

A HYBRID BUSINESS MODEL FRAMEWORK FOR IOT

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Summary

Abstract: The Internet of Things is the emerged technology for the progressive enhancement of various industries including manufacturing, public healthcare development, power generation and business. Out of diverse area of research in IoT, the development of new and improvement of existing applications is a highly focused area for making IoT an elegant approach for automated fact discovery and task handling. To ignite the progress of IoT applications with ease of commercial exploitation a business model is highly essential. On the other hand, a framework facilitates the realization and development of the business model by defining the building blocks of the model, their functionalities and relations. This paper aimed at designing a hybrid framework for IoT enabled the business model to facilitate the development of IoT applications. Some of the existing models are discussed at the beginning of the paper. Conceptual flow of model components are also shown to understand the impact of IoT in business models.

Keywords: IoT, Business Model, Management, Optimization, hybrid company

Introduction

It is challenging to find a standard definition of the business model. Thus many authors have proposed own definitions in their publications. Timmers admits that the business model is “an architecture of the product, service, and information flows, including a description of the various business actors and their roles; a description of the potential benefits for the various business actors; a description of the sources of revenues”[17]. Whereas, Chesbrough & Rosenbloom think that the business model is “the heuristic logic that connects technical potential with the realization of economic value.” Shafer et al. in their work they have discussed a business model as “a representation of the underlining core logic and strategic choices for creating and capturing value within a value network.” However, researchers and practitioners disagree on almost all accounts on what a business model is, what kinds of business models can be said to exist and what in fact is meant by the term business model innovation.

Also, it is worth mentioning that a business model describes the mechanism of operation of a company to serve their customers. A good business model includes all components that contribute to the progress of the business, including various stakeholders, business activities, and resources. Because these are the key to produce and sale the product, brings value to the product, maintains relationships with consumers, determines the channel to sale the product, cost incurred for production and collection of revenue. A model adopted by a company may not be suitable for its first deployment. Business models are a new unit of research in academia and are not yet well defined. It is referred to and described in many ways. Common traits include an activity system perspective with a focus on the creation, delivery, and capture of value. Its scope is often broader than the firm, but more narrow than a network level approach. The business model can be viewed from many perspectives, including system models, role models, scale models and recipes.

So, a framework is designed to facilitate the company to improve their business model by rectifying the functionality of the components of their business model over time. However, developing a perfect business model is a challenging task and considerable refinement till it is achieved. Moreover, a business model for IoT enabled businesses is entirely different and more challenging compared to models for traditional companies. Many of the actions are manually carried out in conventional market and fully or partially automated in IoT enabled transactions. An application is a crucial resource in IoT allow business, whereas applications in traditional business are the auxiliary components in the model. The accuracy of the claims in IoT based industry plays a vital role as any false detection of the event may crash the market in totality. A company-centric approach is adopted in traditional business models, on the other hand, an IoT based business model demands collaboration among fellow companies, interaction with customers and other stakeholders. Moreover, dynamic nature of market environment needs immediate cope up of the company with the technology change. Hence, the innovative business model is gaining popularity among researchers.

Traditional, present and future business model

In a traditional business, model companies operate to supply its clients and consumers with a product in exchange for compensation. The typical goals of these types of businesses all contribute to reversing a profit for the owners or operators, meaning that the business pulls in more money in revenue than it expands. Businesses spend a significant sum of money on operational bills and wages.

Perechuda has noticed that there is some kind of conflict between business models in the past (old business models), present (actual business models) and future (new business models). Through business models you can define, detail, design and exploit the essence, content, and functioning of a company, which we can call corporate architecture in short. Perechuda also admits that in reality, a modern, transitional company has the very complicated infrastructure based on a networking paradigm [14]. See Figure 1:

