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IT-ENABLED ORGANIZATIONAL AGILITY –PROPOSITION OF A NEW FRAMEWORK

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ABSTRACT

The environment of companies is nowadays changing continuously. This rapid evolution is related to several aspects: economic, political, technological, regulatory, social and ecological. In order to gain competitive advantage, firms should be able to adapt so as to identify opportunities quickly, launch innovative products and comply with local and international regulations. Organizational agility, a key dynamic capability of the firm, allows it to sense environmental change and respond adequately.
In this work, we present a new conceptual framework highlighting agility's enablers and their direct/indirect effect on firm's performance. Based on a systematic literature review, we identified the main agility's enablers groups (IT, process, knowledge management, innovation, organization structure, human resources), and the characteristics of an agile enterprise (speed, flexibility, awareness, responsiveness, integration and competency).
In addition, we focus in our proposed IT framework, on the impact of IT besides the complementary effects of the other agility's enablers, on fostering organizational agility and thereby on enhancing firm performance.

Keywords: *Organizational agility, Sensing, Responding, Information technology, Firm performance.*

1. INTRODUCTION

The history of agility started in the USA as the new model that will help to revitalize the US industry and regain its lost leadership in the 70s and 80s in favour of the Japanese and European industries.

In 1991, Robert Nagel and Rick Dove wrote a report which was published by Iacocca Institute and which aimed to develop a strategy for boosting competitiveness of the US industry for the next 15 years as to replace the mass production. They suggest that the classic organizational model does not allow companies to provide satisfactory answers to the demands of the post industrial world characterised by a growing importance of information and knowledge. Indeed, they proposed a new strategy in order to meet these challenges.
This strategy is based on the concept of "The agile enterprise" driven by four forces (continuous change, rapid response, evolving quality journey and environment responsibility). In order to achieve this vision, the agile enterprise should have key characteristics (empowered people, continuous learning, technology leadership ...) enabled by an agile infrastructure (organizational structures and practices, technology adoption and transfer, rapid cooperation mechanisms ...).
This infrastructure for enabling agile manufacturing enterprises depends on cooperation between firms and the industrial, governmental and academic representatives.

The concept of organizational agility is broader than the application of agile methodologies (XP, Scrum, etc). These methods are referenced by the agile manifesto since 2001 [1] as a new way of developing software in replacement of a cascade development cycle. It allows meeting customers' expectations, dealing with changes and optimizing delays when managing projects.

Also, organizational agility is different from the lean paradigm which started in 1952 with Toyota's production system [2]. Indeed, lean manufacturing is inappropriate for an uncertain environment [3] and is concerned essentially with Just-in-time production [4], Kanban production [5] [2] and optimization of the resources' use [2].

Thus, through this historical overview, the last two decades have witnessed a considerable

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importance of organizational agility which can help companies to take advantage of opportunities and deal with the changing environment. However, the question is about the adequate ways of activating and enhancing organizational agility in order to gain competitive advantage.

Therefore, we study through our research the following research questions:

RQ1: What are the main characteristics of an agile enterprise?

RQ2: Which firm's resources (including IT) can enable agility and to what extent?

RQ3: How firm's agility enhances its performance?

The structure of this work is organized as follow. Section Two provides a systematic literature review defining organizational agility, its enablers and characteristics. Section Three is devoted to the proposition of the new conceptual model. In section four, we will discuss the IT framework case presenting the IT-enabled organizational agility. Finally, section Five provides a brief conclusion of this article and the future research perspectives.

2. SYSTEMATIC LITERATURE REVIEW.

2.1 Background: organizational agility definition

Agility in manufacturing organizations can be defined as a combination of several features: speed, flexibility, proactivity, quality and profitability [6]. It includes two aspects [7]: adequate and rapid response to change (anticipated or unexpected); exploitation of environmental changes as opportunities. Agile manufacturing is also linked to virtual enterprise which can be set-up and changed rapidly. It allows bringing together different competencies, resources and skills of each partner of the joint-venture [8].

In addition to the research about agile manufacturing in the 90s, the concept has been expanded to the whole organization. Indeed, organizational agility is the capacity of the enterprise to sense opportunities/risks in its environment and to respond efficiently and rapidly [9] [10].It is the ability of a business to adapt to unexpected change through rapid and innovative responses exploiting the changes as opportunities for development and growth [11].

