(Re-)Designing the Business Model of a Digital Ecosystem: An Example in the Socio-Care Context

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Abstract: The advent of digital innovations is pushing many companies to re-design their Business Models (BMs). Amir and Zott (2015) described the process concerning the design of a new BM as constituted by elements, themes and antecedents. This research is based on a European project aimed at improving the independent living for elderly people affected by Mild Cognitive Impairment (MCI) or Mild Dementia (MD), through the definition of a new BM based on the adoption of digital innovations. Through a clinical inquiry approach, this research aims at analysing the interactions among antecedents and providing suggestions regarding the tools that could support BM re-design processes for an ecosystem of actors. Results highlighted alternation of antecedents that results in the continuous development of knowledge and increase of collected information. The increasing complexity should be limited thorough the integration of the collected information that allows the removal of not consistent information.

1   INTRODUCTION

Nowadays innovations require contributions of different actors that collaborate and compete in the development of new products and services (Brandenburger and Nalebuff 1998; Moore 1993). The concept of ecosystem is useful to analyse contexts based on inter-organisational relationships (Adner 2011; Moore 1993). Following Adner (2017, p.42), ecosystem comprises "the multilateral set of partners that need to interact in order for a focal value proposition to materialize". Value proposition is defined as a "selected bundle of products and/or services that caters to the requirements of a specific customer segment" (Osterwalder and Pigneur 2010, p.22). It is one of the main parts in Business Model (BM) literature (Zott et al. 2011). It considers the expectations and perspectives of the various actors of the ecosystem, and it should enable the creation and distribution of value among them (Adner 2017; Gomes et al. 2016). The selection of the best value proposition is a complex process because of the multitude of available choices regarding existing innovations and the various actors considered (Schwartz 2003).

BM is a relevant concept in strategy literature, and the number of publication about it increased from the late of the 1990s (Klang et al. 2014; Massa et al. 2016). Most of these publications focus on the perspective of the BM of a single firm, while others also consider the network as the unit of analysis but with the primary attention on the focal firm within the network (Zott and Amit 2010; Amit and Zott 2015).

Following Wirtz et al. (2016), there are several research areas concerning BM. These areas span from the description of constituents of BM to the achieved performance based on specific BMs. One of these areas regards BM Design (BMD), and it illustrates how BMs are created.

Some authors analysed this area (Zott and Amit 2010; Pigneur and Werthner 2009) and identified several key concepts—i.e., *antecedents*, *elements*, *themes*. *Antecedents* are the aspects that should be taken into account before designing the BM (Amit and Zott 2015). *Elements* are related to which activities should be performed, who should perform these activities and how these activities are interrelated, while *themes* are the effects of these activities and can be considered as proxies of the value proposition (Zott and Amit 2010). Following Amit and Zott (2015), there is still room to study

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BMD regarding already established firms that are modifying their BM (re-design) because of some market opportunities. Moreover, it is not clear if antecedents are still valid in the case of re-design of the BM and which tools are suggested to accomplish these activities. Finally, the relationships among antecedents and themes are described, but it is not clear if there are relationships also among antecedents. Therefore, this research aims at answering the following research questions (RQs):

RQ$_1$: What are the existing relationships among the antecedents concerning the process of business model re-design for an ecosystem of actors?

RQ$_2$: What are the tool supporting the activities related to the antecedents for an ecosystem of actors involved in the process of business model re-design?

To answer these questions, we exploit an action research accomplished among the activities of a European project (Horizon 2020 program) aiming at improving the quality of life of the people affected with MD or MCI through the new care processes supported by Digital Innovations (DIs) (Locatelli et al. 2017). Therefore, we consider the viewpoints of all the actors involved in the care process (e.g. caregivers, healthcare professionals, social care professionals, IT providers) to re-design the BM of this ecosystem of actors. Indeed, the notions of BM related to DIs are also diffusing in the healthcare context (Steinberg et al. 2015).

2 THEORETICAL FRAMEWORK

Following Massa et al. (2016), BM research is characterised by several definitions. Given the need to take into account several actors and to avoid focusing on a single focal firm, we adopt the definition provided by Zott and Amit (2010, p.216), which considers BM "as a system of interdependent activities that transcends the focal firm and spans its boundaries". The research of Zott and Amit (2010) identified the key design *elements* of *content*, *structure* and *governance*. They are related to the set of activities, called activity system, which the actors perform to reach the overall objectives of the ecosystem.