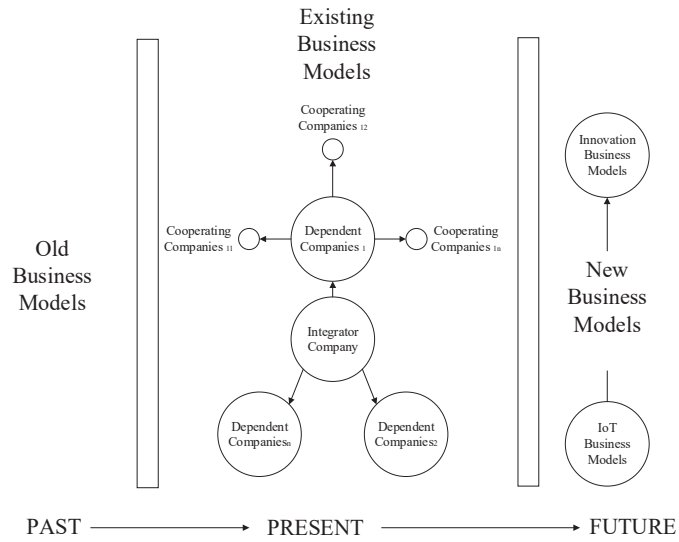


Figure 1. Traditional, present and future business model

Source: [14].

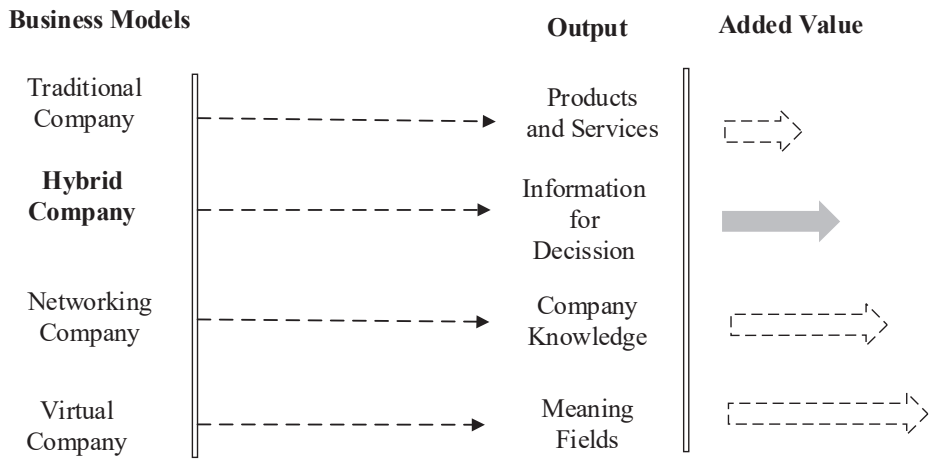


Figure 2. Hybrid company

Source: [15].

Business model innovation is firmly integrated with other management disciplines like innovation management, change management and strategy. Together these fields form the necessary theoretical platform to facilitate, initiate, and implement business model innovation processes successfully. Innovation management helps in understanding how to best facilitate the innovation process through cross-functional information flows and innovation teams. Change management deals with creating change acceptance in the organization and mitigating rigidities that hinder the process. Many business models couple strategic innovation with competition and markets, making sure that any initiative increases enterprise performance in the long run [1].

The hybrid business model could be defined as combinations of competing elements or technical generations. The advantage of hybrids is that they are a half-step that can help their developers manage long and difficult transitions, such as the one between generations of technology or the transition between careers. The challenge of hybrids is that they are only temporary half-steps. Looking back at history, we can identify hybrids that bridged many of the major technology transitions. The hybrid business model seems to be quite simple because it combines the traditional and technical solutions, technics and method of the Internet. It is worth remarking that the hybrid business model can be processed as an annex of the traditional commercial enterprise model and not an invention of a new means of managing the business. So, IoT business model we can treat as a hybrid approach as well because in this model the Internet is the base of doing business in this model.

Hybrid IoT business model

In in the near future, companies – even SMEs- will be able to access IoT technology more than ever before. Thanks to the decreased cost of sensors and software platforms,”. Maybe in the next coming year companies will mostly utilise IoT to generate more data that enables them to better interact with customers. Further, IoT will help to decrease operational costs or to improve organizational efficiency.

