Internet of Things and Services (IoTS) : a Brief Introduction to the Emerging Business Models

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Abstract

The business framework in the Internet of Things and Services (IoTS) is undergoing major changes with the augmentation of technology framework. This has necessitated the design of innovative business models for the fruitful exploitation as well as the deployment of the applications as well as the services. It has been observed that the existing infrastructures of the Internet of Things and Services (IoTS) generally make the focus on the technologists, researchers as well as the developers of the software. However, the positioning of the real-life applications becomes result-oriented, only on the basis of the capability of the potential of the business, that is the sustainability and the real-life cases in the domains, that have been chosen for the purpose. The research paper tends to focus on the foundations of the practices and the theories for the performance of the modelling of the businesses, related to complex as well as multi-customer aligned services of eBusiness, that are based on the organizers of the Internet of Things and Services (IoTS) as middleware components that support the developers of the applications in the areas of embedded systems. The paper highlights the performance of the modelling of the business in the applications of the Internet of Things and Services (IoTS), that involve the businesses of the products, as well as the mode of deriving the innovative as well as the new propositions of value, that are the emerging concepts of the service.

Keywords : framework, infrastructures, Internet of Things and Services (IoTS), deployment and eBusiness

Introduction

The modern technology is focused on the development of the middleware for the evolving of the Network Embedded Systems (NES), where there is cooperation of the devices of diversified nature, for the attaining of the target, that has been assigned. Under normal circumstances, the developed middleware permits the software developers to unify the diverse physical devices in the applications by making the offer of simple services of web-servers as interfaces for the management of any type of physical device, ignoring the allied network technologies, as Radio-Frequency signals, WiFi, Bluetooth, etc. The services and devices that are evolving through middleware could be considered as reliable and secure, operating through the trust components of the middleware and the distributed security. The kit for the development of software for the middleware is utilized by the developers for evolving applications that are driven by models, that are implanted with the compatibility of the environment of the Internet of Things and Services (IoTS). It would be useful to use a Device Development Kit (DDK) for authorizing the manufacturers of devices, to produce devices, that are Internet of Things and Services (IoTS) authorized.

Objective of Study

The main objective of the study is to introduce the business models of the environment of the Internet of Things and Services (IoTS). There are two different approaches of the business models, namely, value model and process model.

Methodology

The innovative technologies of the environment of the Internet of Things and Services (IoTS) augment the opportunities of business and the manufacturing of the devices. Any kind of device, including industrial products, would have the capability to be connected to a network, that makes available a big network, that are interconnected. The businesses have augmented in a monumental fashion, from the nascent manufacturing stage to various ranges of combined concepts of maintenance. The business offerings comprise of management support for customers, that includes installation followed by commissioning of the products, with support for diverse ranges of maintenance services. The offering are always related to the own products of the business, that neither augment the business risks, nor make any increment to the total value of the processes of the business, apart from remaining competitive in the market. The businesses of the products could

utilize the networking technologies of the devices, that not only reduces the costs, but also the time of the installation, along with neutralizing the differences of learning, with gaining new customers, augmenting effectiveness, grabbing new opportunities of businesses, and bridging the gaps of knowledge. The businesses deploy the devices of the Internet of Things and Services (IoTS), into the environment of Internet of Things and Services (IoTS), that has a relationship of customer service, that in turn, augments the retention of customers and revenues.

In the recent past, the businesses appended new services to their new systems, as in management of supply chain, management of various service levels, and also management of services. These services further augment the appended economic benefits into the computation of creation of value, that mostly comprise of retention of customers and loyalty of customers, that integrate into new models as management of customer assets and services for the customer assets. It is found that there is a common feature for these business models, that includes the added complexity, which results in the increase of risk of the loss of the benchmark for the computation, validation, as well as the evolution of value, causing the business models to remain proportionately static.

