2009

Mobile information systems and organizational control: A Foucauldian approach

Claudio Vitari
Università Carlo Cattaneo - LIUC, cvitari@liuc.it

SOURCES OF IT DYNAMIC CAPABILITY IN THE CONTEXT OF DATA GENESIS CAPABILITY

Abstract

Dynamic Capabilities are often considered as the factor justifying the different degrees of success of organizations in turbulent environment. However Dynamic Capability development remains a difficult issue to research, with a paucity of work directly addressing this question, despite its importance. The explanation of the sources of Dynamic Capabilities would give organizations the instruments to rationally improve their chance of success and to more likely sustain their competitive advantage.

We contribute to the emerging literature on Information Technology (IT) Dynamic Capability by proposing a research framework grounded in the three sources of Dynamic Capabilities: organizational processes, firm history and firm's assets. Our model takes into consideration also the moderating role played by environmental turbulence on Dynamic Capability and on process performance.

In this contribution we lay the theoretical and methodological groundwork and we foresee the test of the model using Data Genesis (DG) capability as the context. DG is the Dynamic Capability of (1) choosing IT to unobtrusively generate and capture data in digital form, (2) integrating the technology in the appropriate business processes, and (3) managing the digital data so captured.

Keywords: IT capability, Dynamic Capability, capability development, Data Genesis.

1 INTRODUCTION

Explaining the variation in the degree of success of business organizations is an evergreen issue in strategic management and organizational studies (Zollo & Winter, 2002). Among the different concepts developed so far, Dynamic Capabilities are one of the most recent ones, employed to justify the different degree of success, particularly in turbulent environment (Pavlou & El Sawy, 2006; Rai, Patnayakuni, & Seth, 2006; Zollo & Winter, 2002).

However Dynamic Capabilities is an unclear and troubling research construct. Dynamic Capabilities risk being a vague and tautological concept as they are the things that enable organizations to sustain competitive advantage, but they can only be inferred when looking at apparently successful organizations over sustained period of time (Priem & Butler, 2001; Zollo & Winter, 2002). Even if a certain consensus on Dynamic Capabilities is growing (Easterby-Smith & Prieto, 2008), the origin of Dynamic Capabilities over time is still a difficult issue. Testament to the difficulty associated with research on the emergence of Dynamic Capabilities is the paucity of research directly addressing this question. If Dynamic Capabilities really impact organizational success, the explanation of the sources of Dynamic Capabilities would give organizations the instruments to rationally improve their chance of success and to durably sustain their competitive advantage. As a consequence, research in this area is clearly important.

The embryonic research on this subject proposes different theories and models on the sources of Dynamic Capabilities (Montealegre, 2002; Pavlou & El Sawy, 2006; Tanriverdi, 2005; Teece, Pisano, & Shuen, 1997; Zollo & Winter, 2002), but an attempt to integrate these different propositions into a comprehensive and testable research model of the sources of Dynamic Capabilities is missing. In this article we seek to contribute to the emerging literature on the sources of Information Technology (IT) Dynamic Capability, in turbulent environments. We will attempt to integrate the different models and theories on the sources of Dynamic Capabilities into a comprehensive and testable research model of Dynamic Capability development and its antecedents: Organizational Processes, Firm history and Firm's assets. We question the validity of this comprehensive model on a specific IT Dynamic Capability: Data Genesis.

This paper is organized as follows: §2 introduces the theoretical framework, which is based on the resource-based view theory, and formally defines the Data Genesis (DG) Dynamic Capability construct. §3 summarizes the literature on the sources of Dynamic Capability. §4 describes the research model, its variables and hypotheses. §5 presents the research methodology and §6 concludes this research in progress highlighting the future directions and achievements.

2 THEORETICAL FRAMEWORK

2.1 Resource-based view

The resource-based view has been largely introduced in Information Systems research to theoretically ground studies on competitive advantage and its sustainability at the firm level (Wade & Hulland, 2004). This perspective highlights the importance of the firm's internal resources for the evaluation of the firm's competitive advantage (Eisenhardt & Martin, 2000).

Resources are the "assets and capabilities that are available and useful in detecting and responding to market opportunities or threats" (Wade & Hulland, 2004). More specifically, "assets are defined as anything the firm can use in its processes for creating, producing, and/or offering its products (and/or services) to the market, whereas capabilities are repeatable patterns of actions in the use of assets to create, produce, and/or offer products (and/or services) to the market" (Sanchez, Heene, & Thomas, 1996; Wade & Hulland, 2004). We label the products and/or services offered to the market by an

organization a bundle (Kohli & Bharadway, 2007) of products/services, in line with the cross-disciplinary service science movement (Chesbrough & Spohrer, 2006).

The resources that are valuable and rare temporary provide the competitive advantage. The extent to which these resources are also inimitable, immobile and not substitutable between firms explains the sustainability over time of the competitive advantage (Barney, 1991).

The attention paid by this perspective to the internal resources of the firm has the weakness of excluding the socio-economic environment outside the firm. In fact, the environmental conditions could change and make the firm's resources far less valuable (Leonard-Barton, 1992). Hence the resource-based view has been extended to better explain firm performance in turbulent environments (Eisenhardt & Martin, 2000).

