Internet of Things (IoT)

How vendors can use IoT to achieve value creation

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Abstract

The IoT (Internet of Things) is developing rapidly, as a result of that, the number of connected devices in Sweden has doubled every year. According to big companies like Ericsson, the estimated number of connected devices worldwide will be 50 billion in 2020. IoT, by itself, may be a relatively simple concept of connected devices and machines, but its implications are profound. For companies in Sweden which offer a broad range of non-connected tools and products, it is becoming increasingly important to adapt their products to IoT; adherence to IoT will warrant new developments which offer value-added services such as monitoring and remote control, etc. The primary research method employed for this thesis is a case study at a vendor company who today offers their customers non-connected tools. To be able to demonstrate the concept of IoT enhanced tools we create a conceptual framework and a prototype, which we present to our interviewees and use as a starting point for qualitative interviews. In this thesis, we want to know how vendors could benefit themselves by the use of IoT in their businesses. We formulated some research questions, being, based on a vendor’s perspective: why do they (vendors) need connected products; how can such products be made marketable to the customer; and what are the predicted benefits of IoT-connected products for the customers? The case study brings to light some issues dealing with the business model, service providing, data display and data security which every company should take into consideration before implementing IoT.

Keywords: IoT, Vendor, System Integrator, Value Creation

1. Introduction

1.1 IoT

Defining the concept of the IoT is a difficult task, bearing in mind that this concept differs from one study area to other. The “IEEE” Internet of Things group gathered concepts from several Internet associations and research groups to achieve a cumulative definition of the IoT. The following are the most appropriate definitions for this thesis:

“The main idea is that IoT will link objects around us (electronic, electrical, and nonelectrical) to provide all-in-one communication and related services provided by them. The progress of RFID tags, sensors, actuators, mobile phones makes it possible to become reality IoT which interact and conjoin each other to make the facility better and accessible anytime, from anywhere.” (Pereira, 2016)

“The IoT refers to the exclusive identification and ‘Internalization’ of everyday objects. This permits for human communication and control of these ‘things’ from everywhere in the world, as well as device-to-device communication without any need of human participation.” (Pereira, 2016)

For the purpose of this thesis, IoT can be defined as per our perspective as:

"An IoT device is a connected resource with embedded systems, which has the ability to accomplish many well-defined tasks such as sensing, networking and signal processing. It also has wireless communication abilities and is generally powered by batteries."

As we can see, the internet is used to transfer data between things, but this alone does not make the product different. It is the nature of being a part of the IoT that makes it different. According to Wortmann et al.
(2015) and Tankard (2015), organizations are aiming to get their products into the IoT, mainly as the number of ways to take advantage from making Internet-connected devices is huge due to its networking competence. Some examples of organizations implementing IoT for their products include providers of:

- Utilities
- Smart environment
- Transport automobiles
- Medical examination devices

According to Anderson and Rainie (2014), more than 10% of all establishments will use IoT by 2025 in their services, in one area or another. Those who do so will earn more profit as compared to those who do not, the main differentiating clause being improved and efficient service provision to clients. The cause of this assessment is that they will provide improved services to their clients.

1.2 Stakeholders

The three most important stakeholders appearing in this thesis are the vendors, the system integrators, and the end users.

Vendors are defined as those who promote or exchange goods or services for money. Vendors play a pivotal role in bringing technologies to market and can be considered to be the strongest thrust to bring IoT innovation. IoT is an evolving technological idea that will revolutionize the way individuals live, work and interact, keeping pace with the rising marketplace in new technologies. However, if vendors do not take the correct measures before entering this innovative space, there is a possibility for significant risk. (Chui, Löffler, & Roberts, 2010).

A system integrator (SI) is an organization that shapes computing systems for customers by merging hardware and software products from various vendors. Using SI, a company can bring into line economic, pre-configured components and ready-to-use software to meet key business successes, as vendors and SI are at the midpoint of a digital artistic practice revolution. By putting them in the ideal position, they can act as conduits to bridge the IoT Gap (Wikipedia, 2017).

The End User is, by definition, the individual who truly uses a specific product, i.e., an individual or organization that really uses a product, as opposed to the individual or organization that allows, orders, obtains, or pays for it. In information technology, the term end user is used to categorize the individual for whom a software or a hardware product is planned by the installers, coders and services of the product (Wikipedia, 2017). The "end" section of the term possibly originates from the fact that utmost information technology contains a chain of interlinked product elements at the end of which is the "user." Commonly, complex products encompass the involvement of other-than-end users, e.g., administrators, installers, and SI. In addition, the connected products need to have new supporting technology infrastructure to provide data exchange between product and SI. In this case, we need kind of users who work with a platform where the data storages, data analytics, run applications, secure the access to product and data flowing to and from them, (Porter and Heppelmann, 2015). This will explain to us what kind of user de we have in this case study when we talk about the users. Some of them work with the product, and some of them work with the platform.