The businesses have realized that in the environment of the Internet of Things and Services (IoTS), the networking of devices is essential for future growth. In the present day markets, the consumers continuously look for increased integrated and complex services. Hence it is being construed that the intelligent services and the applications in the environment of Internet of Things and Services (IoTS), would help mitigate the problems, that arise when businesses migrate to global services with augmented responsibility of management. The launching of the offerings of Internet of Things and Services (IoTS), necessitate the introduction of new business models, that require the explanation and identification of the created dynamic values. These are necessary for the models of the exchange of information and products, with the resulting values, among the appearing clusters of numerous stakeholders across the systems of the businesses. The potential for the accurate creation of value, and the participants who are involved, indicate the difference between failure and success of a new offering of Internet of Things and Services (IoTS).

Findings

The term 'business models' are used nowadays for the description of the most complex environments, in which the businesses operate, and deal with the upcoming disruptive technologies, similar to the Internet of Things and Services (IoTS), with fast and variable patterns of demand. In the environment of the Internet of Things and Services (IoTS), the businesses need to remain dynamic and fast moving from their positions. The structured patterns of such dynamic behavior are known as 'business models', for the purpose of right selection. The business models with middleware combine the values of the offerings of businesses to various divisions of the customers. The design and the network of associates of the businesses, who generally create, market and deliver the values, are normally responsible for the generation of sustainable revenue and profits, for all the participants. The business with a strong business model has much better prospects for meeting and comprehending the challenges along with the sharing of the messages with the consumers. The social modelling ideas permit the authentication of the required elements in a domain, and the charting as well as the utilization of the business models support changes as designers are capable of altering the specified elements of existing models and make replication of the new businesses. These operations enjoy the freedom from risk, and do not cause any harm to the businesses. This type of business model is therefore an extraction from the enterprising activity of the business. The basic queries that are needed to be resolved by such a business model, include, who the consumers are, what offerings are made to the consumers, how the operation is executed for the delivery of the service or the product such that the business remains sustainable and makes profits. It is necessary that analyses and recognitions are made of the proposition of the value of the Internet of Things and Services (IoTS) in the service of the concerned eBusiness, recognize the group of the consumer where the service is intended, and the nature of the organizing of the business, for making of an efficient delivery of the service. The sequence of the operation of the three steps, play a big role on the selection of the proposition to be made for the modelling. After the resolution of the three queries, the model could be initiated, and followed by the steps to be taken for the analyses of the cost model and the revenue, evaluation of the sustainability, along with the derivation of the financial returns, of the proposed eBusiness in the environment of the Internet of Things and Services (IoTS).

We had discussed that there could be two different approaches for the business model, namely, value model and process model.

As far as the value model is concerned, there is focus on the creation of the value, how the creation of the value is made, who makes the creation and for whom the creation was made. It proves to be a tool of strategy with the objective of recognizing the new opportunities of business, and how the businesses could station themselves in a strategic fashion for reaping highest benefits from the emerging as well as the new chances of eBusiness, that might not need any major alteration of the existing infrastructure of business.

As far as the process model is concerned, it might be observed that there are significant variations from the value model. These models are utilized by the businesses of the same nature, that could be restricted together into a model. These models are normally stipulated for performing operations in dissimilarity to the process itself. So these models are best utilized for providing a structural outline in the execution of the strategies of business in confirmed frameworks of business.

This paper would restrict itself to the discussion of working with value models for the progression of eBusinesses for the services in the environment of the Internet of Things and Services (IoTS), that utilizes the middleware architecture.