By sensing changes in the environment through knowledge management processes, organizational agility enables the firms to prioritize and choose the best solution among the possible alternatives, to change business processes and to customize real-time response [12].

Agile organizations are dynamic, innovative and adaptable. These organizations harmoniously combine the features of chaos, fluidity, and flexibility with a minimum of order, control, and predictability [13] [14].

Organizational agility allows the company to maintain a competitive leadership by responding quickly to various customer expectations, to the internationalization of competition, to market fragmentation and to the increase of external cooperation's relations [15].

There are three types of agility: customer agility, partnership agility and operational/internal agility [16]. On one side, customer agility is the ability to involve customers in the development of innovative products by sharing new ideas, co-creating the products or testing and giving feedback for new functionalities. Partnership agility deals on the other side, with the participation of suppliers in the proposition of higher added value products and services. The exploitation of these innovative opportunities with accuracy and speed is achieved through the operational agility of the firm [17].

2.2 Systematic Literature Review: PRISMA Statement

The methodology adopted to conduct the systematic literature review is based on the PRISMA Statement [18] (Preferred Reporting Items for Systematic Reviews and Meta-Analyses).

2.2.1 Description of the flow diagram

In figure 1, the flow diagram of the different phases of the SLR is described.

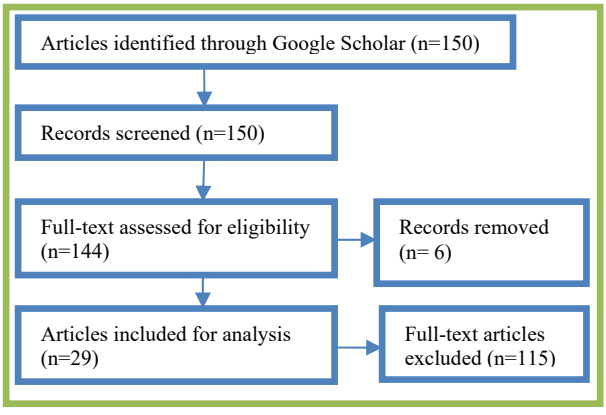

Figure 1: The SLR flow diagram

We identified the most cited 150 articles through Google Scholar since 1998. Indeed, we used the Publish or Perish Software [19] and specified the following query: 'Agile OR Agility'.

After screening titles and abstracts of the articles, we removed 6 articles which are related to other

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domains: sport, physics, mechanics, robotics, telecommunications and emergency management.

As the aim of this study is to focus on agility on the organizational level, we excluded based on full-text assessment 115 articles which are related to supply chain agility or which study agile methods for software projects. Consequently, we selected 29 articles related to enterprise agility.

2.2.2 Results

➢ Result 1:

We identified agility's enablers belonging to 6 categories: Information Technology, Process, Knowledge Management, Human Resources, organization structure and innovation.

None of the selected articles deals with the effect of the 6 enablers at the same time on firm's organizational agility.

Table 1 below presents the selected articles by reference, year, number of citations and the corresponding agility's enablers.

The results show that IT, Human resources and Process are the most cited groups of enablers among the selected articles with respectively 82%, 55% and 44%. The other groups namely innovation, knowledge management, and organization appear respectively in 27%, 17% and 17% of the selected articles. We can observe that IT is the most significant enabler studied in the recent years. It highlights the increased importance of IT in supporting firm's capabilities, especially agility which is a key dynamic capability [20].

➢ Result 2:

The review of these articles shows that organizational agility is usually driven by a change in market, competition, customers' needs, and technological, political or social environment of the firm. Also, agile enterprises have in common one or different sensing/responding characteristics, mainly: awareness, responsiveness, speed, flexibility, competency and integration.

➢ Result 3:

Few articles in the literature have studied the cause-effect relationship between organizational agility and firm performance. In our sample, we distinguish 2 articles on this subject.

Sambamurthy [17] have studied the effect of three types of agility (customer, partnering and operational) on financial performance through competitive actions helping firms to disrupt their rivals and seize short-term advantages.

Tallon and Pinsonneault [21] propose a framework linking the strategic alignment of IT to business performance through organizational agility. The empirical study of 241 companies showed that the alignment has a positive effect on agility, and that this latter has a positive effect on business performance especially in a turbulent environment.

