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VALUE NETWORK TRANSFORMATION BY DIGITAL SERVICE INNOVATION IN THE VEHICLE INDUSTRY

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Abstract

This paper reports from preparations in an ongoing research study concerning how digital service innovation transforms value networks in the vehicle industry. The research study concerns digital services based on remote diagnostics systems. This digital service innovation in particular is of great importance since the vehicle industry has great potential to expand its business and found new and extended boundaries and relationships with other stakeholder in the networks they are attached to. Core challenges and opportunities for digital service innovation will lead us to the study of its influence on the business and innovation environment i.e. the value network. In this paper, we propose three propositions to study transformation from product oriented value networks to digital service oriented value networks.

Keywords: Value network, Digital Innovation, Digital service innovation, Remote diagnostics system

1 INTRODUCTION

Innovations in the digital age are rapidly transforming the landscape for contemporary business and the ways to represent these through related networks. Advancements in digital computing, web 2.0, digital convergence and other digital technologies are modifying business and organizations, and disrupting their traditional boundaries and models associated with them (Yoo et al., 2010a; b; c). For example, in innovation such as global broadband, mobile infrastructures, electronic patient record system, YouTube videos, e-newspaper, and pervasive use of RFID chips, digital technology is the chief source of innovations. Such digital innovation is transforming the traditional business to e-business, for example, it gives rise to e-maintenance from traditional maintenance, e-manufacturing from traditional manufacturing (Koc et al., 2003). In other words, trends of digital service innovation based on digitalized products and the associated opportunities and challenges open new areas of research (Lyytinen and Yoo, 2002a).

As a result of this development, traditional production business such as manufacturing, the physical artifacts are now being intertwined with digital components that add digital capabilities to them. Inspired by this, digital convergence of applications, devices, networks and artifacts presents both challenges and opportunities for industries (Lyytinen and Yoo, 2002a; b; Yoo et al., 2010a). The digitalization of equipment is transforming industries from manufacturing to service industries (Jonsson, K., 2010). One example is the transformation of the vehicle industry where new opportunities for digital innovation such as e-maintenance based on remote diagnostics systems are emerging (Kuschel 2009).

Digital innovation includes not only a shift in technology but also change in existing relationships within industrial business and with markets. This ultimately forces businesses into new competition which depends upon how it adds value and challenges present market know-how (Abernathy and Clark, 1985). The addition of value (both digital and non-digital) is perceived through value network which is then realized through a business model (Christensen and Rosenbloom, 1995). The value in network is shown with the help of network of relationship which has key role in the innovation process for outsourcing of technology, knowledge etc. (Van de Ven et al., 2008). For example, network of external stakeholders is important source of innovation (Chesbrough and Rosenbloom, 2002). Kim and Lee (2007) have provided the economic analysis of unprofitable stakeholders in the networks where externalities exist and shown their strategic importance which is often unseen or overlooked.

Digital service innovation triggered by advancement in digital technology or potential service innovation such as e-maintenance services cause change in structures of value networks overtime. It may cause migration of innovation to new networks, and new technological paradigms may cause the emergence of new value networks (Christensen and Rosenbloom, 1995). For example, digital service innovations may be adopted with the result of new emergent but still interconnected value networks (Åkesson, 2009). A single innovation may trigger wakes of overlapped and interacted innovations, hence may play the part of as the initial conditions of another innovation process (Van de Ven et al., 2008). For example, in digital services innovation remote diagnostics system is one of the pre or initial conditions for providing e-maintenance services. However, the individual business interest and technological frame with different meanings and conflicting interests of different actors leads to distributed digital innovation which is characterized by uncertainty and ambiguity (Yoo et al., 2005).

This transformation of modern economy to service economy is mostly enabled and dependant on digitalization of products. The topic has not a long history in Information System research but it is gaining much attention. For example, IFIP working Group 8.2 conference was dedicated to 'IT in service economy', ECIS (2011)¹ conference is dedicated to ICT and Sustainable Service

¹ <http://project.hkkk.fi/ecis2011/>

Development, DESRIST (2011)² will focus on Service-oriented perspectives in Design Science Research, MIS Quarterly (2011)³ will publish a special issue on 'Service Innovation in the Digital Age' and The Journal of Strategic Information Systems (2011) will also publish a special issue on 'Service Management & Engineering: Aligning Business & IT Services'. Moreover, recent research work in different areas has shown the evolution of digital innovation and influence on value networks. For example, Åkesson (2009) studied the influence of digital innovation on value networks in Newspaper industry. Yoo et al., (2010 a; b) have made studies to find out the characteristics, dimensions etc. of digital innovation on AEC⁴ and camera evolution case. Selander et al. (2010) extend existing innovation theory and propose a process model for transforming ecosystem relationships in digital innovation. Another work by Kuschel (2009) explains a general trend in vehicle industry which addresses extended equipment functionalities instead of consumers' use of vehicles. But there is still a gap on how transformation occurs when digital service innovation influences value networks in the vehicle industry.

