the help of a support facilitating creativity, and around a reflection, in terms of the business model of the organisation and, in fine, able to favour innovation. Moreover, our platform constitutes the basis for our future extension tending to bring together business model design and environment scanning with semantic web technology.

The combination of those functions allows to consider that many forms of SMEs would take advantages depending on their different needs. Firstly, early stage start-ups need assistance in the design of their business model, while considering their strategy [34]. Afterwards, very small and larger SMEs need alerts and environmental scanning functions to capture signals suggesting when their business models could need a fundamental redesign [35]. Then they could take advantage from the creativity functions of the platform. Therefore, we consider that the global range of SMEs could benefit from our project, and its costs will be covered if a large number of SMEs take part of it.

7. Discussion & Conclusion

In this paper, we introduced a new tool to support SMEs in designing their business model without any precognition in the field of strategy. In addition, the produced output provides an innovative employees-sourced business model design platform.

We obtained results and feedbacks from a small number of companies on different categories such as ease of use, simplicity, confrontation of different business models and the new block "competitors". Nevertheless, other methodologies of business models design, which may offer possible alternatives to our business model framework, have not yet been tested. Moreover, our evaluations were carried out on a limited number of companies, leading an entrepreneurial strategy [11], and would need to be tested on a larger, and more diversified panel in order to evaluate its impact within different kinds of management methodologies and through different levels of maturity of the enterprise.

According to our findings, there are three contributions from our first output:

1. The elaboration of an independent application providing simplified input forms in order to support managers in describing their business model.
2. An assisted completion artefact based on an auto-generated tag cloud generated from the inputs computed by the community using the application.
3. An extra option enabling the employees to participate to the business model design reflection, and finally enable to generate, on the manager side, employees-sourced business model designs.

For our further work, we will address issues such as linking the outputs of the scanning systems through Bayesian network and Web semantic with the input forms in order to propose an alternative from the step of business model generation, facilitating the processes and to foster the strategic reflection with gathered information.

References

- [1] M.E. Porter, What is Strategy? Harvard Business Review, 1996, Nov-Dec.: 61-78, p. 68
- [2] M.E. Porter, Strategy and the Internet, Harvard Business Review, 2001, March: 63-78
- [3] A. Osterwalder, Y. Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers, Second Edition, 2010, Self-Publication, Canada, p. 14
- [4] J. Magretta, Why Business Models Matter, Harvard Business Review, 2002, May: 86-92
- [5] P.B. Seddon, G.P. Lewis, Strategy and Business Models: What's the Difference? in proceedings of the 7th Pacific Asia Conference on Information Systems, 10-13 July 2003, Adelaide, South Australia, p. 11
- [6] C. Choo, Environmental scanning as information seeking and organizational learning, Information Research, Vol. 7; Number1, October 2001, p. 1
- [7] J.L. Lequeux, M. Saadoun, Quel business model pour mon entreprise, Editions d'Organisation, 2008, Groupes Eyrolles, Paris