Table 1: the Selected Articles and the Corresponding Enabler's Groups

ID	Reference	Year	Number of citations	Enablers' group					
				IT	Process	KM	HR	organization	Innovation
1	Sambamurthy et al.[17]	2003	1790	X	X	X			
2	Yusuf et al.[7]	1999	806	X	X		X		X
3	Sharifi and Zhang [6]	1999	670	X			X	X	X
4	Gunasekaran [22]	1999	591	X	X		X		
5	Meade and Sarkis [23]	1999	511	X	X		X		
6	Weill and Subramani[16]	2002	500	X					
7	Gunasekaran [24]	1998	499	X	X		X		
8	Overby et al. [9]	2006	431	X	X	X			
9	Goranson [25]	1999	385	X			X	X	
10	Sharifi and Zhang [29]	2001	346	X			X	X	X
11	Sharifi and Zhang [30]	2000	336	X			X	X	X
12	Dove[26]	2001	283		X			X	X
13	Sherehiy et al.[27]	2007	274		X	X	X	X	
14	Gunasekaran and Yusuf [28]	2002	273	X	X		X		X
15	Sharp et al.[31]	1999	262	X	X		X		
16	Tallon and Pinsonneault[21]	2011	260	X					
17	Dove[32]	1999	226			X			
18	Lu and Ramamurthy[11]	2011	197	X					
19	Van Oosterhout and Waarts[33]	2006	181	X					
20	Lin et al.[34]	2006	171	X	X		X		X
21	Tsourveloudis and Valavanis[35]	2002	167	X	X		X		
22	Arteta and Giachetti[36]	2005	167	X	X				
23	Pérez-Bustamante [37]	2009	152	X		X			X
24	Zain et al.[38]	2006	148	X					
25	Fink and Neumann [39]	2007	145	X					
26	Breu et al.[40]	2002	134				X		
27	Zhao et al.[41]	2007	123	X					
28	Dyer and Shafer[42]	1998	122				X		
29	Crocitto and Youssef [43]	2003	108	X			X	X	

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3. PROPOSITION OF A NEW CONCEPTUAL FRAMEWORK

3.1 Description Of The Conceptual Framework

Based on the literature review, we can summarize the main enablers and characteristics of organizational agility as described in figure 2.

Figure 2: Agility's enablers and characteristics

The conceptual framework of our study is presented in figure 3.

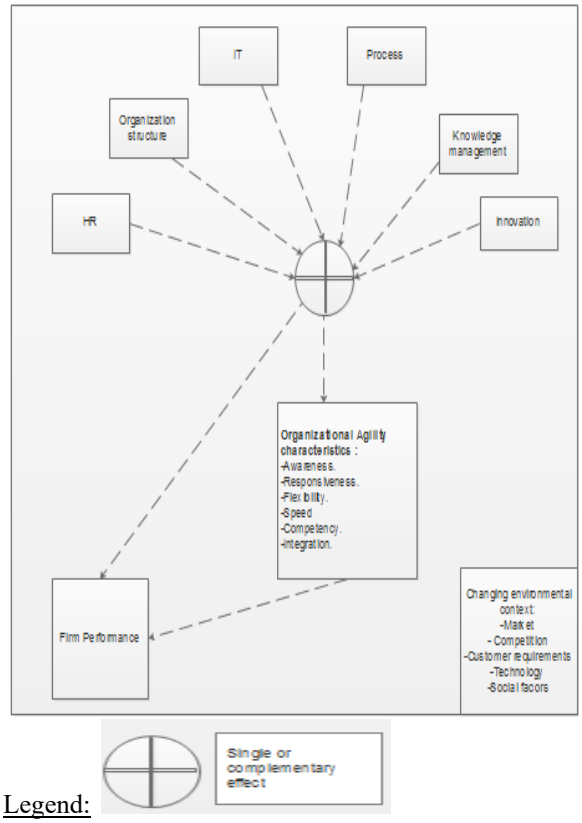

Figure 3: Our conceptual Framework

3.2 Key Constructs And Relationships

3.2.1 Constructs of the conceptual Framework

➢ Agility's enablers : 6 groups

o IT :

The information technology infrastructure is related to: application infrastructure, data management, communications, security and channels [16]. The IT infrastructure can be either owned by the firm or used through cloud services which offer efficient, scalable and cost-effective solutions for companies [44].

o HR:

It includes mindset, practices and skills of employees.