The vehicle industry constitutes an area where digitalization contributes to an increase in services as opposed to traditional product focus which gives way to the introduction of remote diagnostics system. Such a system is capable of providing different types of remote services such as preventive as well as predictive or condition-based maintenance. The benefits to the companies are not only limited to remote diagnostics facilities but also other value-added service e.g. vehicle performance report that helps companies to plan better about their fleets by tracking them. This requires an organization to rethink and reflect upon the influence of such services on the existing value networks (especially roles and relationships within these networks), both internally and externally. Thus, a research challenge in this context is to understand how existing value networks in vehicle industry are influenced by services based on remote diagnostics system (called digital services) and will be the addressed in this paper.

Thus the question addressed in this paper is: *How are existing value networks in product oriented business transformed by digital service innovation?*

This question has been addressed in a collaborative research project on digital innovation for remote diagnostics between a global vehicle company and academic researchers. The innovation of digital technologies associated with this project will enable new types of services. These services include identification, detection and diagnosis of faults and errors of vehicles. The vehicle company has ambitions to expand their business by innovating on digital services which will require transformation of their value networks and the associated relationships, value creating process and exchanges.

The aim of this paper is to explore and propose how existing value networks in the vehicle industry are influenced by the service innovation based on remote diagnostics systems. These proposals refer to product oriented value networks transforming into digital service oriented value networks.

The article is structured as follows: First, we ground our rationale of value networks in the organizations and present main topics of discussion that are most likely to be influenced as the result of digital service innovation i.e. introduction of services based on remote diagnostics system. The following section gives a background to the research approach, and contextualizes the empirical work. Thereafter, we provide three propositions on how value networks are influenced by services based on remote diagnostics system. A discussion about its implication in IS followed by conclusion and future work closes the article.

2 LITERATURE REVIEW

The section brings about a review of literature on value networks, and short description about transformation of value networks driven by digital innovation. This will provide the basis to study the

² <http://desrist.org/>

³ <http://www.misq.org/>

⁴ AEC = Architecture, Engineering and Construction

transformation of such innovation on value networks. The digital innovation literature serves as a background to establish and describe its impact on value networks.

2.1 Value Network

A *value network* in general is “Any set of roles and interactions in which people engage in both tangible and intangible exchanges to achieve economic or social good” (Allee, 2008, p. 6). It is categorized as internal-facing value networks, that is, within organizations and external-facing, that is, value networks among organizations and its suppliers, investors etc. (Allee, 2008). Value networks have been recognized as having a key role in innovation process which spans from the practice of inventing to the process of realizing value, and adoption by the community (Åkesson, 2009). This practice of inventing is visualized by an innovation network and, realization and adoption by community is effectuated by a value network (Chesbrough et al., 2006).

A *value network* creates value through complex and dynamic exchanges of three entities called value currencies: goods, services, and revenue; knowledge; and intangible benefits (Allee, 2000a; b). Knowledge values, now, are also considered as a part of intangible values instead of a separate currency value (Allee, 2008). According to Allee (2000a: b; 2008) *roles/actors* are the main focus for dynamicity and innovation rather than processes in a value network and intangible values are of equal importance as revenue exchanges. For instance, a vehicle company itself can be understood as a value network and it may offer knowledge about the health status of a particular vehicle to its customers as an intangible value currency in the value network. The roles/actors that organizes network and has strong incentive is considered as focal actor (Amit and Zott, 2001).