Discussion

It is believed that sustainable businesses could be built if the business settlements evolve values, that are lasting and true. The business results in failures if there is no increase in value for the consumers. The value model has a specific purpose of describing the transactions of the objects of value, mentioning the concerned participants, who are engaged in the transaction. The value model further makes the forecast to which range the participants could make profit, and if the participants have any intention of transacting valuable objects with each other. The value model utilizes the disintegration of the activities of value for giving way to new businesses of profit, where the disintegration of the functions of the process modelling provides the target for the study of the assignment of resources

for diverse functions. The normal practice of utilizing the e^3 value methodology, is used to create value models. This methodology could reveal the participants, who are associated in the scenarios of the Internet of Things and Services (IoTS), as well as make recognition of the objects of economic value, that are created by the participants, and then exchanged and consumed. The objects of value are made public, that the participants hope to receive in return for the delivery of an object of value, or any system of reciprocation economically. This method also demonstrates the objects that were offered in clusters, and the operations that are causing the transactions between the participants.

The e^3 value methodology comprises of experience, economical and ecological values. The experience values comprise of certain viewpoints that are people-oriented, with aspects that are hedonic and utilitarian. In the first level, the experience values could be classified into intrinsic and extrinsic. The next level of classification is composed of emotional, social, epistemic and functional. Emotional values could be classified into reactive and active values. Social values could be either intrinsic or extrinsic. Epistemic values could be the utilities perceived from the capacity of an alternative, for satisfying the desire of knowledge, or providing novelty and arousing curiosity. The epistemic value could be acquired by an alternative by the method of questionnaires, that refer to novelty, curiosity and knowledge. The functional values remain extrinsic, when epistemic and emotion values are considered to be intrinsic. The experience values are apt in the creation of values that are essential for environment, as memorable experiences, that spread out over time. Experiences are distinguished by interactions in society, participation by customers, and the degree of dynamism in the usage of the environment. The focus of the design of experiences need to be made on the improvement of the interactions of the participations, for the emerging of successful experience, by way of designs of interactions in the society, and the planning of activities with the layout. The values perceived by the customers, due to the usage of the services or products, could be grouped into hedonic and utilitarian values. These two components contribute to the dimensions of feeling and thinking. When the experience of consumption is admired as an end in itself, it is known as intrinsic value, and when there is means-ends relationship, it is known as extrinsic value.

The economic value is related more to the manufacturer of business and provider of service. There is enhancement of income and reduction of cost. The achievement of enhancement of income is made by creation of market, bringing contrast, and making the retention as well as the acquisition of customers. If service or elements of product are added, the positioning units of product and service could attain contrast from the enhanced competition of the market, augmenting the relationship with consumers, resulting in setting up new markets. With the concept of pooling of profit as well as revenue, the monetary values were modified from economic values, and then comparisons were made with each other, in a quantitative manner. Further the provider of service and the manufacturer of product would have viewpoints, that could be found, along with the economic value of the consumers. It is also necessary to make careful consideration of the economic value of employees as providers of service, for an improved quality of service.

The ecological value takes into account, the themes of values as saving of energy and water, dissolution, recycling, reprocessing, as well as causing a reduction of the materials that are hazardous. To initiate the sustenance of consumption and the sustenance of development, the authorities make guidance to customers as well as businesses by making campaigns and administer regulations. Various international bodies have shown remarkable activities in the promotion of the patterns of sustainable consumption, by ways of systems of product services, environmentally responsible purchasing and ecologically responsible designs. Sustainability is proved to be a major option for innovation. The compliances are utilized by businesses as major chances that could modify their value chains to a higher degree of sustainability. A higher degree of sustainability of the designs and services of products, and evolving new models, could help attain ecological values.

If one or more value models are connected, it generates the statements of income, and helps in the calculation of income. So these value models present the business scenario, in the graphical e^3 value software tool. This method uses the concept of economic values, and further demonstrate the ways the participants make the creation, and then making exchange, as well as making consumption of the objects of economic value. The e^3 value doctrine comprises of various sub-sections, that are related to the types of demands. The concept of the global participant demonstrates the involvement

of the participants, along with the articles of economic value, that were created, and then subsequently exchanged, and followed by the consumption of the participants. It further demonstrates the articles of value, that the participants expect in return for a delivery or the system of reciprocation economically.