The other aspects analysed by these authors are related to the *themes*, i.e., the primary drivers of value

creation. They are distinguished in the following four categories: *Novelty*, *Lock-in*, *Complementarities* and *Efficiency*. Amit and Zott (2015) furtherly developed their research through the study of the four antecedents of BMD named *goal*, *template*, *stakeholders activities* and *environmental constraints*, and linked them to the BMD *themes*. The scholars focused on the creation of a new BM and did not consider the case of a firm aiming at modifying the already existing BM. *Goal* refers to value creation. *Template* is the tendency of entrepreneurs to copy/recycle from other BMs. *Stakeholders activities* is related to the collaboration among the actors of the ecosystem during the design phase and/or during the usage/application of the designed BM. *Environmental constraints* is related "to the conditions imposed on the business model designer by the economic, legal, socio-political, regulatory, and cultural environment in which the business model will be embedded" (Amit and Zott 2015, p.343).

The studies of Amit and Zott considered the *antecedents* individually and identified the relationships among antecedents and *themes*. Furthermore, it is not clear how to connect *antecedents* with the *elements*. Finally, they deliberately did not consider *internal constraints* (i.e. capabilities and resources required to perform the required activities) to limit the complexity of the proposed framework. Nevertheless, this omission could not be appropriate in the case of an already established firm that intends to change its BM. As stated by Amit and Zott, the relationships among antecedents and themes could require a review. This paper describes the possible relationships among antecedents and proposes some tools to support this complex process, which is preparatory for the actual BM design (i.e., the definition of the *elements*).

3 METHODOLOGY

The paper is based on the activities accomplished by the authors during a European project. The overall objective of the project is related to the improvement of independent living for elderly people affected by MCI or MD. This objective should be pursued through the definition of a new BM based on the adoption of DIs. The three years long project (from mid-2015 to mid-2018) is characterised by the launch of four pilots, in Israel, Italy, Spain and Sweden, which are useful to test the designed BM.

The actors involved in this project were different categories of organisations, i.e. healthcare centres, IT

providers, universities/research centres, related to five different Countries.

The results described in this paper are related to the first year of the project and concern the process through which the BM of the ecosystem has been designed. This article does not consider the subsequent phases concerning pilots and the actual implementation of the BM. We adopted an action research in the form of clinical field work research, also known as clinical inquiry research (Schein 2008; Schein 1987).

The primary objective of researchers is to support practitioners to solve a problem. The opportunity of learning is caused by a specific demand of the practitioner requiring support (Schein 2008). Practitioners are more likely to provide critical information. Researchers are involved as facilitators to provide technical knowledge and advice, but the other actors are responsible for defining the specific interventions that will take place, i.e. the design of the BM. The purpose of the clinical field work consists of theoretical and practical contributions. From the academic perspective, we aim at extending the scientific knowledge regarding the antecedents of BMD. From the viewpoint of practitioners, the clinical field work aims at supporting them through the creation of the basis for the creation of a new BM. The advent of the new one will imply organisational changes and development (Kotter 1996). The related process is based on the adoption of several tools that other organisations could exploit during the re-design of their BM.

During the first 12 months of the project, researchers directed and participated in various activities leading to the development of the new BM in the four pilot sites and the launch of the related pilots. Hence, scholars support practitioners release resources through self-intervention and self-examination (Stebbins and Shani 2009). The research allowed actively involving "those who experience or "own" the real world problem", e.g. caregivers associations, healthcare professionals (Elden and Chisholm 1993, p.129).

This field work was based on collaboration, incorporation of local knowledge and eclecticism and diversity (Greenwood et al. 1993). Collaboration because interactions and cooperation among researchers and practitioners played a key role in the BMD process. The field work incorporates local knowledge because allowed us to interact with the people of other organisations, especially those working with patients. It is characterised by eclecticism and diversity because it adopted several methods and sources of information.

Data collection to describe the BMD process followed during the project is based on several sources: (i) direct observation; (ii) focus groups; (iii) documents and emails regarding the project; (iv) reports regarding the meetings among the actors of the project. All the produced documentation was digitally stored and collected during the project. The documentation regarding reports comprises not only the final version of the developed documents but also the drafts of these, including the feedback/comments provided by other actors. Coherently with other authors adopting action research regarding DIs, data analysis was interlinked with data collection (Braa et al. 2004). To perform the analysis, we organised and categorised all the collected materials in terms of antecedents, ordered them chronologically, and we identified the typology of tools adopted/developed. All the related activities were analysed regarding the actors involved, the typology of the required inputs and achieved results (outputs). It allowed identifying the paths of the various outputs and highlighting the link among antecedents.