The *relationships* depend upon the transactions or activities in value networks. The value in a network is transferred through the medium or mechanisms of exchanges (Allee, 2008). These emerge from two different kinds of transactions i.e. tangibles and intangibles. The relationships in the value networks are linked by the business model in a sense that they define the value creation process from which the different actors capture value (Chesbrough and Rosenbloom, 2002). Relationships in a network among companies (acting as focal actor) and their customers, suppliers etc. provide insights into business. This includes identification of customer segments and structures for value creation and value capture (Chesbrough et al., 2006) meaning that different organizations have different business models within the same value network. For example, despite the fact of co-creating value within the same network, a service providing company (i.e. providing health status of vehicles) have another business model which is apart from manufacturing company. Even referring to a particular focal actor, its impact spans organizational boundaries (Amit and Zott, 2001) showing the tight coupling behaviour of digitized products as mentioned by Yoo et al. (2010a). These business models align network roles to realized value targeting a defined customer base (Chesbrough et al., 2006). The value networks shapes the roles in the value creating process (Christensen and Rosenbloom, 1995) and thus value is dependant on how the value networks are designed and vice versa (Chesbrough et al., 2006).

The *nature of a value network* consists of: value network interrelationships (Åkesson, 2009); being multilayered and interconnected system of networks (Christensen and Rosenbloom, 1995); and innovation paths (Henfridsson et al., 2009). For example, vehicle related company may be the part of the value network containing vehicle manufacturing, of the vehicle service providers, vehicle parts manufacturing etc. companies. The value networks surrounding these businesses are not the same since they are built on different relations, exchanges and business models yet they are interwoven and interconnected on different levels and hence innovation paths within each have influence on the others. Table 1 below provides the summary of concepts regarding value networks that are needed to be considered.

Concepts	References
Roles/Actors	Allee (2000a; b; 2008); Åkesson (2009); Amit and Zott (2009)
Relationships and interactions	Allee (2000a; b; 2008); Christensen and Rosenbloom (1995); Chesbrough and Rosenbloom (2002); Amit and Zott 2001, Chesbrough et al., 2006
Nature of value network	Åkesson (2009); Christensen and Rosenbloom (1995); Henfridsson et al., (2009)

Table 1. Summary of value network concepts

2.2 Transformation of value networks driven by digital service innovation

In the innovation literature, it is recognized that value networks are not static; they dynamically change over time (Christensen and Rosenbloom, 1995). With the advent in technology, digital service innovation may influence different processes such as supportive processes, relationship with stakeholders (e.g. customers, suppliers, and partners). Selander et al. (2010) show how relationship transformations are driven by tensions between collaborations and competing values in the telecom industry. As a result, value networks need to be reorganized to show changed relationships, value and exchanges that occur due to addition, deletion or modification of stakeholder roles. From business point of view, this also offers several benefits like cost reduction, time efficient and high quality maintenance, increased in sales and new revenue-generating business (Jonsson et al., 2008). For instance, digital services (i.e. services independent of time and place) effect business in manufacturing industry based on remote diagnostics systems. Some other advantages of digital innovation such as creating media-rich channel between companies and their customers have been illustrated by Allee (2000a). She showed how a cloth manufacturer provided competitive advantage to their customers through introduction of internet technology in their business.

This opens new area of research such as redesigning customer-service processes and redesign of existing value proposals (Jonsson et al., 2008). Change in number, type and relationship of actors is another example where digitization influences business and is related to change in value creation structure. However, these changes are not one-directional. Åkesson (2009) demonstrated in the Newspaper industry how value networks in digital innovation are in the state of constant change and parallel configurations. Digital innovation drives value networks to divergent structures whereas stabilization in business drives value networks to convergent structures. This dialectical pattern has also been recognized in the telecom industry (Selander et al., 2010).

Given this literature overview, more research is required on the impact of digital capabilities on customer relations, value creation structures, and value proposals (Jonsson et al., 2008). In particular, there is relatively little research in Information Systems contributing with an understanding of the process by which value networks are transformed in manufacturing industries while expanding their businesses with service economy enabled by digital service innovation (Barrett and Davidson, 2008).

3 THE RESEARCH APPROACH

The research on digital services in manufacturing industries may be viewed as being in exploratory phase, as researchers has only started to explore their business use (Barrett and Davidson, 2008). This research is done in an ongoing project together with a 'group of companies' in the vehicle industry. The overall research is collaboration between research community and practitioners from the industry as such that it can be characterized as action oriented research (Baskerville and Myers, 2004, Kock and Lau, 2001; Mathiassen, 2002). On the basis of digital innovation in remote diagnostics technologies, an expansion from only manufacturing oriented to the service oriented business is target of the project. The project is aimed at two things: first is to develop new remote diagnostics technologies; and second is to develop new digital services, identify the related conceptual business models and its implementation in their value networks. The research question addressed in this paper concerns the second aim.