Figure 1 depicts the "vendor" who both supplies goods/services to an organization and promotes the technology for companies/market by supplying/selling the technology. “System integrators” are responsible for installing and integrating the results into business processes within the service provider's organization.
The flow is as follows: the vendor supplies products. The system integrator combines the products with software and network capabilities, enabling IoT enhancements for the vendor. Finally, the end-users will use the products/services which are supplied by the vendors. (Daub, 2015)

1.3 The Promise of IoT

Significant growth is predicted in the number of machines connected with IoT and areas of its application. It is estimated that the number of connected machines would be reaching 50 billion in 2020. This growth could bring significant values for vendors and their customers if capitalized on in the right way. A significant number of researchers, as well as companies, are attracted by the promise of IoT. They spend much attention on how the future would look like with these connected machines, where it appears that everything would be connecting with everything. The inclusion of IoT in traditional vendor products is not uncomplicated though. Saarikko, Westergren, and Blomquist ask in their article what can be gained by directly connecting products to the internet that cannot already be attained with the current range of gadgets and contraptions? What are the consequences and critical issues of a transition to a connected world? Are firms obligated to incorporate another feature into their products ‘just because,’ or is there an actual rationale somewhere behind the hype? (Saarikko, Westergren and Blomquist, 2017).

Products with IoT give opportunities for newer functionality and more reliability. They raise the utilization of the product and raise the capabilities. This new feature of the product would change the value chains, and make the companies consider restructuring their traditional work. Because it would change the nature of competition, not only new opportunities would arise, but also new risks and threats. “Smart, connected products raise a new set of strategic choices related to how value is created and captured, how the prodigious amount of new (and sensitive) data they generate is utilized and managed, how relationships with traditional business partners such as channels are redefined, and what role companies should play as industry boundaries are expanded” (Berger, 2017).

1.4 Purpose and Research Questions

IoT is still a relatively new topic, and we see a need for more research focusing on this subject. The purpose of our thesis is to contribute to that area, which enables entirely new opportunities, together in terms of making new kinds of products, services and value creation for the customers in addition to making the company developments run smoother, and gaining understandings from the collected data. The innovative
thing in data collection is that now products will be fitted with sensors, network connectivity, and even processors to facilitate the products or “things” that can self-sufficiently communicate and receive data and make decisions and act based on that data.

The specific problem we focus on in our study is how vendor companies who today offer their customers non-connected products and tools, can connect their products to the IoT to create value, for themselves and their customers. Here system integrators also play a crucial role, when enhancing the vendors’ traditional non-connected products. This exploration on how vendors can benefit themselves by the use of IoT in their businesses boils down to some research questions. Based on a vendor’s perspective:

- Why do they need connected products?
- How can such products be made marketable to the customer?
- What are the predicted benefits of IoT-connected products for the customers?

2 Background

IoT vendors and system integrators are together trying to find their way through the production process to integrate IoT and establish an interlinked ecosystem, where the machines, as well as the product, can communicate with each other cooperatively. Thus, they can bring real-world value to end users. E.g., in an automobile, smart gears include the locomotive control unit, Anti-lock slow down the system, rain-sensing windscreens with robotic wipers, and touchscreen displays. In many devices, software substitutes some hardware components and allows a single physical component to perform at a diversity of levels (Porter & Heppelman, 2015). IT vendors are trying to integrate their products with many different types of sensors. Traditional enterprise applications were redesigned to communicate with people; now it is like machines communicating with systems. IoT increases new devices, data, and services, all demanding their integration as well as connecting to the current complicated IT systems (Bauer, Patel, & Veira, 2014).

If we look back at history at the end of the eighteenth century, the first steam engines and the intelligent use of hydropower made a revolution in the productions. The late nineteenth century saw the rise of electrical engineering and mass production the first conveyor moving belt was used as long ago as 1870 in the slaughterhouses of Cincinnati Ohio. In the mid-1970s electronics and IT began to expand rapidly into the industry. Now in 20th-century Industries/organization want their product entirely to communicate and interconnected wirelessly. Vision experts believe that it will only become a reality within the next 20 years. In intelligent factories, everything is interconnected wirelessly (Wikipedia, 2017).

In a study conducted in 2015, three distinct enterprises WashCo, LinkCo, and InterfaceCo assembled their skills in developing an IoT based solution for laundry equipment planned to cater large-scale use in laundromats, hotels, and apartment buildings with shared laundry rooms. WashCo enterprise is expanded globally in several industries. WashCo’s professional laundry systems division took part with the intent to develop a connected washing machine. LinkCo’s expertise revolves around secure connectivity and cloud services, and InterfaceCo is an expert in data filtering and interface design. All these three firms joined together with the aim to combine their diverse areas of expertise into a scalable IoT solution (Saarikko, Westergren, & Blomqu, 2017).