The company's human resources are at the heart of the company's development. This latter cannot be agile without adopting adequate HR practices.

o Process:

It includes as by the Porter's generic value chain two groups: primary processes (inbound/outbound logistics, operations, marketing and sales, customer service) and support processes (firm infrastructure, human resource management, technology development, procurement) [45].

o Knowledge management:

It is related to better managing and applying knowledge by the firm [32]. It includes creating new knowledge, storing it, sharing/diffusing it, and applying it for effective actions [46].

o Organization structure:

It is related to the structure and the configuration of the firm. Mintzberg distinguishes five types of organizational structures: entrepreneurial with flat structures (start ups), machine or highly bureaucratic, professional bureaucratic, divisional (business units) and innovative structures (adhocracy) [47].

o Innovation:

It involves a creative culture [48] and working environment [49]; the conception of new disruptive products [50] or incremental innovative products for new uses [51].

➢ Organizational agility characteristics

While, **awareness** is the ability to detect and anticipate accurately a change in the environment [12], **responsiveness** is associated to making

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adequate decisions and taking actions in order to respond to change [13].
Flexibility is the ability to adapt to change within pre-established parameters and limits by reconfiguring the same resources [52].
On one side, **competency** is related to productivity, efficiency, effectiveness and high quality. On the other side, **speed** means short production cycle, time to market for new products and quick execution of processes [6].
In addition, **integration** refers to coordination both inside firm across functions [7] and between firms through alliances, virtual enterprise and collaborative platforms [24].

➢ Firm performance

The competitiveness of a company is often related to the degree of customer satisfaction, market share, quality of products/services and the engagement of its employees.
Firm performance doesn't refer only to financial measures but also to having a balance between economic, social and ecological aims. There are different factors which impact sustainability: internal (managerial, operational, economic) and external (market, government, stakeholders' expectations) [53].

Different methods were proposed in order to assess firm's sustainable performance. The Sustainable Balanced Scorecard (SBSC) is among the most used methods. Indeed, beside the four perspectives of the BSC (financial, learning and development, customers and internal processes) [54], SBSC adds social and environmental aspects.

3.2.2 Main cause-effect relationships

➢ Direct effect

Within this resource based view (RBV) of the firm [55], enablers and their complementary effects are directly linked to performance. Indeed, It constitutes a set of tangible (IT) and intangible assets (Knowledge, Process, HR) that the firm can use [56]. When, the assets possessed by the company are valuable and rare, it can achieve a competitive advantage and thus, a short-term performance.

However, in order to attain a sustainable performance, the resources should be inimitable and non-substitutable [57].

➢ Indirect effect

Enablers and their complementary effects impact organizational agility, which in turn influences firm's performance.

IT infrastructure, when it is modular and scalable, can enhance firm agility [17].
Indeed, the service oriented architecture enhances better alignment between systems based on services and business requirements. This fosters agility in changing environments [21].

Also, flexible Processes enable the firm to sense effectively its environment and to respond to change in a customized manner [12] [58].

Concerning knowledge management, the more there is a balance in managing knowledge and change, the more company is agile [32].

Regarding human resources, the agility-oriented mindset and behaviors with the associated HR practices are the key enablers [13]. These include initiating and improvising new initiatives, being versatile, reconfiguring resources quickly, collaboration and continuous learning.
In addition to employees' behaviors, the company needs to integrate agility into HR management: agile career management in order to adapt to the new HR needs of the company; training employees to develop their skills; agility in the evaluation of employees' performance. It is about developing a culture and leadership that promotes the learning organization [43].

Also, agile organizations are characterized by an adaptable structure which is designed around independent and multi disciplinary business units [59].It allows the firm to respond effectively to changing environment as each business unit is focused on a specific market, line of products or segment of customers [60]. This form is defined by Mintzberg as the divisional structure which allows the firm to be customer-centered and to adapt easily to users' needs.

When the bureaucratic machine structure as defined by Mintzberg may be effective for mass production in predictable environments, the adhocracy is the structure which facilitates quick decision making and flexibility through self organizing teams [61]. Also, the flat structure improves coordination and collaboration among employees for better agility in rapidly changing environments [62].