To study the implication of digital services on value networks, this paper uses interpretive study (Walsham, 2006). The project is organized as a collaborative process in four steps: exploration, conceptualization, development, and implementation and verification. At this point of the project, the exploratory study (exploration) is being done with the purpose to understand and explore the existing value networks of the ‘group of companies’. As a case study, the ‘group of company’ involved one project manager, two service developers, and number of business area representatives. The research company involved three informatics researchers and number of technical researchers as shown in *Table 2*. Project manager planned and managed the flow of program in addition to provide access to the required resources. The following part of this section presents the studied ‘group of companies’, data collection and interpretation of data:

The ‘group of companies’ consist of a research company and number of other companies. Each of the company has highly specialized business areas and deals with distinct vehicles. The ‘group of companies’ manufacture physical products i.e. vehicles and their parts and has limited service business. Being manufacturing company, it follows traditional value chain approach for products. In this part of the project, it employed one project manager, two service developers, three number of technical developers and number of business area representatives. The service business take care of basic maintenance services related to vehicles and hence produce low business. One of the service related business is, for example related to unplanned breakdowns of the vehicles. These unplanned breakdowns are creating problems as well as offering opportunities for new businesses. Innovation is digital technologies and related services are seemed as one solution to address these issues. The study in this paper involves the data from different business areas of each company. The rationale behind selecting the different companies for data collection was their willingness to cooperate, the availability of multiple sources and the possibility of purposeful input (Yin, 2003).

The case study is organized as follows: It started with the service development meeting with the purpose to create refined scope document. Each of the meeting lasted between 1-2 hours. These meetings were more concerned with the planning activities, understanding and discussion about potential areas of study of the project in addition to preparing ground for workshops. Field notes about the company’s perspective expectations were collected during the meeting and coupled with the meeting minutes collected after the meetings.

Several activities have been performed in order to collect information by involving important and available participants. These activities include service development meetings, monthly meeting, and workshops. To capture different aspects and comprehensive understanding of value networks, several data sources were used. Hence, we used number of sources for data collection such as interviews, weekly project reports, meeting minutes, company documents and e-mail correspondences. Even though interviews were rich sources of interpretations, they were supplemented with other sources (Walsham, 2006).

Monthly meetings were 3 hours each, generic in nature and discussed project issues which occurred across the disciplines such as technical, business, and service development related issues. While service development meetings were more focused and explored business aspects of service development. Notes, meeting minutes and e-mail correspondences provided additional inputs on the topic.

Workshops were conducted as half-day activities and include the followings: (i) semi-structured interviews were conducted and recorded with the business area representatives. The intent was to explore their business models, services and customers; and (ii) value networks were drawn in co-operation with business area representatives and service developers from the company. The aim was to understand the existing structure of value networks (drawing interactions both tangibles and intangible) within each business area. Initial version of networks showed very limited intangible exchanges and even missing interactions. Second version included more numbers of intangible exchanges. A brief description about value networks were given before hand to provide basic information required to draw them. These workshops involved the discussion about possible implications of digital services on their business.

The collected data were interpreted with the purpose to explore existing networks and how digital services transform them. Workshops including drawing value networks and interviewing were the main sources of information for this purpose. Later on, value networks were analyzed and interviews were transcribed. These were supplemented with the follow-up study using e-mail correspondences about value networks. Information from meetings summaries, weekly reports, and field notes from service development and monthly meetings were also added in the findings. These findings provided the aspects of value network to be considered.

On the basis of the data collected, we provide illustrations about how existing value network in the vehicle industry is influenced by the service innovation based on remote diagnostics system. The interpretations are guided by the related literature and the advice of Walsham (2006) on relating interpretations to literature. In this ambition we have done interpretations on the related literature presented earlier.

Table 2 below summarizes the data collection activities and participants involved in the related activities:

Activities	Participants
Service Development Meetings – regular and on demand (21)	Service developers (2) Project manager (1) Informatics researchers (3)
Monthly Meetings (3)	Technical developers (3) Service developers (2) Project manager (1) Technical researchers (3) Informatics researchers (3)
Workshops (3) – drawing value networks and interviews	Service developers (2) Business area representative (1) Informatics researchers (3)
	Technical developers (3) Service developers (2) Project manager (1) Technical researchers (3) Informatics researchers (3)

Table 2: Summary of data collection activities

4 RESEARCH FINDINGS

To explore the impact of digital services on the value network, this section is organized based on three aspects of value networks: roles, relationships and nature of value networks.