At the beginning of the project, no solutions or standards were established for gathering, evaluating, and utilizing data in WashCo’s operational processes or customer offerings. Project’s key goal was to develop the necessary knowledge and shared an understanding of how connected products can serve both supplier as well as the customer. A second aspect of the project was to develop the participating firms’ understanding of the infrastructure needed to realize solutions in keeping with the IoT. Hence, the endeavor addressed
technical and business-oriented issues to tackle both the rationale for connected products and the skill set needed to bring this idea to fruition (Saarikko, Westergren, & Blomqu, 2017).

Professor Porter and Heppelmann 2015, discussed that companies who are going into the world of smart connected products realize they are getting into a situation; where they're placing one foot in the traditional world of a company who manufactures, sells and services physical products. But they're putting other foot in this new world; it's mostly a software-as-a-service-based on technology company. Smart connected products are resources and other things implanted with CPUs, software, connectivity and sensors that enables data to be exchanged between its environment plus product, operators, manufacturer and other systems and products (Porter and Heppelmann, 2015).

Many people know the internet of things (IoT), but the core of this phenomena is the changing nature of products and the ability of products to be smart and connected, making a fundamental transformation impact on both competition in many Industries (Porter and Heppelmann, 2015). Porter and Heppelmann 2015, talked about the nature of competition is likely to substantially evolve not only in manufacturing industries but also in industries that use these products were their new capabilities. Further, he argues, more about what happens inside the firm given the new products and their new capabilities and the new data that they're generating about their function in about their environment and about how they're used.

According to Porter & Heppelmann 2015, revolution in the value chain of the manufacturing firm everything is going to change dramatically; all the way from product of element to marketing and sales to after-sales service to manufacturing and in many other areas, and the nature of the people in the skills and how they work together in the manufacturing. But the basic structure of the manufacturing firm stays the same for many decades the classic functional structure there's a Marketing Group and a production group and an RND group and so on but the Advent of these products is kind of boring and cutting across these traditional functional definitions and boundaries and seeing entirely new functions arise within firms that they never really had before.

### 2.1 The relation between Vendors and Systems Integrators

Under section 1.2, we have discussed the different stakeholders on by one, defining their respective roles in the IoT development process. For the sake of this thesis, we need to look closer at how these stakeholders relate to one another.

A vendor mostly manufactures items and sells those items to a buyer. In information technology, the term is mostly applied to suppliers of goods and services to other companies. But vendors, on the other hand, most of the time do not have detailed knowledge of the business products they are vending solutions to. Furthermore, no vendor can deliver all the IoT solutions which organizations are asking for (Chui, Löffler, & Roberts, 2010).

IoT is composite. It has countless moving parts, the sensors/devices, the stage, the connectivity, the applications, the business judgment that makes it all happen, and the users (including working out and altering their workflows). It can be tough for an organization to assess which IoT vendor is the best suitable for their connected results (Meola, 2016).

The situation from the vendor point of view is that most vendors in the IT space do in fact have IoT experience, but it's largely from the IT end, the implementation, and not from the device end of the implementation. Their experience is typically organized around their various products and services. Their various business units in kind of compartmentalize in terms of communication to the outside world and often in terms of internal strategy. IoT is implicit and not an explicit piece of their business it's not something they communicate to the world or strategist around (Meola, 2016).
This is where the system integrator does and can get involved. A system integrator is responsible for the installing and integrating the result into the business processes and service provider's organization. They have a previous connection with the processing/operation side of the organization, so they are in the relation that exists when things occur at the same time with the organization’s needs and requirements. They relate to many integrate and vendors for the solutions to resolve and solve user issues. They close the gap between vendors and users with quicker and more efficient their systems; the quicker will be the income inflow for them and their customers. By using a systems integrator, an organization can use preconfigured, less expensive, standardized system to meet organization goals and ideas instead of to customized programs, software or even new machinery that will undoubtedly push up costs. These systems include designing specialized application that will integrate with the new or existing software, hardware and communications set-up (Mulholland, 2016).

2.2 Value creation

The value that can be created by IoT-connected devices is immense. Technology provider Cisco estimates that IoT will create $14.4 trillion in “Value at Stake” — the combination of increased revenues and lower costs that are created or migrates among companies and industries — in the ten years ending in 2022 (Les & Roberts, 2016).

The growth and implementation of IoT devices and applications are that they create value rapidly in many ways. For example, sensors and adopters can use the devices to monitor existing procedures and processes and use the resulting data to gain insights that allow them to innovate and transform processes, products, and even their business models. Value always an important parameter of any business/marketing system. Which give feedback about the functional capabilities of the system. Until recently, the value generated from a specific task was concentrated into a certain portion of prescribed rate. The advent of IoT has made this path clear while integrating cloud platforms to itself. Things are now easily integrated to perform targeted job easily. IoT cloud is proposed to extract more values (multiple functionalities) from an entity. This indeed paves the revenue generation process in business activities more beneficial for the organizations (Saarikko, Westergren, & Blomquist, 2017).