2.2 Dynamic Capabilities

In turbulent environments, organisations need to constantly match or create market changes and Dynamic Capabilities are "the firm's processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match and even create market change" (Eisenhardt & Martin, 2000). Hence, Dynamic Capabilities have the potential (Prieto & Easterby-Smith, 2006) to create, to evolve and to recombine internal existing resources to adapt to turbulent environments (Teece, Pisano, & Shuen, 1997). This adaptability is especially required in fast-paced technological environments (Banker, Bardhan, Hsihui, & Shu, 2006; Teece, Pisano, & Shuen, 1997; Zahra, Sapienza, & Davidsson, 2006), as it has been theorized that adaptability can lead to improved customer value (Sambamurthy, Bharadwaj, & Grover, 2003; Wheeler, 2002).

The Resource-based View foresees a direct relationship between Dynamic Capabilities and the firm's process performance (Ray, Barney, & Muhanna, 2004; Ray, Muhanna, & Barney, 2005; Zahra, Sapienza, & Davidsson, 2006). However the process outperformance by one firm in competing environments does not automatically imply any firm's sustained competitive advantage due to the several mediating and moderating variables interposing between process outperformance and firm's sustainable competitive advantage (Ray, Muhanna, & Barney, 2005). The acknowledgement of this interposition between single process outperformance and sustained competitive advantage stimulates the study Dynamic Capabilities and its outputs, without employing organizational global performance as dependent variable.

Hence, in today's competitive environment characterized by increasing IT intensity (McAfee & Brynjolfsson, 2008) organizations should be capable of integrating new or established IT. A number of Dynamic Capabilities have been documented in the literature, in this study we focus on an emerging Dynamic Capability, Data Genesis (DG) (Piccoli & Watson, 2008).

2.3 Data Genesis as a Dynamic Capability

We define Data Genesis capability as the three-fold process of:

- Choosing Information Technology (IT) (Wheeler, 2002; Williams, 2003) to unobtrusively generate and capture data in digital form. Such IT may be emerging IT (Wheeler, 2002): a new technology not commercially viable (e.g., multi-touch displays). Otherwise, such IT may be enabling IT (Wheeler, 2002): an established technology used in an innovative application by the firm (e.g., RFID in gaming chips to track table play);
- Integrating the IT in the appropriate business processes;
- Managing the digital data so produced in order to continuously deliver accessible, accurate, complete and current digital data.

Data Genesis is a Dynamic Capability as it is the process that uses IT resources to gain and release data and as it has the potential to create, to evolve and to recombine internal existing IT and data to adapt to turbulent environments. This potential is based on the degree of Reconfigurability (Pavlou &

El Sawy, 2006) of the ineffective Data Genesis process into more promising one that better match the environment, better, faster, and cheaper than the competition (Eisenhardt & Martin, 2000).

Note that the DG capability is concerned with the unobtrusively generation and capture of digital data and its management, not with its actual use in, for example, analytical processes. In other words, DG is a prerequisite to being able to compete on analytics, thanks to the provision of accessible, accurate, complete and current digital data. The outperformance in the digital data accessibility, accuracy, completeness and currency are the valuable outcomes of Data Genesis.

Exemplars of DG capability are emerging, such as Harrah's corporation: this company systematically integrates IT, such as computerized slot machines or RFID chips, to gain unobtrusively valuable digital data on customers' behaviour at the Harrah's casinos and it exploits these pieces of data to profile and reward customers (DeLong & Vijayaraghavan, 2003; Piccoli & Watson, 2008). Note that the unobtrusive *generation* of the data in the above example pertains to DG capability while the *exploitation* is within the scope of other capabilities (e.g., data analysis).

3 SOURCES OF DYNAMIC CAPABILITY

The relevance of DG capability in fast-paced IT environments motivates its choice as the empirical Dynamic Capability on which we build the model of the sources of Dynamic Capability. If several studies have investigated Dynamic Capabilities and their effects on business performance, there is not an equivalent attention to the sources of Dynamic Capabilities (Montealegre, 2002; Pavlou & El Sawy, 2006; Tanriverdi, 2005; Teece, Pisano, & Shuen, 1997; Zahra, Sapienza, & Davidsson, 2006; Zollo & Winter, 2002) and an integrative model gathering all these sources is missing.

By the consequence, we propose an integrative research model of the sources of Dynamic Capability. Our starting point to understanding the sources of Data Genesis Capability are the three sources of Dynamic Capabilities in rapid technological change environments (Teece, Pisano, & Shuen, 1997):

- The organizational processes of sensing, coordination, integration, learning.
- The firm's assets, which define the firm-specific strategic position,
- The firm history, which accounts for the path dependent nature of capabilities.

Leveraging these theoretical sources of Dynamic Capabilities, a first case study empirically highlighted the set of actions to develop capabilities (Montealegre, 2002). The organizational processes of sensing, coordination, integration and learning emerged as important in capability development. By contrast, the firm's assets and the firm history played a marginal supporting role.

Others have theorized that the learning mechanisms would be the main independent variable influencing the development of the Dynamic Capabilities (Zollo & Winter, 2002). Hence theoretically, learning would be the main organizational process for the development of Dynamic Capabilities. The other organizational processes of sensing, coordination and integration as well as the firm's assets and history have been neglected.

In 2005, firm's assets and organisational processes were combined in a model of Dynamic Capability development (Tanriverdi, 2005). In particular capability development depended on the IT infrastructure and IT management processes. IT infrastructure is one kind of firm's assets, while IT management processes are a portion of the organisational processes of sensing, coordination, integration and learning. Nevertheless, this integration in one single model of Dynamic Capability development of these two different sources of Dynamic Capability still excluded firm history as the third source of Dynamic Capability.