Finally, the conception of innovative products helps the firm to adapt to changing environment. It allows introducing new products to deal with customer's needs, and to transform the company by entering new emerging markets [63].

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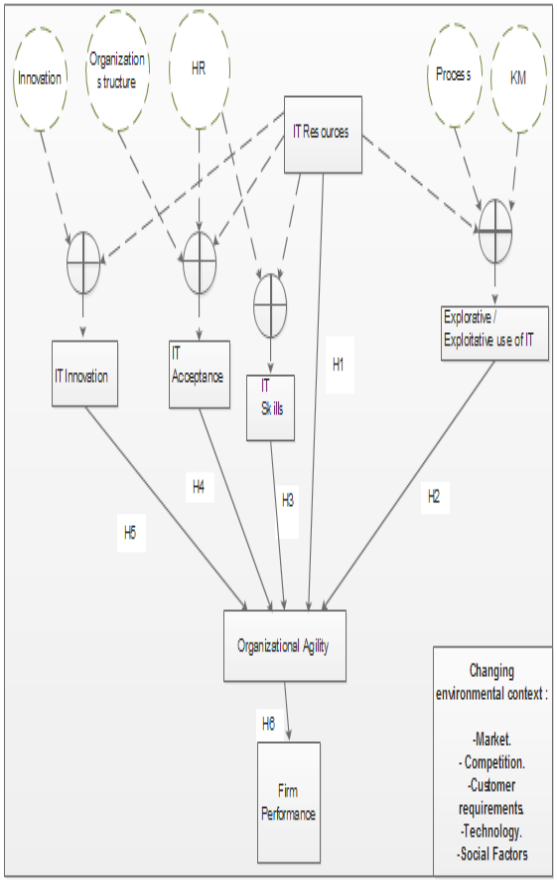
4. IT FRAMEWORK CASE

4.1 Description of the IT framework case

Based on the overall model viewed in section 3.1, we will focus in the rest of this article on the IT case. Indeed, we study the impact of IT on organizational agility (see figure 4). It can be either a direct impact, or an indirect effect in completion with the other groups of enablers (HR, organization structure, process, knowledge management and innovation).



Legend:

Figure 4: IT framework case

4.2 Description of the framework hypothesis

The research framework is thus based on six hypotheses (see table 2 below).

Table 2: Hypotheses of the Research Framework

Hypotheses	
H1	IT resources → Organizational agility
H2	Explorative / Exploitative use of IT → Organizational agility
H3	IT skills → Organizational agility
H4	IT acceptance → Organizational agility
H5	IT innovation → Organizational agility
H6	Organizational agility → Firm performance

H1: IT resources → Organizational agility

The IT infrastructure may enable business agility especially when it is organized around reusable and configurable web services [64]. Indeed, with Service oriented architecture, IT systems can easily evolve to adapt to new requirements and integrate with other systems for higher interoperability [65].

Also, this web services can be available over the internet through cloud computing infrastructure [66]. The latter allows the firm to adapt IT resources to the business needs and to easily adjust storage capacity if data volume increases.

H2: Explorative / Exploitative use of IT → Organizational agility

By Its explorative and exploitative IT capabilities, the firm is able to better sense the opportunities within its environment and to respond efficiently [17] [9].

IT resources can create complementary effects with business process and knowledge management. It is called digital options [17] which can be used by the firm in order to increase its process and knowledge reach/richness.

IT resources, like workflow/EDI/portal systems, increase process reach (market intelligence, partnerships) by optimizing collaboration and coordination between stakeholders inside and outside of the firm [67]. Also, the quality of information is improved within processes: availability, security, reliability, customization, accessibility [68]. These digital

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processes allow the company to respond efficiently to environmental changes [9] and therefore to improve its organizational agility.

Decisional systems like data warehouses and data mining tools permit the firm to gather high quality information from different sources across the company. This enhances the organizational agility by sensing new opportunities in the business [9]. Indeed, data mining tools help to collect raw data, to select target data and to identify meaningful information which constitutes the knowledge acquired [69]. This knowledge when assimilated and transformed can be used through business intelligence systems. Indeed, these latter allow decision makers to have insight based on automated reports used for analysis and to integrate precedent validated analysis outputs [70].