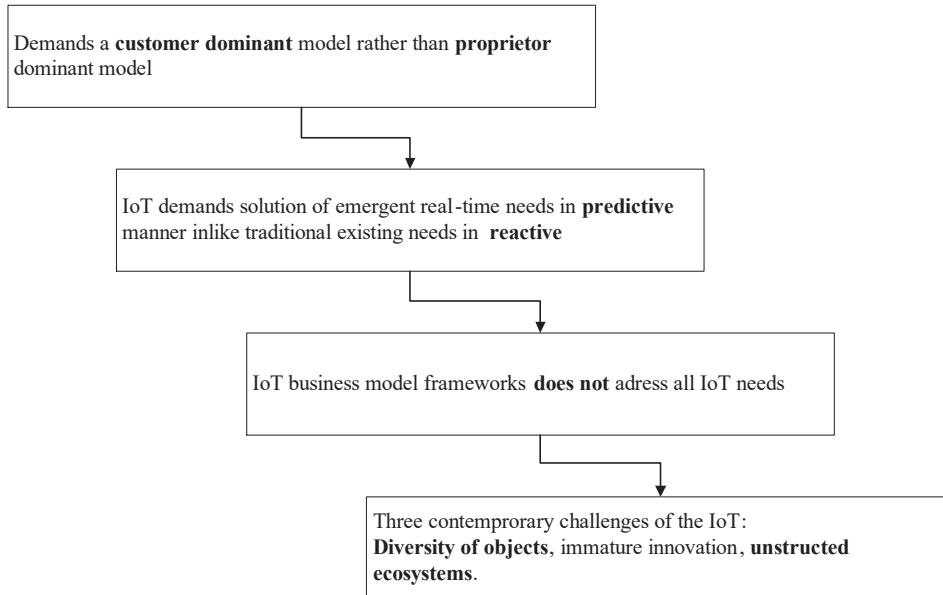


Figure 3. The Conceptual flow of the Business model

The IoT based companies are not only focused on selling goods but also to provide platforms upon which users can add value. However, the identification of the killer applications and the formation of the underlying business model framework is still not sufficient. So, in this paper, the authors have planned to fill this gap with an objective to identify the applications or the value proposition and evaluate the business models that best fit for such companies. At this moment, the authors propose a business model framework for IoT enable firms where the application plays the critical role in the success of the business. The significance of each of the components in the model framework is justified keeping in mind the wholly or partially automated execution of actions against the occurrence of various events.

1. Literature review

Chan H. C. Y has conducted an interesting review of IoT models in business [4]. In his work titled " Internet of Things Business Models" presents the emodel opted for by Bucherer et al., [10] described some key issues when designing IoT business models, including "information between nodes and win-win information exchange for all stakeholders" [3]. Furthermore, Westerlund et al., identified three contemporary challenges of the IOT, comprising the diversity of objects, the immaturity of innovation, and the unstructured ecosystems [19]. Chen Min presents a more detail four-layer architecture for the Internet of Things (IoT) [5].

Various models stated in this section refers business model that contributes to the development of SMEs. Their primary focus is to include components which increase the importance and need for business entities. However, these models either not considering IoT as part of the business model or simply introduced the term. The need of the recent market is to make IoT as an integral part of the

business model. Keeping this in mind the impact of IoT in Business development in this paper have been discussed.

2. Research methodology

An empirical research methodology is adapted to identify the building blocks and their functions to fit in the IoT operated company. Subsequently, the importance of each of the block is also analyzed based on the need and demand of the business. In this work the authors have been following according to steps below:

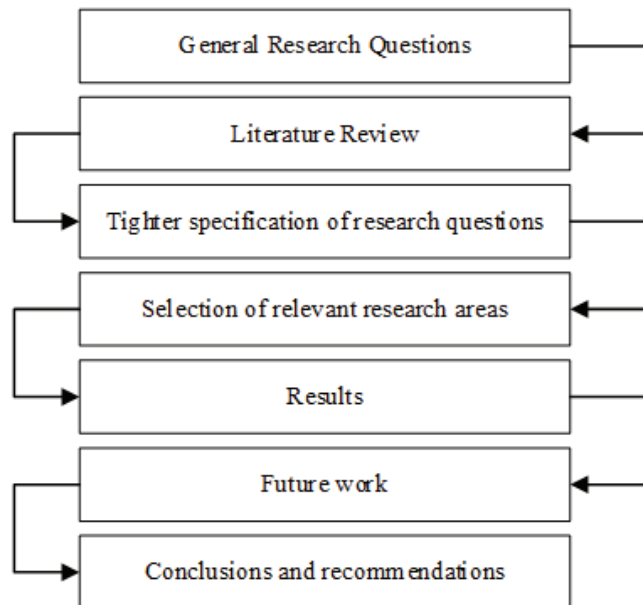


Figure 4. The steps in this work

The Goal of the Study

- To identify the components of hybrid IoT business model
- To present Conceptual Implementation
- To recommend developed acquisition level processing

3. Results

3.1. Hybrid IoT business model

A logical flow of entity relationships in a business model is shown in Figure 5. A business model should address all the four aspects as stated in the circle like what, how and the value. What indicates the primary offerings of the business, ‘who’ address the targeted customers, ‘how’ signifies the way to reach and address customer demands. The business model also signifies the ‘revenue’ sources for the business.