An additional theoretical contribution reaffirmed the role of the organizational processes and of the environmental turbulence in the dynamic capability development (Zahra, Sapienza, & Davidsson, 2006). The processes of coordination, selection and combination were proposed as the main organizational processes that enable the firm to build dynamic capabilities. The theoretical model

proposed also that the environmental turbulence decreases the relative performance of the existing capabilities and hence stimulates the development of new dynamic capabilities in replacement of the obsolescing ones. The others sources of dynamic capabilities, as such firm history and firm's assets, had no impact on dynamic capability development.

The last work proposes and measures the impact of IT leveraging competence on the development of Dynamic Capabilities (Pavlou & El Sawy, 2006). IT leveraging competence is proposed as the only independent variable, is conceived as the ability to effectively use IT functionalities and it can be classified among the firm's assets. The other firm's assets and the firm history were excluded from this study. On the contrary, the organizational processes of coordination, integration and learning played the role of mediators between IT leveraging competence and Dynamic Capabilities. Finally, the environmental turbulence moderated the relationships between all these variables.

Even if at different extent, all the three sources of Dynamic Capabilities have been studied separately by different authors. The lack of a comprehensive research model including all the three kinds of sources of Dynamic Capability appears as the main research gap. Therefore, our main contribution is the design of a model which combines the three sources of Dynamic Capabilities in a comprehensive research model of the sources of Dynamic Capability.

4 RESEARCH MODEL

Our research model integrates and organizes previous literature around the three-fold classification of the sources of Dynamic Capabilities: organizational processes, firm's assets and firm history (Teece, Pisano, & Shuen, 1997). We posit that these processes are responsible for the emergence of DG capability. The outcome variables, Digital Data Accessibility, Accuracy, Completeness and Currency, dependent on DG capability and the variable Environmental Turbulence moderates some relationships. The specification of our hypothesized relationships completes the presentation of the variables (Figure 1).

4.1 Organizational Processes

The Organizational Processes of Sensing, Learning, Coordinating, and Integrating play a pivotal role in developing Dynamic Capabilities when the opportunity or need arise (Kogut & Zander, 1996; Maritan, 2007; Pavlou & El Sawy, 2006; Zahra, Sapienza, & Davidsson, 2006). The Sensing process is related to the understanding of the environment, the identification of market needs and opportunities. The Learning process determines the building of new thinking and the generation of new knowledge to enhance existing resources. The Coordinating process is about the allocation of resources, the assignment of tasks and the synchronization of the activities. The Integrating process concerns the implementation of the new configurations of operational competencies by developing the required patterns of interaction. So:

H1: the effectiveness of the Sensing has a positive and direct impact on DG capability.

H2: the effectiveness of the Learning has a positive and direct impact on DG capability.

H3: the effectiveness of the Coordinating has a positive and direct impact on DG capability.

H4: the effectiveness of the Integrating has a positive and direct impact on DG capability.

4.2 Firm's assets

Different kind of assets can positively influence the possibility to develop new capabilities: technological assets, complementary assets, financial assets, reputational assets, structural assets, institutional assets, market structure assets (Teece, Pisano, & Shuen, 1997). The main kind of asset influencing the development of Data Genesis capability are IT assets as on IT assets the IT

Capabilities, and specifically Data Genesis, are built (Tanriverdi, 2005). For example, TER Rhone-Alpes, a French regional railway company chose RFID cards and readers to generate and capture digital data about the passengers' flows on its trains. Passengers load on this RFID card their train passes and they have to validate the card at a RFID card reader, before getting on any train. These digital data are then used to adapt the frequency and the capacity of the trains based on their actual use, improving, by one hand, the passenger satisfaction and, by the other hand, the optimization of the train fleet.

IT assets are a two-fold category composed of : IT Infrastructure and Information Repositories (King, Grover, & Hufnagel, 1989; Piccoli & Ives, 2005). IT Infrastructure is "the base foundation of the IT portfolio (including both technical and human assets), shared through the firm in the form of reliable services" (Broadbent, Weill, & St. Clair, 1999) or functionalities (Fink & Neumann, 2007; Pavlou & El Sawy, 2006; Zhu & Kraemer, 2005). The IT Infrastructure varies in reach, and range (Piccoli & Ives, 2005). The reach of the IT Infrastructure measures the extent of the connectivity both within and outside of the firm, while the range of the IT Infrastructure sizes the scope of services that it can support. As reach and range of the IT Infrastructure increase, the IT Infrastructure ability to support capability development increases as well. The reach and range of the existing IT Infrastructure influence the possibility and cost of IT integration for gaining unobtrusively valuable digital data hence impacting on the development of DG capability. TER Rhone-Alpes has progressively extended the reach of its IT infrastructure to deploy RFID card readers from the principal traffic railways to the secondary railways, in order to capture digital data on passenger flows.

The second category of IT assets gathers the Information Repositories. An Information Repository is "a collection of logically related data, organized in a structured form, that is accessible and usable for decision-making purposes" (Piccoli & Ives, 2005). As capabilities relying on organized data need Information Repositories to develop (Piccoli & Ives, 2005), also DG capability needs Information Repositories to develop. Given that DG capability includes the use and management of digital data, DG capability needs Information Repositories to organize and access the gained digital data. A lack of Information Repositories would restrain the organization in data availability and by consequence impeding the development of DG capability. TER Rhone-Alpes exploited its information repositories on the sales of paper-based ticket and passes to establish the first kinds of train passes to transfer on the RFID card and the first train stations to deserve with the RFID readers.