Partha Pratim Ray, 2016 discusses in its research about the Value of IoT based cloud. The importance of IoT based cloud is predicted to great values other than the fixed role for which it is to be used and its parameter of any business or marketing. A great percentage of the IT-based industries is getting into a new word ‘IoT cloud,’ that is what is called, IoT enabled cloud. Numerous methods of cloud placement models such as community, hybrid, public, and private can be seen in the everyday living. IoT is being spread as a business idea among the top IT marketplace companies of the world that some giants like Microsoft, Intel, IBM, Samsung, CISCO, ARM, Google, Amazon, Oracle, Accenture, Apple, and so forth. IoT and cloud aided technologies and vendors are constantly emerging into the IT market. They are in phase with the development of any product or solution utilizing IoT enabled technologies (Partha Pratim Ray, 2016).

3 Methodology

Internet of Things (IoT) refers to the use of actuators, sensors and data communication technologies assembled into physical things, allowing them to be tracked, controlled or synchronized all over the Internet to create value. The shortage of studies that connects the value-creating capabilities of IoT to vendor's benefits is very evident. Further, IoT applications are very limited to vendors. As stated before, to address this crucial gap in the literature, this master thesis project aims to study how vendors can benefit from using IoT to achieve value creation that can capture the value-creating capabilities of IoT. The research was conducted in the form of a case study with a vendor called Elpress, where our main source of data collection
was interviewed. In addition, we created a prototype conception which was used to ease the understanding of the idea of IoT enhanced products for the participants during the interviews.

3.1 Case Study

A case study is defined by Yin (2003) as an “Empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not evident.” He also argues that case study is a very inclusive research plan of action, data gathering techniques, covering strategy and approaches to data study.

Yin (2003) describes three situations when the case study approach should be used. First, the form of research question used must be a kind of “how” and “why.” In this study, the research question is in the form of “How,” ("How vendors can benefit from the use of IoT?") so it fulfills the first condition. Second, you as a researcher should closely examine the data within a specific context. This is correct in this study, as the interviews executed were done so within the Elpress case (as described under section 3.1.1). Third, the emphasis of the study should be on modern-day phenomena, not on historical events. The focus of this study is very strongly targeting an existing phenomenon, using history only to comprehend the trend of digitalization in the case vendor. All three conditions are fulfilled, and thus the case study approach was found valid for us to use.

An important and recurring notion in our thesis is practiced. According to Reckwitz, practices are “routinized types of behavior which consist of several elements, interconnected to one another: forms of bodily activities, forms of mental activities, ‘things’ and their use, a background knowledge in the form of understanding, know-how, states of emotion and motivational knowledge” (Jarzabkowski,2007). In our study, we will clarify the practices of vendor and customer/end user to understand their working. This understanding will further help us to build our concept and prototype; as a complete comprehension of vendor practices and daily transactions is essential to our prototype integrity. Therefore, the case study outlined in this thesis will take into account daily practices and work transaction, simply put as “how it is happening and how is it done.”

3.1.1 Elpress

Elpress is the market leader in electrical connections since 1959. They have been developing, manufacturing and marketing complete cable crimping systems for electrical connectors. The Elpress Group, consisting of the Elpress and Kablema Komponent business areas is owned by Lagercrantz Group AB. Elpress head office and factory are located in Kramfors, Sweden. The office of Kablema components is in Stockholm, and other countries as well. Elpress are market leaders on the Scandinavian market in respect of sales of electrical connector crimping systems. They have long experience in the electrical field. They are stationed at Kramfors, Stockholm, and Göteborg. They have representatives in the neighboring countries of Finland and Norway. Their products are marketed in over 50 countries and are one of Europe’s largest manufacturers of electrical connector crimping systems.

Elpress now wants to develop their business through adding the use of IoT, to achieve its target of connecting products for customer use. The motivation behind this is to enhance their product, get the sustainability, ease service for the customer, and become a competitor in the market. Elpress has a significant edge to utilize and benefit from IoT technologies as IoT is progressing and companies are competing to launch themselves in this market before the IoT truly explodes. Elpress wants to set an example for companies willing to shift to IoT.
More specifically, Elpress wants to adopt a wireless sensor network to monitor and handle their product at a distance. In an IoT perspective, Elpress' current priority is to enhance the appeal of its products by connecting their products with the IoT. Their aim is to show and deliver value in an efficient enough way by understanding the product as well as its environment, and by being willing to support customers in their day-to-day operations. Elpress is to provide added value to customers through a very wide range of electrical connectors, including cable lugs, and through connectors on different operating areas through a certified solution. They want the customer to feel safe when using the system, with safe connections between the inter-linked tools and systems.