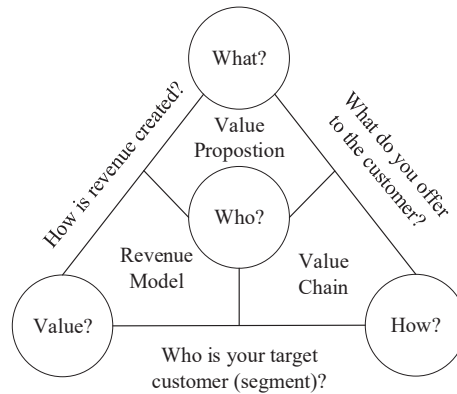


Figure 5. A logical flow of entity relationships in a business model

Source: [10].

Basic offering (What?); Additional benefits (expensive) (Revenue?);
 Attracts price sensitive customers (Who?); Based on very cost conscious processes (How?)

A business model depicts the way a company earns money from their products. Many researchers have suggested various business model components. Although they are differing slightly from one another, all of them conclude mainly few significant blocks. Irrespective of the geographical locations or motivation of researchers, all of them identified mostly into nine major categories. Each of these types is described below:

Producer: it is the entity that offers a service or a product. Mainly the company itself is projected in this category. In case a company uses a third party to sale their product, the third party becomes the producer. In such fact, the third party is responsible for addressing consumers query and need. The original producer is no way come into the picture.

Value Proposition: It is a conceptual component of the model, and specifies the value of the product from the customers’ perspective. The value proposition is difficult to quantify as users satisfaction differs from customer to customer. In most of the cases the products are accompanied by after sale services, and in that case, the value proposition is considered as an integrated entity.

The Consumers: The consumer plays the vital role in the success of the product and upliftment of the producer. The business model must provide the option of identifying the targeted segment of

the customer. A clear understanding of the consumer of a specific enables the producer to capture the market. Moreover, a periodic survey on the customer's satisfaction or dissatisfaction level subsequently helps to refine the product. Such refinement will help to survive the company and increases profit. The consumers are the critical component in the business model that offers the value of the product and ensure sustainability.

Distribution process: This component of the business model describes the process of reaching the product to the consumer. It also includes advertising and publicity of the product which indeed accelerates the acceptance of the product. Distribution process depicts the strategy and mechanism for marketing to reach a maximum depth of the consumer community. This entity of the model also includes potential outlets, distributors, and well-organized marketing plans for the promotion of the product. Periodical survey about the customer satisfaction is also involved in the process.

Value addition and Resource Configuration: Resources, either human machinery is a necessary component for production. It ensures value addition to the product and enables resource configuration. This arrangement of the resource is the basis for determining the cost and revenue from the product. A business model must take into consideration the required resources and their use in the production to specify a cost structure.

Apart from all the components of the business model, in IoT model, few more essential elements are required. These components enable a business to cope up with the need of the cyber world for the establishment of their company and product. Below, the essential elements of the IoT enable business models are discussed.

IT infrastructure: a well organized IT infrastructure is required to deploy the business in IoT environment. Resources configuration and value addition stated above may include and pay particular attention to this component. However, the resources required for IoT should not be clubbed with the general resources. The IT infrastructure will help to provide services to end users anytime anywhere.

Data Analysis: A proper analysis of product-related data and subsequent mining of valuable information enables a company to understand the impact of the product in the market and opinion of the customer. Hence, adequate data analysis and subsequent refinement are considered to be an essential requirement to boost the acceptance of the product among users.

Cloud environment: Appropriate cloud environment helps faster processing with cost-effectiveness. It minimizes the cost of the product and increases revenue generation. Every business should take into account the feasibility of the use of cloud in every stage of the product right from the production till the customer support after the sale.