Finally , IT Infrastructure and Information Repositories are subjected to asset stock accumulation dynamics (Ingemar & Cool, 1989; Piccoli & Ives, 2005): the IT Infrastructure and the Information Repositories can be accumulated by the organization into IT asset stock over time. The reach and the range of IT Infrastructure as well as the volume of Information Repositories can increase, extending the pre-existing IT asset stock. This IT asset stock accumulation influences, in general, Dynamic Capability development as well as DG capability in particular. An extended stock of IT assets facilitates the development of DG capability. Therefore, we respectively hypothesise that:

H5: the stock of IT Infrastructure has a positive and direct impact on DG capability.

H6: the stock of Information Repositories has a positive and direct impact on DG capability.

4.3 Firm history

Firm history explains the existing firm's position and the same time it influences the firm's opportunities ahead, framing the path dependencies of organizations (Teece, Pisano, & Shuen, 1997). Present capabilities depend on previous ones and they constrain new ones, because learning tend to be local and related to existing processes (Teece, Pisano, & Shuen, 1997; Zahra, Sapienza, & Davidsson, 2006). By consequence, the development of DG capability depends on historically existing Dynamic Capabilities closely related to DG, as such: IT capability and Information capability.

IT capability is the multi-dimensional and enterprise-wide capability to leverage IT (Bharadwaj, Sambamurthy, & Zmud, 1999). The historical capacity to leverage IT will favours the recognition by

the firm's IT personnel of the potential of emerging/enabling IT to generate and capture digital data and the good relationships between IT personnel and line management in integrating such IT within appropriate business processes is critical. The lack of IT capability would make unclear the choice of the IT to integrate and would cause the eventual IT integration ineffective. By consequence, digital data would not be accessible or would be of poor quality, impeding any effective use (Culnan, 1983; O'Reilly, 1982; Zimmer, Henry, & Butler, 2007).

Harrah's IT managers and customer service managers realized very early on that a modern slot machine is a digital computer and they worked together to develop a customer relationship management information system which collect over time digital data on the customers' behaviours at slot machines (DeLong & Vijayaraghavan, 2003; Piccoli & Watson, 2008).

The concept of Information capability is rooted in Information Theory (Shannon & Warren, 1949) and Information Capability is proposed as the capacity of disseminating (Mathews & Healy, 2007), or applying and managing (Yoon, 2005), or processing (Lin, 2005) information. The historical capacity to manage information will enable the firm to manage digital data and therefore take advantage of its ability to unobtrusively generate the data in digital form. Conversely, the inability to manage digital data would negate the value of data capture and integration.

Harrah's corporation preferred digital data on guest preferences and transactions coming from slot machines than the unstructured information coming from customer service staff. The same firm processes the collected customer data, from slot machines, to profile gamblers and it disseminates these profiles, throughout the different casinos (DeLong & Vijayaraghavan, 2003; Piccoli & Watson, 2008).

So, we hypothesize that:

H7: IT capability has a positive and direct impact on DG capability.

H8: Information capability has a positive and direct impact on DG capability.

4.4 Digital Data Accessibility, Accuracy, Completeness and Currency

The performance of an organization in Data Genesis capability does not automatically imply any sustained competitive advantage due to the several mediating and moderating variables interposing between Data Genesis outperformance and organizational sustainable competitive advantage (Ray, Muhanna, & Barney, 2005). Data Genesis capability aims at outputting accessible, accurate, complete and current digital data. The use in, for example, analytical processes of the gained digital data will depend on their accessibility, accuracy, completeness and currency (Culnan, 1983; O'Reilly, 1982; Zimmer, Henry, & Butler, 2007).

Information accessibility is the extent to which an individual perceives that any particular source is available for use (Zimmer, Henry, & Butler, 2007). Information accessibility is the most important driver for information source selection for use, with people consistently choosing and using lower-quality sources that are more accessible over higher-quality sources that are less accessible (Culnan, 1983; O'Reilly, 1982; Zimmer, Henry, & Butler, 2007).

Nevertheless, information quality is important because when sources are equally accessible, individuals will consistently choose and use sources that are perceived of higher quality (Hirsch & Dinkelacker, 2004; O'Reilly, 1982). Information Accuracy, Completeness and Currency are dimensions of the quality of the information retrieved from an information system (DeLone & McLean, 1992; Nelson, Todd, & Wixom, 2005). Accuracy refers to the degree to which information is correct, unambiguous, meaningful, believable, and consistent. Completeness is about the degree to which all possible states relevant to the user population are represented in the stored information. Currency concerns the degree to which information is up-to-date and precisely reflecting the current state of the world that it represents.

Harrah's corporation appreciates the quality and accessibility of the collected data on customers at the slot machines. Basing on the accessibility, accuracy, completeness and currency of the accumulated transactional data from past guests, Harrah's can quickly estimate the customer's future value within minutes of the player joining the program. This enables the casino to start treating the customer according to his or her future value rather than having to wait for observed play before starting to provide rewards (Piccoli & Watson, 2008).

Consequently, the hypothesis we propose is that:

H9: the DG capability has a positive and direct impact on Digital Data Accessibility.

H10: the DG capability has a positive and direct impact on Digital Data Accuracy.