4 RESULTS

This chapter illustrates the four phases that characterised the preparatory activities required for BMD. Each section is specific to one of the phases and describes the related activities. The purpose is to describe the steps made by the ecosystem of actors involved in the project to move from the antecedents to the elements of the BM.

At the end, we provide a graphical representation of the performed activities regarding antecedents illustrating the path of the developed outputs and the tools to perform these activities (Figure 1). Furthermore, we also consider the collection of the various templates gathered during *template* activities (Figure 2).
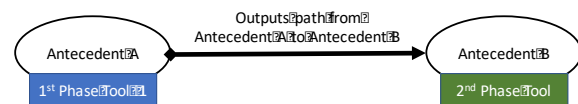
Figure 1: Example of the graphical representation of antecedents and related tool concerning two phases.
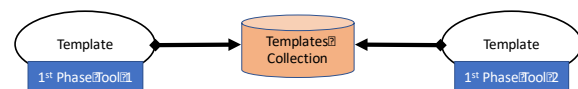
Figure 2: Example of the graphical representation of template antecedents, related tools and collected templates.

The decisions regarding the tools adopted and all the outputs of the performed activities were subject to the review/judgment of the other actors involved in the project. Therefore, all the *antecedents* always included a component of *stakeholders activities*, because they are also based on collaboration among actors.

4.1 Needs, Current Processes and State-of-the-art of Practices

The overall goal of the project was the improvement of the quality of life for MCI or MD patients at home through the adoption of digital technologies. It was clear from the beginning that the designed BM should also support other actors involved in the care process of patients, i.e. the caregiver but also healthcare and social care professionals.

The first BMD antecedent considered was *goal,* and it concerned the simultaneous achievement of the objectives of all the actors of the ecosystem. The achievement of this multitude of objectives required the identification of the needs of patients, caregivers, healthcare and social care professionals. It was performed through two tools that supported *goal* definition: a literature analysis and an analysis of the four pilot sites. The literature analysis concerned MCI and MD pathologies allowed classifying all the aspects useful to examine and describe these patients and the healthcare context in which they are inserted. They concerned medical, functional and socio-economic perspective, the various related needs, the characteristics of the related care network. Given the will to adopt digital innovations, it was also relevant to consider the level of ICT acceptance and literacy of patients.

The study of the four pilot sites allowed obtaining information about the characteristics of the related care services (e.g. care activities, processes, roles, information shared), i.e. the *elements* of the current BM. Therefore, this analysis highlighted also the related organisational needs. Nevertheless, the main output is the current care process and the related BM, that is recallable to *internal constraints* (not considered in the model of Amit and Zott (2015)). The existing BM is an aspect that cannot be ignored not only in terms of the constraints that it introduces in BMD process but also for the potential synergies among the two BMs that should be taken into account (Markides and Charitou 2004).

Together with the analysis of the care systems, researchers of a healthcare organisation conducted a literature analysis regarding the state-of-the-art of clinical and assistance management practices. It concerned the most accepted, evidence-based pharmacological and non-pharmacological therapies for patients with MCI and dementia. These treatments should allow the improvement of the quality of life, independent living and physical activity. The study also included the analysis of several successful international examples of implementations of integrated care programs. Furthermore, the investigation incorporated also quality guidelines regarding integrated care programs for patients with MCI and dementia. This research is recallable to the antecedent called *template* because it suggested solutions that can be "borrowed" (Amit and Zott 2015) and adopted to design the new BM.

The first phase of the BMD process required *goal* and *template* antecedents. The literature review and the analysis of care processes are the tools used to perform *goal* activities and allowed developing the list of needs and describing the current care systems in the four pilot sites. Therefore, two tools contributed to support the same antecedent. Another literature review contributed to *template* activities and helped to collect the first possible components that could be borrowed to design the new BM (Figure 3). During this stage, the only interaction among antecedents is related to the feedback provided by *stakeholders activities* related to the review of the outputs.

4.2 Validated Needs and Processes, Borrowing Components

The second phase required the passage from needs to the potential solutions to address these needs and it was characterised by two literature reviews. The first regarded technologies to support patients affected by MCI or MD and the other actors involved in the care process. The second literature review concerned the components of BMs related to digital solutions to support people with MCI or MD. These tools are recallable to *template,* and they were used to integrate the outputs of this antecedent obtained during the previous phase.