Figure 6 depicts the key components of the business model. Total nine components are depicted in the figure. The cost structure and revenue stream deal with the earning and profits of the business. Partners are the contemporary other businesses who help to uplift the business. The key activities reveal the actions for running the business and the resources smoothly are the raw material including manpower. Other four components value proposition, customer relation distribution channel and customer segments reflect the strategies for maintaining the product standard after the sale of goods.

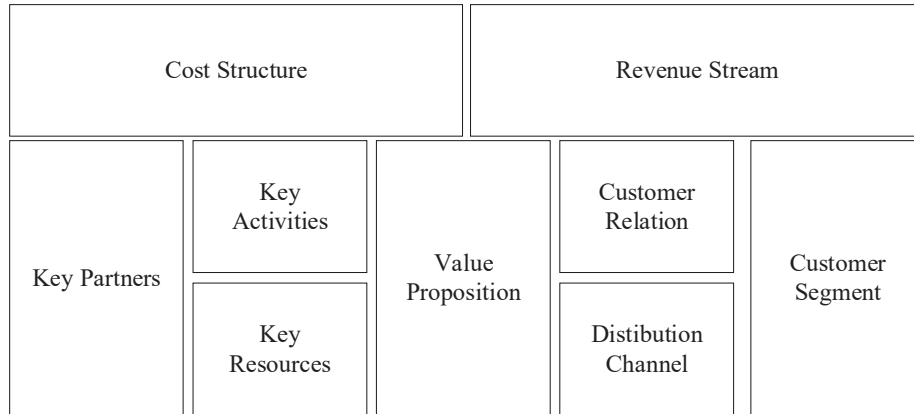


Figure 6. The business model canvas

Source: [13].

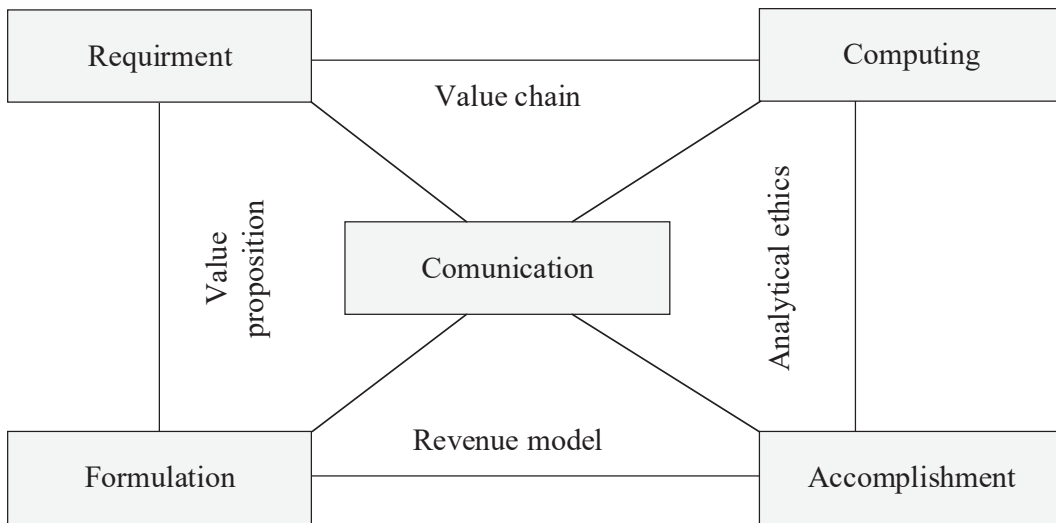


Figure 7. Relation among various components of the business model

In Figure 7, the relation among various components of the business model is shown. This relational model shows the flow of information among various components. A proper understanding of one component by another component of the model is essential to make the success of the business.