H11: the DG capability has a positive and direct impact on Digital Data Completeness.

H12: the DG capability has a positive and direct impact on Digital Data Currency.

4.5 Environmental Turbulence

Environmental Turbulence describes the general conditions of uncertainty and/or unpredictability caused by the changes in customer preferences and technology development (Mendelson & Pillai, 1998). Customer preferences' turbulence causes unpredictability in market demand, while, technology development's turbulence causes uncertainty regarding new technological breakthroughs.

On one hand, Environmental Turbulence stimulates the reconfiguration of existing capabilities, increasing the possibility that the Organizational Processes of Sensing, Learning, Coordinating, and Integrating develop new valuable capabilities (Sambamurthy, Bharadwaj, & Grover, 2003; Zahra, Sapienza, & Davidsson, 2006). On the other hand, Environmental Turbulence weakens the process performances depending on the existing Dynamic Capabilities (Teece, Pisano, & Shuen, 1997). So, we propose that Environmental Turbulence reinforces the relationship between Organizational Processes and Data Genesis, while it attenuates the relationships between Data Genesis and Information Accessibility, Accuracy, Completeness and Currency:

H13: Environmental Turbulence positively moderates (i.e. reinforced) the relationship between Sensing and DG capability.

H14: Environmental Turbulence positively moderates (i.e. reinforced) the relationship between Learning and DG capability.

H15: Environmental Turbulence positively moderates (i.e. reinforced) the relationship between Integrating and DG capability.

H16: Environmental Turbulence positively moderates (i.e. reinforced) the relationship between Coordinating and DG capability.

H17: Environmental Turbulence negatively moderates (i.e. attenuates) the relationship between DG capability and Digital Data Accessibility.

H18: Environmental Turbulence negatively moderates (i.e. attenuates) the relationship between DG capability and Digital Data Accuracy.

H19: Environmental Turbulence negatively moderates (i.e. attenuates) the relationship between DG capability and Digital Data Completeness.

H20: Environmental Turbulence negatively moderates (i.e. attenuates) the relationship between DG capability and Digital Data Currency.

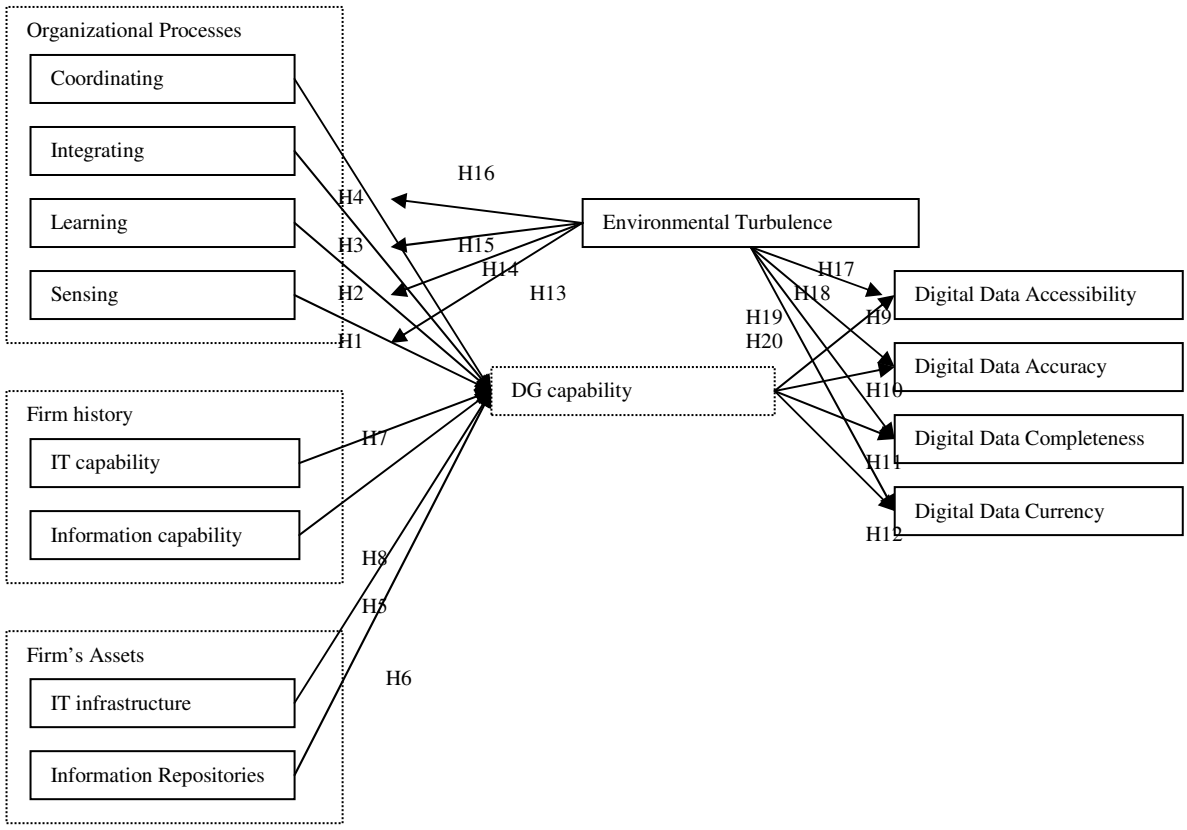

Figure 1 The research model

5 RESEARCH METHODOLOGY

We are now engage in the data collection phase of this research in order to test the model through a double Configurational-Structural approach. Firstly, we will test our theory-based structural model, through Structural Equation Modelling (SEM). As the organizational alignment on the three sources of Dynamic Capabilities facilitates the development of new capabilities (Teece, Pisano, & Shuen, 1997), we think that the internal consistency among the three sources of Data Genesis will enhance its development. Hence, we will cluster the empirical data sample, in order to identify the different organizational configurations (Meyer, Tsui, & Hinings, 1993). Finally, we will test the configuration-based structural model, through SEM.