Implications

The utilization of value models in diverse ways could be discussed to understand the implications. The services in the industry were normally considered to be necessary accessories of the physical product. It is only in the initial stages that there could be centering of any custom design, and in the final phase, there could be provisions of spare parts. In the present era, there have been significant changes from providers of technology to providers of performance. The most powerful tool of the businesses in the present era comprises of services, for generation of revenues and retention of customers. The businesses that manufacture components, have long-established customers, and enjoy very strong positions in the market, with deep penetration in several countries. If these businesses make the introduction of the environment of the Internet of Things and Services (IoTS), in their product base, the resultant business model would comprise of owners, users as well as consumers. In these cases, the first step normally comprises of the launching of a remote monitoring service. The participants, who include departmental managers, owners as well as consumers, would be able to make the access remotely, and perform their own functions of control and monitoring. There could be detection and monitoring of malfunctions as well as breakdowns, and that would be of great advantage as that would reduce the downtime. Furthermore, there could be monitoring of compliance, and storage of the reports for future use, as inspection during audits. The service contract and the object of value remain closely related, and this augments the retention and loyalty of customers.

It has been observed that the disintegration process evolves two absolutely new value activities. One activity deals with the contracts of service, whereas the other deals with the internal supports for the technicians in the field. There is growing complexity in the businesses of manufacturing, and hence there is the urge for the training of the service staff. There is also

substantial growth in the expenditures incurred during education and support during the various phases of operation in the businesses, and the expenditure for actual service work is quite high. The remote accessibility feature of the businesses, enable them to augment the value activity in all their units, in the same city, as well as others, and also saving much of the expenses incurred in the service support. As the feature of remote access became a necessity for all the participants, the proposition of the launching of new participants, with the same proposition of value, received active consideration. This feature could be utilized for transmission of data, related to supply and consumption of energy, and as such, the data need to maintain high standards of accuracy. If the businesses could join the information network of smart grid, for the distribution of energy, there could be a new object of value, that could be of considerable interest to a participant, who is completely new in the environment of the Internet of Things and Service (IoTS).

These scenarios of businesses utilize the e^3 value tool for flexibility and performing several complicated tasks, followed by the producing of results, in terms of visualization as well as the economic value in the environment of the business. The objects of value are clearly defined, and the functions of the participants are also specified. The remote access to the sub-units of business, could bring innovation in the nature of the business. There could be an increase in the number of information brokers, as well as providers of service, in the environment of Internet of Things and Service (IoTS). The innovative environment could make new service offers like management of energy, remote diagnosis, maintenance and repair, management of information, provide remote assistance to installation and commissioning of new plants in businesses, optimization of assets, as well as remote metering of energy. It is convincingly established that in this type hypothetical market, all the participants are profit-making, and the concept of the Internet of Things and Services (IoTS) in eBusiness is very much sustainable.

Conclusion

The research demonstrates the significance of making the application of a value based approach to models of business in the emerging environment of the Internet of Things and Services (IoTS). The paper highlighted the formal doctrine of modelling of value, that is the e^3 value method. The method is of great use and it provides a deep knowledge of the environment of the Internet of Things and Services (IoTS), along with the process of creation of value, as well as the exchange of the objects of value between the participants. The method further provides the instrument for disintegration and reorganization of the activities of value, for the development of the innovative and new model..

The research mainly highlighted the businesses of products, and also demonstrated the development of a sustainable model. It also explained how the analysis of value could be used for the recognition of the new objects of value, that could be of interest to the existing participants. It is further demonstrated how the new objects of value that have emerged, could be the reason of the joining of new participants, in the system of the business, for the augmented sustainability and performance of the model. The models, discussed in the paper, have complexity of moderate nature, and we use the identical methodology of the analysis of value, in healthcare and agricultural sectors, that are characterized by several types of participants, including those who operate on a voluntary basis.

Acknowledgement

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