The framework adopted to categorise the various aspects of BMs was business model canvas of Osterwalder and Pigneur (2010) and exploited the results of the literature review regarding technologies and the list of needs obtained in the previous phase. The work done in the previous phase regarding the needs was useful to understand the characteristics of the targeted customers better. The knowledge about the potential patients, caregivers and healthcare professionals allowed searching for all the solutions not only specifically designed for MCI/MD but also other DIs adopted for pathologies with similar characteristics.

Since this moment, *Stakeholders activities* were only associated with the meetings of the various research groups, the emails among people of different institutions to coordinate and provide feedback about the developed works. These aspects are examples of collaboration, one of the typical traits of action research (Greenwood et al. 1993). Given the necessity to validate the outputs of the previous phase and to integrate the preliminary results of the literature reviews on technologies and BMs, four focus groups were organised (i.e. in Israel, Italy, Spain and Sweden). The focus groups lasted on average 4 hours each and involved several categories of actors, i.e. nurses, physicians, therapists, social care workers, ICT professionals, managers cure/care institution, nutritionists. These focus groups were also useful to consider perspectives different from the one of the researchers performing the studies. They encouraged the incorporation of local knowledge (Greenwood et al. 1993). The outputs of the four focus groups were: (i) validation of the current care systems, the list of (ii) validated needs, (iii) further possible organisational solutions and (iv) further technological functionalities.

The validated description of the current care system (*internal constraints*) constitutes one of the inputs required for the re-design of the BM. The selection of BM *elements* is also based on the existing processes, which support the decision maker in the identification of the required organisational and technological changes. In this phase, the previous outputs of *goal* and *template* were validated and extended through *stakeholder activities*. The extension of the list of "templates" was also pursued through further literature analysis regarding technological aspects and BMs. All the components (e.g. needs, functionalities/value propositions), except the current care systems, are still considered individually (i.e. was not stated which technological functionalities addressed the various needs) and are not context-specific (Figure 3).

4.3 Environmental Constraints and Pairs Need-functionality

The third phase of the BMD process was characterised by three main activities useful to consider contextual variables, context-specific preferences and to link technological functionalities with needs. The study of the contextual aspects aimed at listing all the Country-specific characteristics regarding (i) key trends, (ii) macro-economic forces, (iii) industry forces and (iv) market forces. These aspects were analysed regarding the four pilot sites. This research was performed through a literature analysis, and the results were complemented through the suggestions provided by the other actors within the project. Once the list of various needs was validated and consolidated in the previous phases, the required information was then related to the relevance of these needs in the four contexts where the pilots would take place. It was assessed through a questionnaire delivered to the four pilot sites a questionnaire. It contained the list of the needs and the request to provide, through a Likert scale, information about the relevance of the various needs in the case of care processes for MCI or MD patients.

Another key passage concerned the connection between the needs and the technological functionalities useful to address these needs. Through knowledge from previous literature analysis regarding technologies and BMs, we were able to identify coherent pairs functionality-need, i.e. functionalities that are useful to address the various needs. The output of this activity is a prerequisite for the following phase and constitutes a useful information for firms.

The relevance of needs and the coherent pairs functionality-need were also discussed and validated during the second round of focus groups organised in the four pilot sites. As the previous ones, they were characterised by the involvement of several categories of actors (i.e. nurses, physicians, therapists, social care workers, ICT professionals, nutritionists, home care professionals, mental care professionals, caregivers, policymakers). The results of the questionnaires and the outputs of the second series of focus groups allowed taking into account the needs of all the actors. Therefore, it is another example of the antecedent *goal* but mixed with *stakeholder activities*, given the adoption of focus groups (Figure 3). Furthermore, the activity conducted to find the coherence among needs and functionalities is not recallable to any of the antecedents described by Amit and Zott (2015). Therefore, we adopted the word "integration" to identify this further antecedent.