A questionnaire-based survey will be the main source of empirical data on a sample of key informants in different organizations. The target population is hospitals, as they are data intensive organisations and DG capability could advance the medical care standards (Piccoli & Watson, 2008). 200 responses from distinct organisations are pursued to assure a convenient sample size due to the 100 measured items on the 15 constructs (with 6 items for the most complex construct).

The key informants will be IT managers and line managers in order to reduce common method bias (Straub, Boudreau, & Gefen, 2004). IT managers are likely to be the most informed about IT assets, IT capabilities in general and Data Genesis Capability specifically. Line managers are likely to be the most informed about environmental turbulence, organisational processes, Information Capability and Data Genesis output. A formal check will assess the managers' understanding on the different topics of the questionnaire (Pavlou & El Sawy, 2006), using a cut-off point of 5 out of 7.

Existing measurement scales operationalize all the constructs of the model.

- Organizational Processes – Sensing. The effectiveness in sensing the environment will be reflected by the adaptation of the market orientation measurement scale (Kholi & Jaworski, 1990; Pavlou & El Sawy, 2006).
- Organizational Processes – Learning. Effectiveness in learning will be measured by the adaptation of the absorptive capacity measurement scale (Cohen & Levinthal, 1990; Pavlou & El Sawy, 2006).
- Organizational Processes – Coordinating. Effectiveness in coordinating will be evaluated by the adaptation of the coordination capability measurement scale (Malone & Crowston, 1994; Pavlou & El Sawy, 2006).
- Organizational Processes – Integrating. Effectiveness in integrating will be estimated by the adaptation of the collective mind measurement scale (Pavlou & El Sawy, 2006; Weick & Roberts, 1993).
- Firm history – Information capability. The Information capability construct will be measured adapting the Information capability measurement scale (Marchand, Kettinger, & Rollins, 2002) with its two dimensions: Information management and Information behavior.
- Firm history – IT capability. The IT capability measurement scale will adapt the Technical Capability, Behavioral Capability and Business Capability dimensions of IT Personnel Capability construct (Fink & Neumann, 2007).
- Firm's Assets – IT Infrastructure. The IT infrastructure measurement scale will adapt the IT infrastructure Capability (Fink & Neumann, 2007).
- Firm's Assets – Information Repository. The Information Repository construct will be reflected by the adaptation and unification of two different Repository scales (Freeze & Kulkarni, 2005).
- DG Capability. The DG capability scale will adapt:
  - Choosing New Emerging/Enabling Technologies construct (Wheeler, 2002; Williams, 2003), to measure the ability to choose emerging/enabling IT to gain unobtrusively valuable digital data.
  - IT Business process integration category of the IT Capability construct (Bharadwaj, Sambamurthy, & Zmud, 1999), to measure the ability to integrate in the business processes such IT.
  - Information Management dimension of the Information capability measurement scale (Marchand, Kettinger, & Rollins, 2002), to measure the ability to manage digital data.
  - Reconfigurability. The potential to reconfigure Data Genesis integrating will be estimated by the adaptation of Reconfigurability measurement scale (Pavlou & El Sawy, 2006).
- Digital Data Accessibility. The Digital Data Accessibility construct will be assessed by the adaptation of the Information Accessibility measurement scale (Zimmer, Henry, & Butler, 2007).
- Digital Data Accuracy. The Digital Data Accuracy construct will be measured through the adaptation of the Information accuracy measurement scale (Nelson, Todd, & Wixom, 2005).
- Digital Data Completeness. The Digital Data Completeness construct will be measured through the adaptation of the Information completeness measurement scale (Nelson, Todd, & Wixom, 2005).
- Digital Data Currency. The Digital Data Currency construct will be measured through the adaptation of the Information currency measurement scale (Nelson, Todd, & Wixom, 2005).
- Environmental Turbulence. The measurement of Environmental Turbulence construct will be based on the Turbulent Environment scale (Pavlou & El Sawy, 2006).

A set of Control Variables complements the measurement scale of the main constructs of the model. Several factors that have been previously shown to be related to Dynamic Capability development will be measured, so that their effects on Data Genesis Capability development will be controlled:

- The functional role of the respondents: management versus non-management positions (Fink & Neumann, 2007).
- The size of the organization through the number of employees (Bhatt & Grover, 2005; Fink & Neumann, 2007).
- The size of the IT department through the number of IT personnel (van der Heijden, 2000).

- The seniority of the respondents among senior, mid-level or junior managers (Fink & Neumann, 2007).

6 CONCLUSION AND FUTURE RESEARCH

Dynamic Capabilities are often considered as the factor justifying the different degrees of success of organizations in turbulent environment. However Dynamic Capabilities development remains partially unexplained. The explanation of the development of Dynamic Capabilities would give organizations the instruments to rationally improve their processes and increase indirectly their chances of success.

