Available online at www.sciencedirect.com

ScienceDirect

Procedia CIRP 103 (2021) 298–304

www.elsevier.com/locate/procedia

9th CIRP Global Web Conference – Sustainable, resilient, and agile manufacturing and service operations: Lessons from COVID-19

Implicit business model effects of DLT adoption

Efstathios Papanikolaou[a]*, Jannis Angelis[bc], Vassilis Moustakis[a]

[a]Technical University of Crete, Dpt.. of Production Engineering and Management, University Campus, 73100, Chania, Greece
[b]KTH Royal Institute of Technology, Lindstedtsvägen 30, 11428, Stockholm, Sweden,
[c]IFN Research Institute of Industrial Economics, Grevg 34, 11345 Stockholm, Sweden

* Corresponding author. Tel.: +30-28210-37251. *E-mail address:* epapanikolaou@isc.tuc.gr

Abstract

The significance of supply chain collaboration, communication and data exchange along with the importance of the relationships established among interconnected parties in a digital connected world, indicates the power of Distributed Ledger Technology (DLT) to transform the business model. In our study we set out to advance our understanding on how DLT impacts the business model. Since DLT is in its primitive stage of development, most studies focus into the implementation aspect of the technology and limited research has been done into the business model implications. Our research closes that knowledge gap in the literature by answering the question of "What are the secondary effects in business model that stem from DLT adoption?" Due to the inherent characteristics of the DLT, in respect to its network facet and the network effects created, we argue for a business ecosystem approach for our research. The main contributions of this paper are twofold. It presents implicit effects on business model beyond the direct trust and data openness aspects, and it also provides managers and scholars a process model for assessing how each implicit effect impacts the various business model dimensions.

Keywords: blockchain;distributed ledger;business model;business ecosystem;ecosystem dynamics

1. Introduction

Digitalization affects almost everything in today's organizations, including the way that supply chains collaborate and puts pressure on organizations to change. Digitalization of intra- and inter-organizational processes reveals new avenues of transformation in operations and supply chain management [1]. Distributed Ledger Technology (DLT) promises a new path of digitalization through the decentralized way that companies interact and exchange data. By eliminating the dependency and vulnerability of third-party providers, increasing the control over shared information and establishing trust among actors, DLT adoption promises to lower costs, increase visibility, transparency and supply chain efficiency [2] [3].

There is a clear potential of DLT adoption, but it also has to fit the given business model. Business models represent the value logic of the company [4] [5] [6]. Based on the literature, the 'business model change' concept is considered when non-trivial changes in at least two business model elements are provoked [7]. Its extension is discussed in literature as business model innovation. Trust and data openness are the obvious DLT effects on business model. However, in a business ecosystem context that needs to be adopted due to the inherent characteristics of DLT, supply chain collaboration, network expansion and actor relationships in a highly dynamic

10.1016/j.procir.2021.10.048

environment indicate that further implicit business model effects might arise. This study explores the secondary effects in business model that emerge by DLT adoption. Recognizing the impact of supply chain transformation on business models, we adopt a multi-case study approach to explore the implicit effects of DLT to the business model with emphasis to supply chain intersection with entities external to the company, at a business ecosystem level.

2. Literature review

DLT allows multiple parties to add cryptographically protected transactions to the ledger in an immutable way that promises decentralization. In short, when digitally signed transactions are posted to the ledger, competing nodes need to approve them and after their validity is verified group them into a block. The blocks are totally ordered, hence preventing a block from being appended if it contains transactions that conflict with transactions of the previous block [3]. The latter along with the fact that each DLT network member holds a copy of the shared ledger promise decentralization and immutability in the peer-to-peer network created. Decentralization is achieved since the block created is broadcasted into the network using the consensus mechanism that has been initially defined based on the DLT architecture. That sequence of linked historical transactions is referred to as chain and hence the evolved data structure is often referred as blockchain. In literature blockchain refers both to the entire technology, the implementing factors and in some cases is referred only to public DLT platforms. DLT is neither a platform nor a product, it is part of a back end and when implemented, value is delivered through front end software applications**.**

Under a supply chain context, manufacturers exchange tangible and intangible value assets through DLT transactions with their direct and indirect direct partners as well as with actor members that lie beyond their core business and extended enterprise level of the ecosystem they operate [8]. Information, data, knowledge exchange as well as monetary, service and goods transactions powered by DLT, involve manufacturer's interactions with potentially all its end-to-end external entities interconnected to its supply chain. The intricacy of manufactured products, the need for synchronization among all interacting parties and the complexity of the production processes increases supply chain reliance on technology. DLT aids manufacturers to eliminate dependency and vulnerability of third party providers, increase the control over shared information and establish trust among their interacting partners [2] [3].