3.1.2 Interviews and Prototype
Our main source of data is the interviews. We tried to interview staff on key positions that we thought could be helpful in producing data that could be used in answering our research questions. In addition, Elpress has customers and some of our research questions (though still put from a vendor perspective) concern customers. Accordingly, from our point of view, we would be best off meeting representatives of both Elpress' staff and Elpress' customers to obtain good information on which to build our study. However, because of reasons like Elpress' privacy policies and the limited time we had to conduct our thesis, we did not have the opportunity to interview Elpress' customers. Instead, as Elpress has R&D department, we turned to the R&D Manager as a source of information about the customers. Furthermore, Elpress has a Development manager, and several design engineers and constructor designers. So, those also, we figured, knew concerning customers and their needs. From our perspective, we could get useful information from Elpress' participants because they work closely with customer demands, speaking on the customer's behalf. This at least give us enough data to make predictions about the values for the users, and we claim nothing more in our research question ("Based on a vendor’s perspective: […] What are the predicted benefits of IoT-connected products for the customers?").

Table 1 shows the type of employees who we met in the interviews. As all participants represent the vendor, it is important to point out that the information and the research result will be based on a vendor perspective.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Position</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>The First participant (P1)</td>
<td>R&amp;D Manager</td>
<td>Elpress company location</td>
</tr>
<tr>
<td>The Second participant (P2)</td>
<td>Technical manager</td>
<td>Elpress company location</td>
</tr>
<tr>
<td>The Third participant (P3)</td>
<td>Constructor designer</td>
<td>Elpress company location</td>
</tr>
<tr>
<td>The Fourth participant (P4)</td>
<td>Design engineer</td>
<td>Elpress company location</td>
</tr>
<tr>
<td>The Fifth participant (P5)</td>
<td>Design engineer</td>
<td>Elpress company location</td>
</tr>
</tbody>
</table>

Table 1, Participants list

Since Elpress have not ready embraced IoT, they lack an existing system integrator, which complicates this study. Because of that, and our chosen technique to use a concept prototype to enhance the quality of our interviews, we in one way need to act as the system integrator. This dual role could complicate matters. We
still decided to build the concept and prototype, inevitably affected by our perspective of IoT, to help the participants imagining a possible IoT enhanced work situation, and give us better feedback. In addition, outside the research setting. The system integrator will cooperate with the vendor to find the real value for them and their customer. We were aware of the problem, but from our perspective and based on the current circumstances, we decided that we still wanted to go with creating the concept and the prototype. We will acknowledge our dual role in the discussion part of this thesis. More information and details about the conceptualization and prototype you could find it in section 4 and 5.

We presented the prototype to the participants at the vendor company location. We used a set of questions to get an impression and evaluation of the new practices. Through the discussion, there were some other questions were we in part abandoned the pre-decided set. These questions came up based on the discussion, situation and the information that we got, and by not adhering strictly to the set questions, we believed that it could add more useful information for our study. We did interviews, one by one, and face to face, and we used several ways to record the interviews, like a mobile record, video camera, and writing notes.

3.2 Analysis method
Our chosen analysis method is inspired by Grounded Theory (GT). Our case study is mainly concerned with capturing and interpreting common sense, substantive meanings in the data, (Ritchie, 2011). According to Charmaz (1990), “theoretical sampling is best used when some key concepts have been discovered. Initial data collection is commenced with a fairly ‘random’ group of people, who have experienced the phenomenon under study, to begin to develop concepts. Theoretical sampling is then used to generate further data to confirm and refute original categories”, (Calman, n.d., page 14).

We point out the methodology that is sophisticated in inductively from a corpus of data. When it is done well, the resulting theory will at minimum befits one dataset perfectly. But the methodology derived deductively from GT contrasts with that process without support from data. Thus, could turn out to fit no data at all, (Glaser and Strauss, 1967).

From our perspective, qualitative research method is used to capture rich, complex data. This will help us to know which product could be used with IoT and how, where and when we can use the connected product. Also, this will help us in solving the issues that might arise with this new technology; plus, to make the connected business product smarter.

3.2.1 Theory advantage
Since our theory inspired by GT, the theory ideal for research the integral social relation and attitudes of people where there have been few explorations of the contextual factors that influence the individual's life, (Calman L.,2006). According to Starrin, the abundance of data is one of the advantages of the qualitative research, (Starrin, 1997). Based on our perspective we can say that the advantages of the theory can be listed as:

Provides for Intuitive Appeal:
Usually, our used approach permits investigators to do deep digging with the data. So, this approach has an intuitive appeal for them. In addition, we can note that practically in the constant comparison data, coding and “memo” approaches to data analysis. Our approach is provided with the needed principles and heuristic devices to the researchers to get started, stay involved, and finish the project, (Charmaz,1990). This approach has explicit guidelines which steering the researcher how they could carry out their research. Furthermore, this approach is very useful for the pragmatic researchers in response their question, illuminate their idea and for giving them with encouragement when their hesitations grow during the
research process, (El Hussein et al., 2014).