We contribute to the emerging literature on IT Dynamic Capability development by proposing and testing a research model on DG: the Dynamic Capability of (1) choosing IT to unobtrusively generate and capture data in digital form, (2) integrating the technology in the appropriate business processes, and (3) managing the digital data so produced.

This research in progress foresees the test of the research model on DG capability before the conference attendance in order to present some preliminary results at that time. Finally, future research includes the validation of the model in others organisations and for other Dynamic Capabilities in order to generalize the findings.

References

Banker, R. D., Bardhan, I. R., Hsihui, C., & Shu, L. (2006). Plant Information Systems, Manufacturing Capabilities, And Plant Performance. *Mis Quarterly, 30*(2), 315-337.

Barney, J. B. (1991). Firm Resources And Sustained Competitive Advantage. *Journal Of Management, 17*, 99-120.

Bharadwaj, A., Sambamurthy, V., & Zmud, R. (1999). *It Capabilities: Theoretical Perspectives And Empirical Operationalization.* Paper Presented At The Icis.

Bhatt, G. D., & Grover, V. (2005). Types Of Information Technology Capabilities And Their Role In Competitive Advantage: An Empirical Study. *Journal Of Management Information Systems, 22*(2), 253-277.

Broadbent, M., Weill, P., & St. Clair, D. (1999). The Implications Of Information Technology Infrastructure For Business Process Redesign. *Mis Quarterly, 23*(2), 159-182.

Chesbrough, H., & Spohrer, J. (2006). A Research Manifesto For Services Science. *Communications Of The Acm, 49*(7), 35-40.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective On Learning And Innovation. *Administrative Science Quarterly, 35*(1), 128-152.

Culnan, M. J. (1983). Environmental Scanning: The Effects Of Task Complexity And Source Accessibility On Information Gathering Behavior. *Decision Sciences, 14*(2), 194–206.

Delone, W. H., & Mclean, E. R. (1992). Information Systems Success: The Quest For The Dependant Variable. *Information Systems Research, 3*(1), 60-95.

Delong, T., & Vijayaraghavan, V. (2003). Harrah's Entertainment, Inc: Rewarding Our People (Pp. 24): Harvard Business School Publishing.

Easterby-Smith, M., & Prieto, I. M. (2008). Dynamic Capabilities And Knowledge Management: An Integrative Role For Learning? *British Journal Of Management, 19*(3), 235-249.

Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic Capabilities: What Are They? *Strategic Management Journal, 21*(10/11), 1105.

Fink, L., & Neumann, S. (2007). Gaining Agility Through It Personnel Capabilities: The Mediating Role Of It Infrastructure Capabilities *Journal Of Ais, 8*(8).

Freeze, R., & Kulkarni, U. (2005). *Knowledge Management Capability Assessment: Validating A Knowledge Assets Measurement Instrument*. Paper Presented At The Conference Namel. Retrieved Access Datel. From Urll.

Hirsch, S., & Dinkelacker, J. (2004). Seeking Information In Order To Produce Information: An Empirical Study At Hewlett Packard Labs. *Journal Of The American Society For Information Science And Technology, 55*(9), 807–817.
Ingemar, D., & Cool, K. (1989). Asset Stock Accumulation And Sustainability Of Competitive Advantage. *Management Science, 35*(12), 1504-1511.
Kholi, A., & Jaworski, B. J. (1990). Market-Orientation: The Construct, Research Propositions, And Managerial Implications. *Journal Of Marketing, 54*, 1-18.
King, W. R., Grover, V., & Hufnagel, E. H. (1989). Using Information And Information Technology For Sustainable Competitive Advantage: Some Empirical Evidence. *Information & Management, 17*(2), 87-93.
Kogut, B., & Zander, U. (1996). What Firms Do? Coordination, Learning, And Learning. *Organization Science, 7*(5).
Kohli, A. K., & Bharadway, S. G. (2007). Rethinking Customer Solutions: From Product Bundles To Relational Processes. *Journal Of Marketing, 71*, 1-17.
Leonard-Barton, D. (1992). The Factory As A Learning Laboratory. *Sloan Management Review,*.
Lin, P. (2005). Learning With Information Capacity Constraints. *Journal Of Financial & Quantitative Analysis, 40*(2), 307-329.
Malone, T., & Crowston, K. (1994). The Interdisciplinary Study Of Coordination. *Acm Computing Surveys, 26*(1), 87-119.
Marchand, D. A., Kettinger, W. J., & Rollins, J. D. (2002). *Information Orientation: The Link To Business Performance*. New York, Usa: Oxford University Press.
Maritan, C. A. (2007). Dynamic Capability And Organizational Processes. In E. H. Constance (Ed.), *Dynamic Capability*. Malden, Usa: Blackwell Publishing.
Mathews, S., & Healy, M. (2007). The Internet And Information Capability Reduces Perceived Risk Of Internationalisation: An Australian Sme Perspective. *International Journal Of Organisational Behaviour, 12*(1), 71-87.
Mcafee, A., & Brynjolfsson, E. (2008). Investing In The It That Makes A Competitive Difference. *Harvard Business Review*.
Mendelson, H., & Pillai, R. R. (1998). Clockspeed And Informational Response: Evidence From The Information Technology Industry. *Information Systems Research, 9*(4), 415-433.
Meyer, A. D., Tsui, A. S., & Hinings, C. R. (1993). Configurational Approaches To Organizational Analysis. *Academy Of Management Journal, 36*(6), 1175-1195.
Montealegre, R. (2002). A Process Model Of Capability Development: Lessons From The Electronic Commerce Strategy At Bolsa De Valores De Guayaquil. *Organization Science, 13*(5), 514-531.
Nelson, R. R., Todd, P. A., & Wixom, B. H. (2005). Antecedents Of Information And System Quality: An Empirical Examination Within The Context Of Data Warehousing. *Journal Of Management Information Systems, 21*(4), 199-235.
O'reilly, C. R. (1982). Variations In Decision Makers' Use Of Information Sources: The Impact Of Quality And Accessibility Of Information. *Academy Of Management Journal, 25*(4), 756–771.
Pavlou, P. A., & El Sawy, O. A. (2006). From It Leveraging Competence To Competitive Advantage In Turbulent Environments: The Case Of New Product Development. *Information Systems Research, 17*(3), 198-227.
Piccoli, G., & Ives, B. (2005). Review: It-Dependent Strategic Initiatives And Sustained Competitive Advantage: A Review And Synthesis Of The Literature. *Mis Quarterly, 29*(4).
Piccoli, G., & Watson, R. T. (2008). Profit From Customer Data By Identifying Strategic Opportunities And Adopting The "Born Digital" Approach. *Mis Quarterly Executive, 7*(3), 113-122.
Priem, R. L., & Butler, J. E. (2001). Tautology In The Resource-Based View And The Implications Of Externally Determined Resource Value: Further Comments. *Academy Of Management Review, 26*(1), 57-66.
Prieto, I. M., & Easterby-Smith, M. (2006). Dynamic Capabilities And The Role Of Organizational Knowledge: An Exploration. *European Journal Of Information Systems, 15*(5), 500-510.