Decentralization, immutability, increased supply chain visibility and transparency promised by DLT adoption in a supply chain context, set the basis for many forms of value creation for individual network members [2] [3] [9]. Trusted and previous unknown actors co-evolve capabilities and have the opportunity to collaborate, deliver goods and services more efficiently due to the benefits promised by the new type of DLT powered transactions. DLT evolution also introduced the smart contracts and the development of decentralized applications (dApps), that extend the areas of DLT adoption through the new capabilities they promise [10].

Similar to business ecosystems, DLT creates value for actors, while at the same time they maintain their loosely based interconnections roles in the ecosystem. We argue that the business ecosystem approach needs to be conceptualized for a DLT network of interacting actors. That is also supported by the fact that in both business ecosystem and DLT network of actors, the large number of interconnected participants and their interdependence for their mutual survival are key characteristics [11]**.** Irrespective of the DLT architecture, that mainly is defined by consensus mechanisms, the higher the number of DLT business ecosystem participants, the higher is its sustainability from a security viewpoint. DLT encourages interactivity among network participants and contributes in the creation of network effects [12]. The more actors that adopt DLT and interact, the more value is perceived by each individual and the higher the value is created by the system. In turn this incentivizes more actors to join the network and therefore the network effects created fuel the expansion of the ecosystem [13].

Trust should be recognized as an outcome, but also as the driver for DLT adoption. Direct evidence, or direct trust as mentioned in literature [14] [15], is supported by the decentralized way data is kept, shared and accessed, without the need of intermediaries to validate trustworthiness. Access to undisputable trusted evidence is precisely what DLT supports. We therefore set trust as the basis of the relationships required for an organization to collaborate and also to improve its efficiency under a supply chain context. Collaboration among ecosystem actors requires some level of minimum trust. In a highly dynamic environment, relationships among actors are subject to change between competitive, co-opetitive and cooperative relationship forms. Moreover, these behavioral shapes among ecosystem actors coexist in the ecosystem. Under those circumstances, data openness, being the primary DLT related activity, needs to be evaluated by each DLT interacting actor considering the parameters if its own and its partner's role, interdependency and power attitude. The rules of collaboration in a DLT business ecosystem are obviously massively affected by DLT architecture, position and power dynamics developed in the network. The latter affects actors' intentions to exercise influence to other actors or partners, hence imposing a superficial collaboration.

Based on the literature, value creation and design are the key organizational concepts reflected in business model configuration [16]. The role of technology and the information flow is viewed as the features that convert inputs into economic outputs [17] [18]. In a business ecosystem, where DLT is its dominant characteristic, data exchange with the absence of middlemen is the breakthrough change that prompts potential changes in business model dimensions. In alignment to the most influential business model definitions of other authors, value creation, value proposition and value capture are the most commonly accepted dimensions [19] [20] [21]. Furthermore, there is need to include the value network dimension in this study due to the inherent characteristics of DLT and the fact that supply chain collaboration is a key driver for improved overall performance. Value network dimension emphasizes the role of the manufacturer, its supply chain and ecosystem partners in the networked environment. It also highlights the attributes of actor roles, dependency, ecosystem position,

relationships and complementarities at network level [22].

3. Methodology

To investigate our research question of "What are the secondary effects in business model that stem from DLT adoption?" we selected an inductive, interpretive, qualitative multiple case study method [23] [24]. We adopted a process model building approach through a pattern matching analytical approach using constant comparison between the theory and data following replication logic [25] [26]. Although the 'semi-ignorance' of the literature allowed the researchers to avoid prior hypothesis and conformation bias we needed to set data openness and trust as the boundaries conditions of the research that allowed us to focus on the most important issues and avoid excessive detours to lesser misinterpretation of informants' insights. Authors recognized the risk that stemmed from the complexity and the expected limited or possibly skewed informants' knowledge on DLT under a supply chain concept. In the interview protocol, researchers avoided to structure tight preconditions that would pre-empt or guide the 1st concepts captured and defined a broad and loose framework of interview variables that are directly related with DLT adoption such as those of trust and data openness. The themes discussed in interviews set the trust and data openness as the basis of supply chain decisions and the relationships with manufacturer's direct and indirect supply chain partners. We continued by keep setting as the basis of the semi-structured interview the notions of trust, supply chain collaboration and data openness.