**Fosters Creativity:**
In the methodology, we use the empirical data, instead of starting with testing an existing hypothesis, to generate concepts and theories. The process is done by encouraging the investigators to avoid the preconceived theoretical data. This suggestion might be an advantage to enhance creativity and push the development of new ideas. The themes and interpretations naturally emerge from the data, which assist the researcher to go on through a process of discovery. Furthermore, our approach allows the original results to show up from the data, which in turn allows us to conclude meaning from data and analysis using creative and, inductive processes, (El Hussein et al., 2014).

**Potential to Conceptualize:**
The "Concept" is the most important component of the methodology. The generation of these concepts will be influenced by the approach taken to study data. Stebbins (personal communication, July 6, 2012) said that the “description” is the most important initial step to science. The case study has the ability to generate concepts by using the logic of constant comparison and repeating memo writing. But the concepts include a myriad of incidents. Because of that, they have “broadening power” and are “easier to remember,” which eases the transferability of these concepts into unfamiliar contexts, (El Hussein et al., 2014).

**Systematic Approach to Data Analysis:**
The approach in our case study is generating theory from the data in a systematic way, where the data itself obtained from the social research in a systematic way, (Glaser, 1978, Ch1, p 2). This approach is useful in judging, generalizing and comparing the result of our methodology. In addition, it is broad-ranging, purposive, systematic, pre-arranged undertaking, which makes and help the researcher to achieve for discoveries. Therefore, we can direct manage, and stream our data collection and, moreover, construct an original analysis of our data, (El Hussein et al., 2014).

**Provides for Data Depth and Richness:**
Providing the data depth and richness is another advantage in our used methodology. The world appears new with the rich data, because of providing the researcher with concrete and dense fabric to construct a thorough analysis of the data and will help the researcher to be aware of the details of the details of the participant social and subjective life. Insight is generated into the participants’ world by the tools that are provided by methodology. The researcher should have enough background about the participants, process, and settings from the rich data. Furthermore, rich data must expose any changes over time, and it should reveal what lies beneath the surface, (El Hussein et al., 2014).

**3.2.2 Theory disadvantage**
In our approach, we could find some of disadvantages and limitations as below:

- Exhaustive Process
- Potential for Methodological Errors
- Reviewing the Literature without Developing Assumptions
- Multiple Approaches to GT
- Limited Generalizability

Open coding with the novice researchers is a time consuming, laborious and tiring process. The encompassing concepts and abstracting process are not an easy task. Usually, the theory generates notions with the lower level which have multiple limitations. Accordingly, there should be a mentor available to help novice theorists in their inquiry, (El Hussein et al., 2014). In the same manner, we can note that in our case
where we have a little experience with using the methodology, and the heavy work with the participant to try to get the information in the proper way.

The methodological lines might be blurred by novice researchers in selecting purposeful instead of theoretical sampling. Even if a researcher already has started with purposeful sampling, s/he should go back to theoretical sampling where the process of data collection is controlled by the emerging theory. Otherwise, s/he might have a lack of the result of conceptual depth. Furthermore, using one source of data, such as that of the interview, it might be a pitfall for the new researcher. (El Hussein et al., 2014). So, we will try to avoid this issue as much as possible by undertaking both observation and interviews as part of the data collection process.

The differing of the authors’ ontology and epistemology led to creating a fissure in the understanding and application of theory which we are going to use. This approach led to confusion among the scholars. Intellectual debate was created among the researchers because of the tension and division between the original authors, and several questions were raised by the researcher about the method and how to utilize it properly, (El Hussein et al., 2014). As this might happen in our case, we will try to focus on our research questions, and try to steer the discussion and analysis to get our aim.

Drawing broad conclusions from instances come from generalization, which makes inference about the unobserved based on the observed. The generalization is complicated and controversial because the main goal of qualitative research is to provide a rich and contextualized understanding of the human experience. The problem lies when there are unique opportunities to analyze, interpret, and interpret the data by using the theory. Then will what happen if results are not easily generalized? So, there is a possibility that the generalized might be a limitation on the researcher, (El Hussein et al., 2014).

### 3.3 Ethics

In qualitative methods, ethics are important because researchers might use different ways to collect data, for example, interviews and observations. Furthermore, most of this method need to gather the researcher and the participants in a physical interview, as in our study, (Ritchie, 2011).

Thus, we ensured the privacy of our participants, regarding their personal information and opinions. Each participant was made to feel safe and respected so that they could share useful information with us. In addition, we needed to let participants know that the information they were providing us was important and useful to our study. All participants were informed that the information they shared with us would remain secure.

### 4 Conceptualization

Customers are the target group for the vendors. Customers are not only consumers of vendor products, but also a source of information for developing and enhancing the product. Because of the customers who are using the vendor’s products, they have special practices and behaviors which are very important in helping the vendor to get information about how it could be enhancing the product and be competitive in the market.