3.2. Conceptual Implementation

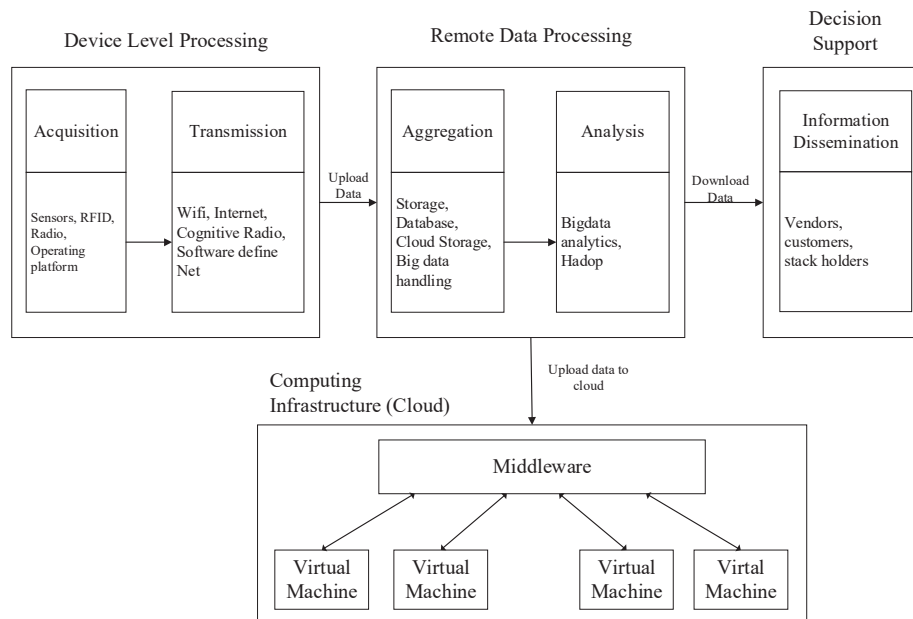


Figure 8. The IoT enabled business model

Source: [16], [7], [2], [11].

The IoT enabled business model has been presented in Figure 8. This figure reflects the objectives of proposed business model in association with IoT in business. Two levels in the model have been presented. The upper model comprises of three components the Device Level Processing, Remote Data Processing, and Decision Support System. The lower level indicates the computational components of the IoT, computation model. The fast and accurate analysis of information at low cost and hence taking help of cloud computing have been emphasized. By using cloud computing, the cost would be minimum, and the computation would be faster. It enables the business to react to the sudden change and demand of the business.

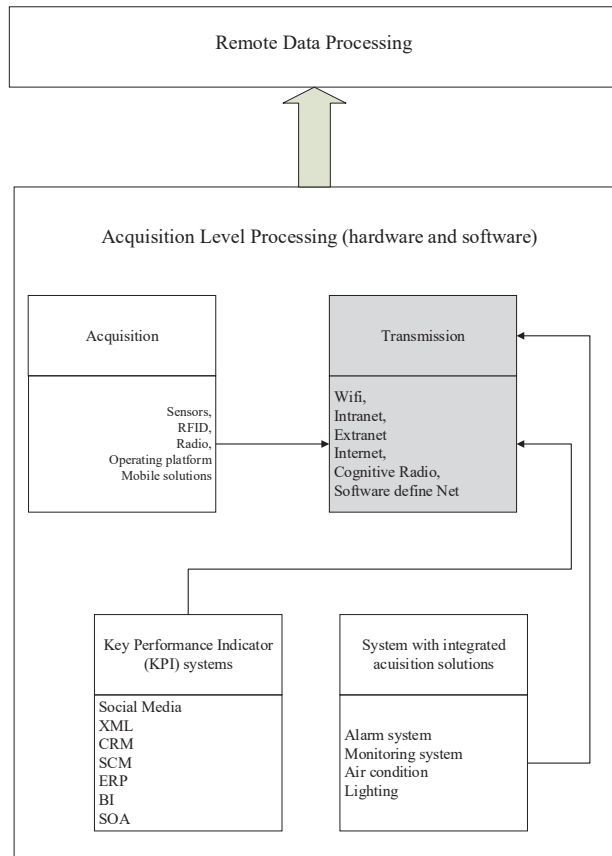


Figure 9. Developed Acquisition Level Processing

Source: own elaboration on [7].

Figure 9 describes a comprehensive explanation of data acquisition model at the device level. Error free and accurate data gathering helps to analyze the data and hence to take proper action at the time of necessity. Further, the transmission of data from source to processing cloud should be fast enough to minimize the delay in processing time sensitive data. There are a lot of scopes to improve the business by integrating IoT. However, proper functioning of such model is highly dependent on the successful implementation of the IoT infrastructure.