4.1 Importance of roles

Roles hold a prime position and importance in value networks as being one of the main building blocks. Hence, it is necessary to pay attention to these building blocks. There is a general trend of not involving some important roles in product oriented companies who wish to expand their business in services. This general trend is expressed by the service developer in a monthly meeting as:

“There are difficulties with rigid attitude to service development and need to be balanced. For example, an attitude not to talk to customers etc. ”

For well-functioning design of products, it is important to bring perspectives of different stakeholders such as who will use the product e.g. customers. This will increase knowledge of various stakeholders regarding the values they are engaged in, resulting in increased trust and satisfaction level. The importance of including more roles for successful development of digital services was highlighted by one of the business area representatives during a workshop

“We have successfully designed together with the customers in a project for new a concept on preventive maintenance”.

It was also observed while drawing value networks that some roles were not considered as part of the networks. But with the digital services, more roles are thought to be included in the network.

With the digital services, many new transactions (both tangible and intangible) were seemed as potential candidates for focal actor, hence increasing their value in the system.

One of the interpretations from value network reflect the need to define roles on the basis of activities, they perform. For example, a salesman dealing with product and services was shown as two separate roles in value network and required separate mechanisms of exchanges. An instance of this is perishable products required direct marketing channel while sales of non-standard products such as parts is done by sale representatives. The digital services abandon perishable nature of traditional services and hence, the roles can be set as single role.

4.2 Relationships – Intangible transactions and exchanges are equally important

Relationships with stakeholders (e.g. customers, suppliers, and partners) depend upon the transactions – both tangibles and intangibles. These transactions lay the basis for analyzing value networks e.g. exchange analysis, impact analysis, and value creation analysis.

Empirical activities and documents reflect that current business setup is based on traditional product based model or approach. Workshop activities showed that there was very limited thinking about intangibles e.g. brand and good-will of the products. It was also found that there was missing or dead links within value networks. For example, the company (focal actor) did not contain enough links to one of its important role (customers). These bottlenecks were marked and decided to be filled in future workshops.

It was also observed that intangibles were neglected or considered of very low significance. They are only considered as additional values to their products. Digital services were also perceived as additional values to attract their customers. This was annotated by one of the business area representative during a workshop

“I think that with digital services more vehicle parts can be sold.”

This situation is very risky and need special attention when dealing with digital services as they produce enormous amount of intangibles e.g. in the form of information services (knowledge about health status of products).

With the digital technologies, there is increasing trend to think about importance of intangibles as negotiable form of value (monetary value). This was annotated by one of business area representatives as

“We do not see service business so profitable right now, but I think with it will be possible with digital services.....”

Another finding that came out as a result of drawn value network is that knowledge about internal and external relationships of different roles within and outside the company was present but remained unaddressed. This includes relationships among individuals and departments of external company; individuals of the company and consumer; departments of two companies; and department company and consumer.

4.3 Nature of Value Network and Overall Business

It is inevitable that dynamics of value network will change business models. Given that there is change in the roles and transactions of value network as the result of digital service innovation. During the workshop, a response to a question regarding impact of digital services on the business, one of the business area representatives mentioned

“... The most important challenge is to understand that you are not just selling a part, you are selling value to the customer and you need to rethink regarding your business model....”

This allows rethinking of value networks and business models which invite companies to incorporate new paradigms within existing networks. This was further explored in the interpretation of value networks and found that these models were changed when considering values of products. Also redefining mechanism to exchange value opens new areas of business.

When physical products are embedded with digital capabilities and service innovation is possible on the basis of these capabilities, it changes business in terms of increase in sale and revenue. Again considering one of the statement from one of the business representatives during a workshop

“I think that with digital services more vehicle parts can be sold.”

And With the digital technologies, there is increasing trend to bring in service-oriented concepts as vehicles are not merely machine but embedded computing devices that will bring value-added to the business. Digital services also bring out opportunities for new revenue-generating business

“We do not see service business so profitable right now, but I think with it will be possible with digital services.....”