That approach based on literature intends to lead to enhanced analysis quality and meet the necessary 'boundary condition' for theory building based on qualitative research [23] [25]. Our inductive approach is based on the approach of figuring out patterns that emerge from the concepts captured and organize them in 1st and 2nd order concepts. After the point where the 2nd order themes along with their respective linkages to the 1st order concepts have been crystalized, theoretical saturation has been reached. Based on the aggregate dimensions that are distilled from the 2nd order concepts end up designing the process model that answers our research question insights [27].

Giving voice to high-ranking informants in appropriate decision making roles, has been central in the interview process [28] [29]. Yet from the identification of 1st order concepts the forced 'stepping-up' in abstractness has been driven by capturing the interpretations of the informants' insight. Our analysis approach, based on qualitative data inductive analysis best practice proposed in literature [26] [30], required data collection and data analysis. Interview transcripts, and notes retrieved from supplementary secondary sources were managed through the RQDA qualitative data management coding software.

The main study data collection consists of semi-structured interviews with informants of 25 large manufacturers located in eight European countries. Between December 2020 and April 2021 two round of interviews were conducted, lasting approximately 90 minutes each. Informant roles include senior, head and c-level supply chain managers to capture a multifaceted view of the discussed themes. Make-to-stock (MTS) and make-to-order (MTO) are considered the most prevalent among other supply chain strategies and for our case selection criteria we only considered manufacturers with MTS or MTO set up. The reason that we left out Engineer-to-order (ETO) from our sample supply chain framework is that the decoupling point is located at the design stage [31]. So customer order triggers order-specific engineering. ETO requires different information management strategies than other supply chain forms and since DLT and information management are inextricably linked ETO has not been included in the LE studied. In short, in ETO information and production systems should allow for basic information to be incomplete, partly inconsistent, or not up to date [32], which is not the case for MTO and MTS. The research questions were aligned with conditions of large enterprises (LE) as per sample selection logic [33]. LEs demonstrate higher supply chain complexity, interact with more business ecosystem actors and develop relationships either from a dominant or a non-dominant position. Under those conditions we expect informants from LEs to have a broad overview of a broad spectrum of options, actions and strategies implemented.

4. Results

When theoretical saturation from data analysis was reached researchers followed iterative analysis of data by contrasting the current literature and refining the emerging themes and patterns for each case. That led to further aggregation of conceptual categories to twelve unique aggregate dimensions. Based on theory a single extract can be labelled with multiple codes if relevant [34]. That led the researchers in some cases to link one 2nd order theme with more than one aggregate dimensions. In the final data analysis phase, researchers consulted business model literature to reveal the linkages of the aggregate dimensions with the factors that depict the DLT implicit effects to the business model. This step has not been a further distil of the 12 unique aggregated dimensions but targeted to link them with the activities that impact the business model. The graphic representation of data structure along with the linkages revealed, demonstrates the qualitative research rigor (see Fig.1) [35] [36].

Based on data analysis, twelve unique overarching themes were inductively identified. Those are referred to different types of intents and activities related to trust and supply chain collaboration, that evolve during DLT adoption at supply chain level and are expected to impact organization's business model. Supply chain partner's ability to deliver results, being the first theme, reflects organization's prospect for operational efficiency through its ability to assess partner's competence due to the visibility and access of trusted data. It appears twice in the overarching themes in our model and has been found to impact supply chain partner's selection, process and redesign drivers and rules of collaboration. Supply chain partner's integrity and consistency of words and actions has been proven to weigh significantly in organization's intention to establish relationships. Access to trusted data facilitates that endeavour. Trust has been proven to be an important decision maker. For specific actor roles, data openness as a future partnership condition is considered a mandatory prerequisite. However,

Fig. 1. Data structure.

access to trusted data, and not data openness itself, is the overall issue at stake. Interviewees revealed that data openness triggers higher level of visibility and transparency. Actor relationships are based on predefined and mutually agreed trust levels. Given the fact that DLT pushes toward higher level of trust, for specific supply roles when trust thresholds are not met, then actors that promise to meet trust expectation through DLT adoption take precedence over substituting current partners.