4. Future work

It is worth mentioning that there are some types of relations (integrating forces) hidden within entry structure – otherwise, no structure could come into existence. This rule also applied to classical organizational theories, where a company was regarded as a monolith generating revenue and profit from the skillful selection and allocation of means of production [6]. See figure 10:

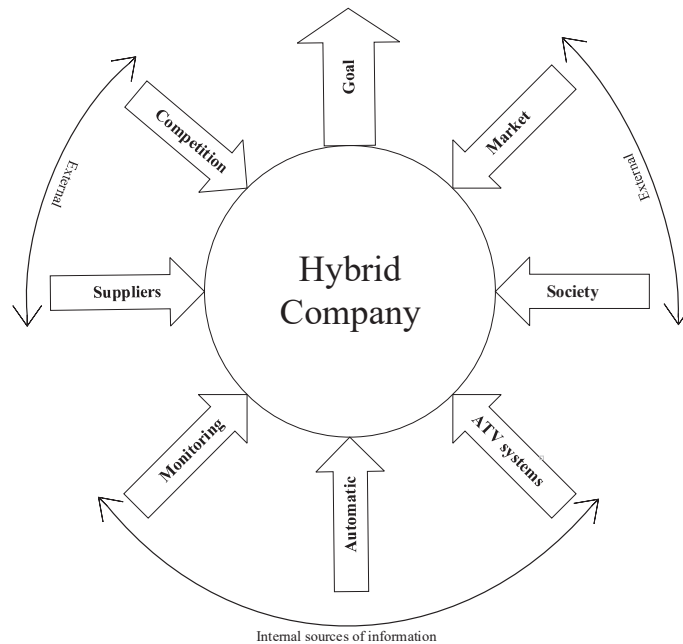


Figure 10. Realation in Hybrid company

Source: own elaboration

The Internet of Things (IoT) has become a dominant force for business transformation, and its disruptive impact will be felt across all industries and all areas of society [9].

The use of IoT solutions directly in companies is expected. Moreover, the use of hybrid solutions is assumed: implants, devices controlled by the Internet [8], [18].

Visible to use IoT trends in business, which will influence shaping the IoT of the business model:

- Integration of devices or equipment;
- The use video systems;
- Further, automation and the use of large-scale robots;
- Ability to control via the Internet from anywhere in the world;
- Cloud Business Intelligence;
- Mobile Business Intelligence;
- Social Media and Collaborative Business Intelligence;
- Development of M2M technology;
- Machine-machine;
- Integration of workplace from home;
- Service- Oriented Architecture (SOA).

From the discussion carried out above, it is observed that IoT business model seems to be quite flexible and dynamic model which can change in the future. It is because this technology is still developing.

The research conducted for this paper showed that business model based on cloud computing technology allows to run business over the internet everywhere and every time.

5. Conclusion

IoT solutions used in the business are in the early stages of development. We should expect the development of IoT that progress along with an increased number of emerging hybrid business models. The research analyzed area seems to be very interesting from a scientific point of view. The development of IoT will be determined by general visible trends in the fields such as: implants, devices controlled by the Internet, CC, mobile technology M2M, SOA.

The proposed framework of the hybrid IoT business model seems to be added value for academia and business as well. It can be developed and analyzed both by professors, students, and people in the business.

Also, this proposal has didactic value because it can be used during classes with students during subjects such as IT in business, Internet of things, management and many others.

The hybrid business model thinks about the whole before the parts of a business. It has been noticed in this research manager will increasingly shift their focus from traditional methods to hybrid. The hybrid business model has been indicated to produce sizeable operating margin growth, but its process is riddled with risk and challenges.

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HYBRYDOWY MODEL BIZNESOWY IOT

Streszczenie

Internet przedmiotów (IoT) to wylaniająca się technologia wzmacniająca różne gałęzie przemysłu, w tym produkcji, wytwarzania energii, publicznej opieki zdrowotnej a także biznesu. Spośród różnorodnych obszarów Internetu rzeczy niektórzy naukowcy koncentrują się na badaniach dotyczących rozwoju nowych i udoskonalaniu istniejących aplikacji. Aby ułatwić wspomniane działania bardzo ważny jest model biznesowy. Warto wspomnieć, że definiowanie elementów składowych modelu biznesowego i ich funkcjonalności ułatwia jego realizację i rozwój. Celem artykułu jest zaprojektowanie hybrydowego modelu biznesowego IoT.

Słowa kluczowe: IoT, model biznesowy, zarządzanie, optymalizacja, firma hybrydowa

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