- [8] H. Madinier, Quelle veille stratégique pour les PME de Suisse Romande ?, *Documentaliste-Sciences de l'information*, Vol. 44, Number 4-5, Octobre 2007, Eds A.D.B.S., pp. 300 – 310
- [9] L. Begin, J. Deschamps, H. Madinier, *Competitive Intelligence in SMESs of French Switzerland: lessons from a research-action approach*, Geneva School of Business Administration Paper Research, 2008, Geneva, Switzerland
- [10] Office fédéral de la Statistique (OFS), Secrétariat d'Etat à l'Economie (SECO). URL: <http://www.bfs.admin.ch>; Accessed March 29, 2012
- [11] H. Mintzberg, J.A. Water, Of Strategies, Deliberate and Emergent, *Strategic Management Journal*, Vol. 6, Number 3, Jul. - Sep., 1985, pp. 257 – 272
- [12] T. Berners-Lee, J. Hendler, O. Lassila, *The Semantic Web*, *Scientific American*, 2001
- [13] J. Hendler, T. Berners-Lee, E. Miller, Integrating applications on the semantic web, *Journal of the Institute of Electrical Engineers of Japan*, Vol. 122, 2002, pp. 676–680
- [14] A. Kim, L.J. Hoffman and C.D. Martin, Building Privacy into the Semantic Web: An Ontology Needed Now, in *proceedings of Semantic Web Workshop, 2002, Hawaii, USA*
- [15] T. Bayes, An Essay towards solving a Problem in the Doctrine of Chances, *Philosophical Transactions of the Royal Society of London*, Vol. 53, 1763, pp. 370 – 418
- [16] I. Ciuciu, G. Zhao, J. Mülle, S. von Stackelberg, C. Vasquez, T. Haberecht, R. Meersman, K. Böhm, Semantic support for security-annotated business process models, in *proceedings of BPMDS/CAISE, Springer LNBIP (joint with EMMSAD), 2011, London*
- [17] M. Hepp, F. Leymann, J. Domingue, A. Wahler, D. Fensel, Semantic business process management: A vision towards using semantic web services for business process management, in *proceedings of the IEEE ICEBE, October 18-20, 2005, Beijing, China*, pp. 535 – 540
- [18] D. Karastoyanova, T. van Lessen, F. Leymann, Z. Ma, J. Nitzsche, B. Wstzstein, S. Bhiri, M. Hauswirth, M. Zaremba, A reference architecture for Semantic business process management systems, *Semantic Web Technology in Business Information Systems (SWEBIS), Workshop at Multikonferenz Wirtschaftsinformatik, 2008, Munich, Germany*
- [19] H. Chen, M. Chau, D. Zeng, CI Spider: a tool for competitive intelligence on the Web, *Decision support systems*, Vol. 34, Issue 1, 2002, pp. 1 – 17
- [20] R.L. Liu, Collaborative multiagent adaptation for business environmental scanning through the Internet, *Applied Intelligence*, Springer, Vol. 20, Number 2, 2004, pp. 119 – 133
- [21] H. Tan, P. Ghodous, J. Montiel, *Internet Business Intelligence*, in *proceedings of CONTENT 2010: The Second International Conference on Creative Content Technologies, 2010, Lisbon, Portugal*
- [22] H. Isaac, Utilisation d'Internet pour la veille stratégique : facteurs déterminant les pratiques des entreprises françaises, 8ème congrès de l'AIM, 2003, Grenoble, France
- [23] K.F. Li, *Internet Business Intelligence*, in *proceedings of International Conference on P2P, Parallel, Grid, Cloud and Internet Computing, 2010, Delft, The Netherlands*, pp. 276 – 277
- [24] G. Camponovo, Y. Pigneur, Information systems alignment in uncertain environments, in *proceedings of IFIP International Conference on Decision Support Systems (DSS), July 2004, Prato, Italy*
- [25] G. Camponovo, A proposal for a business environment ontology, in *proceedings of the European and Mediterranean Conference on Information Systems (EMCIS2008), May 25-26, 2008, Dubai, UAE*
- [26] G. Camponovo, Concepts for designing environment scanning information systems, *International Journal of Business and Systems Research*, Vol. 4, Number 1, 2010, pp. 1 – 21
- [27] A. Osterwalder, *The business model ontology: A proposition in a design science approach*, PhD Thesis, University of Lausanne, 2004
- [28] J.P. Vickoff, *Méthode Agile, Les meilleures pratiques, Compréhension et mise en œuvre*, Eds QI, 2009
- [29] C. Aubry, *SCRUM. Le guide pratique de la méthode agile la plus populaire*, Second Edition, France: Dunod, 2010
- [30] D. Heckerman, A. Mamdani, M.P. Wellman, Real-world applications of Bayesian networks, *Communications of the ACM*, Vol. 38, Number 3, 1995, pp. 24 – 26
- [31] R. Fung, B. Del Favero, Applying Bayesian Networks to Information Retrieval, *Communications of the ACM*, Vol. 38, Number 3, 1995, pp. 42 – 57
- [32] M. Sadok, S. Benabdallah, H. Lesca, Apports Différentiels de l'Internet pour la Veille Anticipative : Application au cas de réponse aux Atteintes à la Sécurité des Réseaux d'entreprises, *Actes du 8ième Colloque de l'AIM, 2003, Grenoble, France*
- [33] F. Debois, A. Goff, E. Chenevier, *La boîte à outils de la créativité*, France: Dunod, 2011
- [34] T. Verstraete, F. Kremer, E. Jouison-Laffitte, *Le business model : une théorie pour des pratiques*, *Entreprendre & Innover*, Vol. 13, 2012, pp. 7 – 26
- [35] W. Johnson, C.M. Christensen, H. Kagermann, Reinventing your business model, *HBR's Must-Reads on Strategy*, *Harvard Business Review*, 2008, pp. 59 – 68