DLT transactions reinforce knowledge creation and enhance co-evolution of member capabilities. DLT network members are offered the perspective to exploit shared data and create new data driven knowledge. In DLT networks future participants are incentivized by both knowledge creation prospects and access to collaborative knowledge promised to reinforce the validity of their data driven decisions and evolve their capabilities. Irrespective of the benefits promised by DLT, data privacy and integrity of the interacting actors are of major concern by both LEs and their future partners. The adaptability of opening or withdrawing specific pieces of information to the network has been found to incentivize to a massive extent all DLT business ecosystem actors' intention to adopt DLT. Attention to transaction design has been found as a fundamental element of DLT adoption. It reflects the potential of interacting parties to realize the benefits promised by DLT implementation. Any architecture design gaps might destroy actors trust into the system and consequently make them sceptical to join the network, since cost and risk might outweigh the benefits.

One of the major DLT adoption drivers at supply chain level is the elimination of information asymmetry. However, data openness also goes hand in hand with trust control. The latter has been found to be the condition that needs to be met so that risk from data openness are mitigated, while information asymmetry is the ultimate scope. According to our results, inbound and outbound partner dependency, role and ecosystem position will not affect organization's control mechanism, irrespective of the trust level achieved among the interacting entities. LEs hesitate to open their data to partners that, at least to a significant degree, cannot control or even govern the relationship with them. The control over the relationship with their partners and the commitment created when data are opened to regulatory bodies, make organizations sceptical to share more with any other partner.

To the extent that DLT adoption at supply chain level is viewed as the mean or incentive for business expansion, organizations are keen to support DLT adoption, even by taking higher risks than usual. Organizations demonstrate higher propensity to open their data to their 1st level supply chain partners, but are sceptical, in general, to act respectively to interacting actors beyond their expanded business network at ecosystem level, unless specific measurable proofs exist. DLT is viewed as the mean to allow flexibility in the case of relationships with high risk. DLT architecture that would support combination of data kept on and off the network is viewed as the vehicle to drive relationship re-establishment and allow flexibility under the terms of gradual data openness when risk concerns arise.

5. Discussion

Based on the study findings we developed a process model that incorporates the implicit effects of DLT adoption to the business model in a supply chain context. Based on the case-based analysis, we mapped the relationships between the dimensions that indicated the implications of DLT adoption, under an ecosystem perspective. Our results show that DLT adoption initiates the transformation of trust and supply chain collaboration between the organization and its supply chain interconnected parties at ecosystem level. The model illustrated in Figure 2 presents a dynamic picture of a sequence of processes comprised of activities and intents that indicate the secondary effects on business model dimensions.

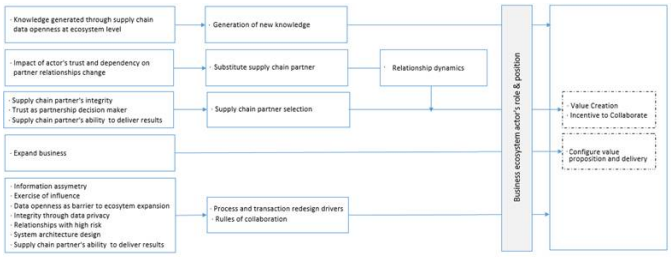

Fig. 2. Process model.

Partner selection process, based on literature, consists of three stages that are: formulating partner selection criterial, qualification assessment and choice of preferred partner [37]. Based on our results, all three are affected by DLT implementation. Data openness, transparency and visibility achieved through DLT are strong candidates for supply chain partnership selection criteria. For non-established partner relationships, DLT adoption raises expectations for high trust level among interacting parties from the partner selection phase. Organizations have been found to emphasise on the assessment of the expected competence of their future partners. Hence, DLT supports partner qualification evaluation process, based on direct evidence that underlines future partners' competence. Dependency upon a partner, meaning actor's role in the supply chain, and its position in the ecosystem was shown to have a joint effect, along with the trust promised through DLT to the organization's decision to substitute one partner for another. Both in the case of established and non-established relationships, partner selection and partner substitution decisions are both affected by DLT adoption. In both cases focus lies mainly in the value creation aspect of the organization.