The practices are different from customer to another, and based on that there are different requirements for each customer. Vendors have interest in knowing these requirements, eager to get all information that helps them to provide a good service and support for the customers, see Figure (2).
4.1 Current Practices Understanding

In our study and vendor product, we need to understand the current practices to build our concept of the new practices with the IoT. Based on that, we visited the company many times and studied the current practices; then we built the diagram for that to have a clear picture of how the work is going on.

From our perspective, it is very important for us to do that process because we need to understand the real work practice, the weak points of the same process and where and why should add IoT for the work practice. So, this will help us to build a prototype that we are going to use it in our interviews with the participants.

As we see in the Figure (3), we can understand that the work practices have three phases to complete the work process which means the traditional practice need a long time to complete the work process and get the result of the work and know if the work was done perfectly or not.

With the traditional practice, there is no kind of connection tools or any smart device or sensor. So, the work is done in the way which is difficult to trace it or get a quality report about it, see Figure (4).
5 Concept Design

To build and design our new concept for the practices with the IoT, we analyzed the current work practice. And we suggested many of solutions until we came up with an idea which became acceptable from the vendor’s perspective, and which helped us later to collect the useful information to build out research.

5.1 Analysis of the new practices with IoT

Based on our study, we suggested the work practices and had built the diagram which will be used to build the prototype. This will help us within the interviews with the participants to get their impression about the practices with the IoT. So, we find that there is no other solution to avoid that, because this concept is totally new in Elpress case, and their workers also have not any idea about the IoT how it looks like with their products. Below in Figure 5, we can see the new diagram for the practices with IoT.
5.2 Build prototype

The vendor (Elpress) has not used the IoT with its business. And the workers have not experienced it before in their work. Due to, from our perspective, we need to build a prototype which will give the worker a real and practical work impression about practices with IoT. Then we can get real information and the good result which will help us to study the case and find the target. After that, we can find the values of using the IoT with the products.

Below Figures (6,7) shows our prototype for the product with IoT.

When the worker wants to carry out a task, first s/he should enter username password to login to the application, then s/he can select from the list which device s/he wants to connect with to carry out the task.
In this prototype, the user can use the mobile application to connect the mobile to the crimping tools, by using either Bluetooth or wireless, as shown below in the Figure (8).

By using the mobile application, the user can check the tool status, if it is ready for use. This application will check the tools status online with the cloud system. If the internet connection is not available, the tools can use the small local database which is stored in the mobile as offline to check the status of tools. Then the user will be able to check the device information, connection, location by using GPS, and device status. S/he will be able to select the cable type and its size and the connector type and its size.

When the user repairs all the needed information, s/he can start the task. When the task is done, s/he can see the result and the evaluation of the task in the mobile application. Then s/he can submit the information
and repeat it as much as s/he wants.

After submitting the information, and the connection status of the mobile will be online, the quality report will be ready for the user management and vendor at the same time. They can evaluate the tasks and get some statistical report based on the evaluation.

6 The Result

After designing the concept and the prototype, we started the interviews and data collection. Then we transcribed the interviews line by line and word by word, and then we described the material, with a low level of abstraction. We went through the material more focused, and sorted the codes and decided what codes were important. Then we created the categories and core category. We could find the axes between the codes and the categories, how categories are related to each other, and Construction of hypotheses and the models. It is important to mention that we present the result in this section as what categories and core categories we obtained.

6.1 Influence of the IoT on the vendor tools and business

6.1.1 Vendor Requirement
The vendor has some demands to achieve requirements, which include understanding customer behavior and obtaining some valuable information about the performance of tools and workers’ behavior to build a new version of the product, which in turn could save effort and money. To achieve this understanding, it is important to analyze several crimps and have statistical output from the outcome and know the quality of crimping. For this reason, the basic goal for the vendor is the customer satisfaction. Moreover, the vendor needs to build trust with the customer. Therefore, when a vendor wants to build a new product, the real and highest values should be available, which make the customers feel that they really need the new product. In other words, the vendor needs to use the IoT and make differentiation themselves from other competitors, so as not lose money, according to participant 5 which mean the same as making money.

6.1.2 Vendor difficulties and issues
It is not easy for the vendor to keep himself in the right competition track. There are factors that effect on the competition. The expensive tools might lead to losing the customer especially when we know that the tools from China are cheaper. In the same time, the vendor is keen to obtain information from the customer. According to Participant 2, “I am really interested in getting their data to myself, so I can learn better how the customer is using the tools.” Therefore, it is important to find an interesting point for the customer to convince the customer to give the information to the vendor. Furthermore, it is not easy to carry the large PC out to the workplace with the equipment. And the cost of using more of sensors with the IoT might be much higher than the value of the information that is being collected. The IoT is a new idea for the vendor which make it face a new challenge like lack of imagining the cost of the IoT with the tools at the beginning. For that vendor cannot say how much should charge the customer. Thus, finding a useful way for using the IoT could be hard. But on the other hand, the competition makes the vendor reduce the price of the tools and add more values for the customer. Furthermore, competitors make the vendor look for the latest technology to keep the competition track especially when the vendor has customer around the world which makes the competition more difficult, as in our case.