4.4 Environmental Coherence and Decision Support System

The last phase regarding the antecedents of BMD was based on the control of the collected templates regarding consistency with external constraints and the development of a Decision Support System (DSS).
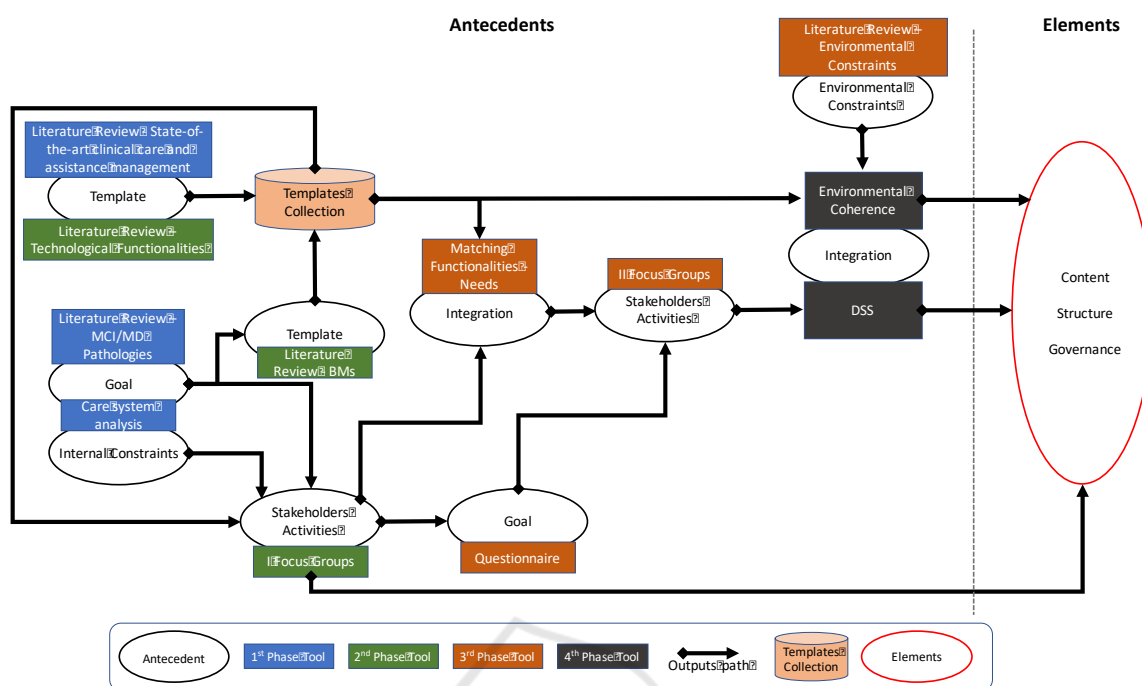
Figure 3: Overall Antecedents of BMD process (stakeholders activities related to outputs review are not shown).

Coherence between the components of the collected templates and the gathered *environmental constraints* is one of the information required to design a BM. It allowed the exclusion of the collected templates which were not coherent with the constraints. It reduced the number of available alternatives and the complexity that decision makers should face during the selection of the elements of the new BM. Given the fact that the re-design of a BM for an ecosystem of actors is intrinsically complex (e.g. different needs of different actors, different DIs from different actors, different contexts, etc.), the reduction of complexity is recommended. Therefore, the reduction of complexity is also pursued through the DSS. The DSS allows discerning between (a) coherent and incoherent pairs functionality-need; (b) relevant and not relevant pairs functionality-need; (c) Country-specific and common among Country pairs functionality-need.

The DSS considered and integrated multiple inputs, i.e. (i) the list of the needs; (ii) the list of technological functionalities; (iii) the list of pairs technological functionality-need; (iv) the Country-specific relevance of the needs for the two categories of patients (i.e. MCI or MD). The tool allowed highlighting the relevant pairs technological functionality-need. It is achieved through the definition of a threshold related to the relevance of needs (e.g. coherently with the Likert-scale values,

the user can select a value of 4 to consider all the needs with a relevance equal or higher than 4) and the selection of the Country analysed. The DSS was devised to (i) insert further functionalities, (ii) keep track of the Country-specific information regarding the relevance of the needs, (iii) update the Country-specific information concerning the relevance of the needs, (iv) highlight the commonalities with other Countries in terms of relevance of the various needs. Hence, the DSS was designed to be also adopted for further changes in BM and different contexts (i.e. Countries). The fourth aspect enables future collaborations among actors of different Countries. Therefore, this tool provided useful information for various actors (e.g. governmental organisations, firms, healthcare organisations) and integrated the results of the activities related to the antecedents' *goal*, *stakeholders' activities* and *template*. Then, the activity associated with the consistency with external constraints contemplated the efforts related to all the four antecedents described by Amit and Zott (2015).