Another key business model impact of DLT adoption is the prospect of DLT business ecosystem participants to generate new knowledge based on to data visibility, information access and data exchanged achieved by DLT. Learning from partners' best practices, in particular at operational level, identifying and analysing patterns, practices and methods applied by partners, reveals the power trusted data access. Organizations have the opportunity to learning from others, optimize their own supply chain activities develop methods to mitigate risks and advance their capabilities. Our results also showed that organizations weigh the effects of the knowledge created through data

exchanged. Data openness raises concerns on how much data need to be opened and to whom. Organizations seem to rely on the fact that they can improve their own operations and advance their activities. In turn, the later contributes to value creation through the knowledge generated when other entities data are accessed and analysed. The same applies to organization supply chain partner leads to a dual impact on its business model dimensions. DLT facilitates knowledge exchange and streamlines end-to-end supply chain operations by enhancing partners' ability to deliver results, while simultaneously raise concerns around data privacy based on the data openness required.

The key for organizations to avoid superficial collaboration lies in the DLT architecture design to incentivizing actors to collaborate and achieve a golden ratio between privacy concerns and data openness necessary for DLT adoption. Superficial collaboration does not support the prospect of a sustainable DLT using business ecosystem, since niche ecosystem actors are pushed to collaborate with dominant companies [11]. System architecture was shown to impact the transactional dimension of business models and depicts the aspect of 'rules of collaboration'. The rules were shown to affect the degree to which business model dimensions of value creation, and value network are impacted by collaboration incentives The extent to which an organization's transaction drivers meet the objectives and the concerns of all business ecosystem actors was found to define the impact on all business model dimensions.

The study results showed that when an organization targets expand its business or re-configure its product, data openness tilts the balance between benefit and cost towards the former, with the latter mainly considered under the aspect of a lost opportunity or potential failure to address customer needs. [38]. Each time the value proposition re-configured, organizations sought to share more data with 1st tier material suppliers and with intermediaries that constitute the market channels. This is irrespective of the level of trust established to that point. DLT was seen as the mean to facilitate transactions with that type of actors, rather than as the relationship driver through trust commonly stated. This is another clear indication that the role of the actors impacts value proposition reconfiguration and value delivery related decisions.

6. Conclusion

In our study we confirm the common view that trust among interacting parties is the main DLT adoption driver. This is expected given the stated role and benefits of DLT adoption in both literature and practice. We focused our research on the intersection of the organization with its interacting entities external to the company in a business ecosystem context to explore how DLT adoption impacts business models. A qualitative inductive multi-case study approach followed, revealed the secondary effects in business model. We concluded that it is too simplistic to argue that trust and data openness are implicit business model effects. Our study results revealed that supply chain partner selection and substitution, process and transaction redesign, generation of new knowledge, rules and incentive of collaboration constitute the secondary business model effects stemmed by DLT adoption.

In managerial terms, the process model proposed by the study allows an overview of links between the business model effects and respective business model dimensions they affect. In that way managers can assess to what extent and which business model dimensions that will be impacted based on the DLT adoption decisions. Drivers based on operational efficiency improvements and configuration of relationships among interacting actors in a highly dynamic environment was shown to affect the business model in different ways. The study results also indicate that irrespective of initial or primary scopes of DLT adoption, it affects at least two of the business model value dimensions of creation, proposition, delivery, and network. Actor's role, interdependency and position in the business ecosystem have been proven to be of critical importance in managerial decisions related to DLT adoption. Finally, the study results revealed that the role of interacting parties in the ecosystem act as decision making filters. As such, the study refines the understanding of how DLT adoption affects the actor business models.

References

[1] Holmström, J. et al., 2019. The digitalization of operations and supply chain management: Theoretical and methodological implications, Journal of Operations Management,Wiley Periodicals, Inc

[2] Bocek, T., et al., 2017. Blockchains everywhere - a use-case of blockchains in the pharma supply-chain, 772–777.

[3] Nofer, M., et al., 2017. Blockchain. Business & Information Systems Engineering, 59(3), 183–187.

[4] Fielt, E., 2013. Conceptualising Business Models: Definitions, Frameworks and Classifications. Journal of Business Models. 1. 85-105.

[5] Osterwalder, A., et al., 2005. Clarifying business models: Origins, present, and future of the concept. Communications of the Association for Information Systems 16, 16(1)

[6] Wirtz, et al., 2016. Business Models: Origin, Development and Future Research Perspectives. Long Range Planning. 46.

[7] Chesbrough, H., 2010. Business Model Innovation: Opportunities and Barriers. Long Range Planning. 43. 354-363.

[8] Moore, James.,1999. Predators and Prey: A New Ecology of Competition. Harvard business review. 71. 75-86.