In addition, IT-enabled knowledge management enhances the absorptive capacity of the firm. [71], which is according to Cohen and Levinthal [72] 'the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends'. Zahra and George distinguish the potential absorptive capacity of the firm (PACAP), and the realized absorptive capacity (RACAP). The first (PACAP) is related to the acquisition of relevant knowledge from external sources and the assimilation of this knowledge by analyzing and understanding. And, the second (RACAP) is the transformation of this knowledge in order to be combined with internal sources for meaningful insights and the exploitation of the new knowledge within the company [73].

The absorptive capacity of the firm enhances the development of innovative products [73], and hence, helps it to be more agile [63].

Absorptive capacity is another dynamic capability which influences the agility of the company and its performance as the firm acquires in a timely manner relevant knowledge which can be used to sense opportunities and market changes [74].

In addition, company not only enhances its sensing capabilities through acquiring external knowledge, but also improves its response ability by an effective diffusion of knowledge internally as to adapt to environment uncertainty and turbulence [75].

H3 IT skills → Organizational agility

Employees' ability to master IT resources helps the company to rapidly deploy information systems.

By training and development, companies can build key technical competencies which are either general or specific [42]. The integration of diverse skills and technologies increases inter and intra organizational cooperation which enhances firm's agility [27].

Moreover, the use of HRIS allows the company to have the necessary information (return on training, turnover rate and costs, time to recruitment ...) which is useful for better decision-making [76].

H4 IT acceptance → Organizational agility

The technology acceptance model (TAM) [77] measures how stakeholders perceive and use the available information within the organization. This IT acceptance is different depending on the organization culture, top management support and HR involvement/experience.

Based on this model, Zain et al proposed a framework which states that the acceptance of information technology by users enhances the organizational agility of the firm. Indeed, attitude towards using systems is related to the perceived ease of use and usefulness. This attitude influences the organizational agility of the firm through the actual use of the system [38].

H5: IT innovation → Organizational agility

IT-based innovation provides firm with advanced systems and high performing standards [78].

Companies which adopt these cutting-edge technologies on the individual and organizational levels can proactively prepare for the future and thus be more agile [79].

Also, the more the firm adopt IT innovations and test new IT systems, the more it is able to renew and reconfigure IT resources to deal with rapidly changing environment [11].

In addition, innovative companies are able to prevent their used IT technologies from becoming obsolete through their R&D centers and academic partnerships [80].

H6: Organizational agility → Firm performance

An agile enterprise identifies market needs, opportunities for improvement of its products and implements the necessary actions to seize these opportunities and thus be more effective.

Agility is a needed capability as stakeholders' requirements of sustainability change overtime. Agile companies are thus more economically, socially and environmentally performing.

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Indeed, organizational agility allows firms to maximize their business value by involving stakeholders in order to adapt continuously the delivered products [81].

Also, agile companies share accurate information across the integrated business processes and can collaborate effectively with suppliers/clients across the supply chain [82]. This improves the company's relational and social capital.

Finally, agile organizations are well prepared and can easily comply with regulations by deploying environmental friendly responses to environment degradation [83].

5. CONCLUSION AND RESEARCH PERSPECTIVES

Based on the systematic literature review, the majority of research in agility has focused on a specific domain (HR, IT, process ...). Therefore, we proposed an integrated model for an overall view of organizational agility including the main characteristics and the most relevant enablers groups: IT, HR, Process, Knowledge management, innovation and organization structure.

Then, we focused on the IT framework case. This sub model is based on six hypotheses related to the impact of IT resources and their complementary effects with the other enablers of the integrated framework, on firm performance through the mediating role of organizational agility.

Future researches will aim to verify the previous hypotheses of our proposed IT framework case. Indeed, we will conduct an experimental study by selecting a sample of companies within or across different activity sectors.

Another perspective is to propose, based on the integrated framework, a strategy toward improving the firm's level of agility by activating or enhancing the adequate enablers. The effectiveness of this strategy is related to the assessment of the actual and the desired agility levels.

As the purpose of this article is to study the impact of IT on organizational agility, future researches may focus in details on the other enablers' groups: Knowledge management, Process, Human resources, innovation and organization structure.

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