The developed tool of DSS is an example of the integration of outputs regarding *antecedents*. The tool considers the various key aspects needed by the decision makers before the design of the BM. The tool allows analysing these aspects highlighting the relationships among them and considering the relevance of the needs. Therefore, DSS helps also in terms of prioritisation of the available coherent

alternatives. We think that considering the four antecedents separately limits the overall understanding of BMD processes. Therefore, we suggest that Integration should be considered as one of the antecedents. Environmental coherence and DSS are the tools supporting the activities concerning this antecedent. At the end of this phase, the outputs are the information that will be useful for the design of the BM, i.e. the definition of the *elements* (Figure 3). They include the list of relevant pairs functionality-need, the information that is consistent with the environmental constraints, and the description of the existing care process. All this information is replicated for the four pilot sites.

5 DISCUSSION

The research described the preparatory activities for the design of the new BM, related to the first year of a European project.

The adoption of the various *antecedents* described by Amit and Zott (2015) was illustrated in the four phases. It allowed considering the relationships among these antecedents. We suggest the adoption of some tools to perform the activities concerning antecedents and to support decision makers.

The answer to the RQ_1 is based on the analysis of the paths of the outputs developed during each activity concerning antecedents, and it is summarised in Figure 3. The results showed that the various categories of antecedents continuously alternate with each other during the process of re-design of the BM. Furthermore, the amount of information generated through the different antecedents is constantly increasing, and it results in the rise of complexity that should be managed by decision makers during the selection of the *elements* of the new BM. These aspects constitute an academic contribution to the literature of business models (Amit and Zott 2015).

Therefore, we can suggest the following propositions:

> P_1: The process of business model re-design for an ecosystem of actors is characterised by the alternation of antecedents that results in the continuous development of knowledge and increase of collected information

> P_2: The various categories of antecedents regarding the process of business model re-design for an

ecosystem of actors are not independent among them.

Furthermore, managing the increasing complexity concerning the re-design of the BM for an ecosystem of actors is not possible with the adoption of a single antecedent. The integration of the collected information to remove the incoherent information is required to reduce this complexity. This aspect supports decision-makers in the selection of the elements of the BM. Therefore, we suggest that "integration" should be considered as another key aspect concerning antecedents.

Then we can recommend the third proposition:

> P_3: The complexity, concerning the process of business model re-design for an ecosystem of actors, can be reduced through the integration of the information collected over time and the exclusion of inconsistent information

The last aspect concerning the answer to the first RQ is related to the presence of the antecedent "internal constraints" in the process of BM re-design. It is coherent with the concepts of Amit and Zott (2015). The answer of the RQ_2 is showed in Figure 3 that shows the tools adopted or developed to support the activities concerning the various antecedents during the four phases analysed. Template and environmental constraints are performed through bibliographic approach; therefore, they do not require the contribution of several actors. The other antecedents are instead characterised by the contribution of the various actors and by different categories of tools to support the related activities, e.g. questionnaire, focus groups.

The adoption of focus groups, considering not only the perspective of the final user but also the viewpoints of the other actors within the ecosystem, is probably the aspect that contributes most to the generation of the knowledge that will be used during the selection of the elements of the BM. Finally, The DSS and Environmental Coherence are the tools that support the activities concerning the suggested new antecedent integration.

Therefore, the adoption of focus groups and DSSs constitutes a practical contribution useful for organisations that intend to work within an ecosystem of actors aiming at developing a new BM. Furthermore, this study applied the concepts of *antecedents* in a real context where the DIs play a peculiar role. It constitutes a contribution to the BM literature regarding digital technologies that lack of

studies regarding antecedents (Zott et al. 2011). From the point of view of the methodology adopted, the article illustrated the potential of the clinical inquiry for studies of BMD processes in practice. We applied this methodology, not in a single organisation, but in an ecosystem of actors (Greenwood et al. 1993; Braa et al. 2004).

Finally, this research does not come without limitations. Given the nature of the project, there is a lack of iteration. It is not possible to generalise the results of this study, but it is the starting point for other scholars investigating the antecedents of BMD.Furthermore, the focus was only on the antecedents. and not on the impact of the *antecedents* to the *themes*. Further studies could analyse the impact on the *themes* of the various tools and frameworks adopted to perform the activities concerning *antecedents*. Moreover, they could include all the three components of BMD of Amit and Zott (2015), assessing the contributions of *antecedents* on the *elements* and then analysing the impact on *themes*.

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