[9] Ferreira, J. et al., 2019. A Systematic Literature Review in Blockchain: Benefits and Implications of the Technology for Business. New Knowledge in Information Systems and Technologies (pp 405-414), Springer

[10] Salviotti, G. et al., 2018. A structured framework to assess the business application landscape of blockchain technologies. Proceedings of the 51st Hawaii International Conference in System Sciences.

[11] Iansiti M. and Levien R., 2004. The keystone advantage: What the new dynamics of business ecosystems mean for strategy, innovation and sustainability. Harvard Business School Press..

[12] OECD, 2014. The digital economy, new business models and key features, in Addressing the Tax Challenges of the Digital Economy, OECD Publishing, Paris

[13] Shapiro, C. and Varian, H., 1999. Information Rules. Harvard Business School Press

[14] Marsh, S., 1994. Formalising trust as a computational concept. PhD thesis, University of Stirling

[15] Mayer, R., Davis, J., and Schoorman, F.,1995. An integrative model of organizational trust. Academy of Management Review, 20(3):709–734.

[16] Bock, A. and George, G., 2018. The business model book: Design, build and adapt business ideas that thrive. United Kingdom: Pearson Education Limited

[17] Chesbrough, H. and Rosenbloom, R, 2002. The role of the business model in capturing value from innovation: Evidence from Xerox Corporation's technology spin-off companies. Industrial and Corporate Change, 11(3), 529-555.

[18] Timmers, P., 1998. Business models for electronic markets. Electronic Markets, 8(2), 3-8.
[19] Chesbrough, H., 2006. Open business models: How to thrive in the new innovation landscape. Boston, MA: Harvard Business School Press.
[20] Osterwalder, A. and Pigneur, Y.,2010. Business model generation: A handbook for visionaries, game changers, and challengers. Wiley, New Jersey.
[21] Johnson, M., 2010. Seizing the white space: Business model innovation for growth and renewal. Boston, MA: Harvard Business Press.
[22]Velu, C., 2018. BMI Research Programme, Mimeo, Institute for Manufacturing, Department of Engineering, University of Cambridge
[23] Eisenhardt, K., 1989. Building theories from case study research. Academy of Management Review, 14(4), 532- 550.
[24]Yin, R., 1994. Discovering the future of the case study. Method in evaluation research. Evaluation Practice, 15(3), 283-290.
[25] Yin, R., 2018. Case study research and applications 6th editions, Sage Inc
[26] Glaser B. and Strauss A, 1967. The Discovery of Grounded Theory. Chicago, IL: Aldine.
[27] Gioia, D., Corley, K. and Hamilton, A.., 2013. Seeking Qualitative Rigor in Inductive Research. Organizational Research Methods. 16. 15-31.
[28]Richards, D., 1996. Elite interviewing: Approaches and pitfalls. Politics, 16(3), 199–204.
[29]Vaughan, S., 2013. Elite and elitelite interviewing: Managing our industrial legacy. In A. Franklin and P. Blyton (Eds.), Researching sustainability, practice and engagement (pp. 105–119). London, U.K.: Routledge.
[30] Lincoln, Y. and E. Guba, 1985. Naturalistic Inquiry. Beverly Hills, CA: Sage.
[31] Gosling, J., and Naim, M., 2009. Engineer-to-order supply chain management: A literature review and research agenda, International Journal of Production Economics, Vol 122, Issue 2, pp 741-754
[32] J.C. Wortmann., 1995. Comparison of information systems for engineer-to-order and make-to-stock situations Computers in Industry, 26 (3), pp. 261-27
[33] Yanamandra, Ramakrishna, (2016. Supply Chain Management: Large vs. Small and Medium Enterprises (SMEs).
[34] Braun V, Clarke V. 2006. Using thematic analysis in psychology. Qualitative Research in Psychology 3(2):77–101
[35] Pratt, M. G.,2008. Fitting oval pegs into round holes: Tensions in evaluating and publishing qualitative research in top-tier North American journals. Organizational Research Methods, 11, 481-509
[36] Tracy, S. J.,2010. Qualitative quality: Eight ‘‘big-tent’’ criteria for excellent qualitative research. Qualitative Inquiry, 16, 837-851
[37] De Boer, L. Labro, E. and Morllarcchi, P. 2001. A review of methods supporting supplier selection, European Journal of Purchasing and Supply Management, Vol.7, pp 75-89
[38] Salum, F., 2019. The Business Models’ Value Dimensions: An Analytical Tool. . Revista Ibero-Americana de Estratégia. 18. 438-4