Finally, interpretations of value networks also show that service development is taken into consideration in early stages together with the product development. This is in contrast to traditional settings where products are developed first and then, their related services are developed. This also brings the usability and marketing perspective at the initial stages of service development. In turn, it will help to better predict about the behaviour and dynamics of value networks

5 DISCUSSIONS

The question addressed in this paper is: Thus the question addressed in this paper is: *How are existing value networks in product oriented business transformed by digital service innovation?*

Based on the literature review and an interpretive case study, we tried to shed light on how product oriented value networks are transformed by digital innovation. By probing into the situation, case study is well-positioned to capture and explore such possibilities. This kind of reasoning is important as digital artifacts show unanticipated properties during their development stages. Thus, the exploration is well suited for theorizing transformation process by investigating their evolution over time.

The interpretations drew on roles, transactions and nature of value network (Allee, 2008; Åkesson, 2009; Jonsson, 2010) and following propositions are put forward:

Proposition 1: “Digital services innovation aggrandize the roles”

The interpretations on roles show that there is a need to involve more stakeholders in value networks in order to shift from product oriented to digital service oriented business. This will provide an opportunity to work more with other stakeholders such as in co-creation of digital services. This also embeds the service consumption perspective in the service development process (Bryson et al., 2004). Another implication is that new roles will be involved in the network, hence they span boundaries of the companies (Amit and Zott, 2001; Jonsson, 2010). In this way the alignment of roles in network to realize value targeting a defined customer based is enhanced. Sometimes, the existing roles' interpretation duplicates some exchanges while missing some important exchanges between these roles. In such cases, roles are needed to be considered for redefining.

Proposition 2: “Digital service innovation modifies exchanges and relationships of value networks”

Success of a business is not restricted to economic transactions rather intangible transactions are equally important. Moreover, concerns about intangible transactions has exceeded from brand recognition and customer loyalty to sense of community, knowledge exchange and many more. This came as an opportunity to convert these intangibles to monetary values or bartering these with other

required intangibles values. Ignoring importance of intangibles will lose the strategic value of unprofitable but important stakeholder (Kim and Lee, 2007). This becomes more important when digital services come into play as they mainly produce information about health of vehicles. Furthermore, considering intangible transactions in daily activities make the network flexible and self-expanding as new ones are discovered. These features allow new innovation to be adapted easily in the network without increasing its complexity and special considerations. Like roles, there is also a trend in increase in the number of exchanges between roles which also expand value networks. Moreover, including intangibles means bringing new aspects to the business and ultimately the network expands because of these new aspects.

Proposition 3: “Digital service innovation embarks the nature of value networks more dynamic than in product oriented value networks”

The introduction of digital services will result in expansion of network e.g. new information models are inevitable that will provide remote diagnostics information services. Thus, it will build new relationships with other stakeholders as well as modify existing ones in the network. Also, there possibility for one of the participating company to take focal position in the value network by increasing the value and number of exchanges. This in turn will increase the complexity of network. The adjustment of such relationships in the existing network requires it to be flexible and self-expanding to some extent, at least. The consideration of transactions and exchanges between different roles open new opportunities for revenue-generating businesses (Jonsson et al., 2008). Moreover, this knowledge is very useful to think and redefine relationships with other stakeholders when new services are deployed on the basis of remote diagnostics system. This allows networks to change dynamically over time (Christensen and Rosenbloom, 1995).

Table 1 presents the summary of proposed transformations of product oriented value networks. These proposed transformations are grounded in the interpretive case study and well as the literature on value networks and digital innovation.

No.	Aspects	Transformations of product oriented value network
1	Roles	Involving more roles
2	Relationships	Modification in interactions and relationships
3	Nature of value network	Expanding and dynamic

Table 3: Summary of proposed transformations

6 CONCLUDING REMARKS AND FUTURE WORK

The research presented in this paper is a response to recent calls for research on the increased service oriented economy in the digital age within IS field. We concur with Yoo et al. (2010b) that the transformative power of digital technology accelerates and that one of the new centres of interest in IS research will relate to the role of digital innovation in the future economy and human enterprise.

An important contribution of this paper is the presentation of propositions regarding the transformation of product oriented business into digital service oriented business. This will contribute to existing literature on transformation by digital innovation in the IS field which tries to address the issue in different industries such as manufacturing, oil and gas, and manufacturing. Moreover, this study will serve as a frame for embarking contemporary and future study in IS field. More research is, however, needed to further explore how such a transformation occurs when digital innovation undermines its foundation.

The context where the study is being applied provides possible limitations in the research context i.e. it will study the influences in particular to vehicle industry. Even so, our aim is that the results will be of value to understand the process of how digital innovation transforms value networks in manufacturing industries in general.

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