Rai, A., Patnayakuni, R., & Seth, N. (2006). Firm Performance Impacts Of Digitally Enabled Supply Chain Integration Capabilities. *Mis Quarterly, 30*(2), 225-246.

Ray, G., Barney, J. B., & Muhanna, W. A. (2004). Capabilities, Business Processes, And Competitive Advantage: Choosing The Dependent Variable In Empirical Tests Of The Resource-Based View. *Strategic Management Journal, 25*(1), 23-37.

Ray, G., Muhanna, W. A., & Barney, J. B. (2005). Information Technology And The Performance Of The Customer Service Process: A Resource-Based Analysis. *Mis Quarterly, 29*(4).

Sambamurthy, V., Bharadwaj, A., & Grover, V. (2003). Shaping Agility Through Digital Options: Reconceptualizing The Role Of Information Technology In Contemporary Firms. *Mis Quarterly, 27*(2), 237-263.

Sanchez, R., Heene, A., & Thomas, H. (1996). *Introduction: Towards The Theory And Practice Of Competence-Based Competition*. Oxford, Uk: Pergamon Press.

Shannon, C. E., & Warren, W. (1949). *The Mathematical Theory Of Communication*. Urbana, Illinois, Usa: University Of Illinois Press.

Straub, D. W., Boudreau, M.-C., & Gefen, D. (2004). Validation Guidelines For Is Positivist Research. *Communications Of The Ais, 13*(24), 50.

Tanriverdi, H. S. (2005). Information Technology Relatedness Knowledge Management Capability, And Performance Of Multibusiness Firms. *Mis Quarterly, 29*(2), 311-334.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic Capabilities And Strategic Management. *Strategic Management Journal, 18*(7), 509-533.

Van Der Heijden, H. (2000). *Measuring It Core Capabilities For Electronic Commerce: Results From A Confirmatory Factor Analysis*. Paper Presented At The Conference Name|. Retrieved Access Date|. From Url|.

Wade, M., & Hulland, J. (2004). Review: The Resource-Based View And Information Systems Research: Review, Extention, And Suggestions For Future Research. *Mis Quarterly, 28*(1), 107-142.

Weick, K. E., & Roberts, K. H. (1993). Collective Mind In Organizations : Heedful Interrelating On Flight Decks. *Administrative Science Quarterly, 38*, 357-381.

Wheeler, B. C. (2002). Nebic: A Dynamic Capabilities Theory For Assessing Net-Enablement. *Information Systems Research, 13*(2), 125-146.

Williams, M. L. (2003). *Identifying The Organizational Routines In Nebic Theory's Choosing Capability*. Paper Presented At The Conference Name|. Retrieved Access Date|. From Url|.

Yoon, C. Y. (2005). *Measuring Personal Information Competency For Organizational Computing*. Paper Presented At The Conference Name|. Retrieved Access Date|. From Url|.

Zahra, S. A., Sapienza, H. J., & Davidsson, P. (2006). Entrepreneurship And Dynamic Capabilities: A Review, Model And Research Agenda. *Journal Of Management Studies, 43*(4), 917-955.

Zhu, K., & Kraemer, K. L. (2005). Post-Adoption Variations In Usage And Value Of E-Business By Organizations: Cross-Country Evidence From The Retail Industry. *Information Systems Research, 16*(1), 61-84.

Zimmer, J. C., Henry, R. M., & Butler, B. S. (2007). Determinants Of The Use Of Relational And Nonrelational Information Sources. *Journal Of Management Information Systems, 24*(3), 297-331.

Zollo, M., & Winter, S. G. (2002). Deliberate Learning And The Evolution Of Dynamic Capabilities. *Organization Science, 13*(3), 339-351.