6.1.3 IoT and Vendor
We presented our concept design and the prototype to the participants one by one. We asked them if the
concept and the prototype were clear or not, and we clarified the ambiguities of our concept and answered their questions.

The interviews were done after the presentation. We did an interview with the R&D manager who used to do an analysis of the market and customer demands. He has a responsibility for the technical issues in the company. Another interview was done with the technical manager who used to focus on crimping solution for connecting electrical terminals. And we did another interview with a constructor designer who is constructing and designing the product based on customer demand. The last two interviewees were design engineers who do drawing and designing for the new mechanical electric.

Based on our study we find that vendor employees had a little information about the IoT and how it could work with the product. And according to Participant 1, he did some research to discover and get a clear picture about the IoT, “I have not worked with it, this is the first time I am working with it,” (Participant 1). So, when we did and explained the presentation, participants started believing that the IoT is used to get information from the crimping device, and they expected that the IoT would be in everything.

Vendor (Elpress) and system integrator are striving hard with IoT to bridge up the gap to facilitate and give services that aim at supporting the end users. Our findings suggest that they can take out, integration, examining, picturing, and sharing data which allow them to unintentionally transform the facts into data, data into knowledge, and knowledge into wisdom. This processing will help to know how particular devices are used and how the devices can become more and more useable through IoT for the end user and end-user development.

6.1.4 Tool’s features with IoT
When we presented the prototype and related questions about the IoT to the interviewees, we received several answers and hypotheses about the connected crimping device to the internet and the reachability. For example, how the product will be more user-friendly and how more feature will be added to the task with the IoT which make the user will be able to know, where were they? And what will they do?

We have also known that the IoT will be used to enhance the product. And the vendor will have a better device, tracking the work and make it better, and save the energy. The crimping also will be easier when sensors are added to the tools. IoT with the tools will provide useful information that will be used to monitor the quality assurance for the task and detect the cause of the fault. Right now, it is not possible to evaluate the task, but when the sensors and IoT are used it would be possible to get the result of the task quality. In other words, we discovered facilities and difficulties for using the IoT as below:

It has become easier now to use the IoT to get more information from the product and save it in the storage where the data storage is cheaper. Not that only, but the computer, capacities, and sensor are getting cheaper and cheaper. And most of the techniques are being used nowadays to connect the PC with the pressing equipment in the industry.

The cost of the IoT with the tools it could be high, especially where this idea is new for the vendor. So, the implementation will not be easy, and it could be expensive. In the same time, the values of the IoT could not be clear at the beginning. Furthermore, when a more of information will start being available from the tools because of using the IoT, this need also a more of applications to handle this information which will add more cost. “if you put too much information in one tool you need also applications like apps in telephone to handle it”, (Participant 3).
6.1.5 IoT with the Business
When we asked the participants about their hypothesis when the IoT will be included with the business, we found that the participants were divided into two groups. The first group believed that the IoT might not be a solution for everything and it could not fit for all businesses. Whilst the other group saw that it is possible to use the IoT with most of the business, not just that, but it could change the business also like how cell phone changes the lives completely, based on their perspective. They believed that the IoT would raise the quality and level of the business. Furthermore, the IoT has been a reality for quite a long time for some industries. But all participants agreed that the IoT with the tools, in the beginning, will be like the mobile, in the beginning, using for few things, but in the future, would have more functions to work with it.

6.1.6 Vendor and Customer service
Participants believed that the vendor support department could have a fast response when the incidents come from customers. They see that the IoT could help the vendor to serve the customer before the defect acquires in the tools by sending a warning message. This process needs high effort from the vendor to added values for providing a higher curve of the service to the customers. The good service from the vendor by using IoT would help the customer to avoid losing money and time in the job. For good service, IoT will enable the vendor to be fully aware of the faulty tools before the faulty tools arrive at a workshop for fixing. This advance knowledge will help the workshop to know the issues in advance and save time and cost for the vendor and customer.

6.1.7 Values for vendor
Vendors are looking for the competition. Therefore, they need to have the IoT to be a best competitor / market leader. Using the IoT make the vendor different from other competitors, and give the vendor competitive advantage. And new values will be added to the customer. Thus, using IoT will give elevated level and high quality in the business. But at the same time, using the IoT with the business need more courage, according to participant 1.

When the vendors want to decide to have IoT with the product, they should take advantage of this feature, not just for the customer, but also for their practices. Based on our interviews with the participants, they began to come up with some hypothesizes for how they could take advantage of the IoT. IoT could be used with the sensor to collect more of information and store it in big data. And by using IoT, vendors can track the tools, “who are we selling the tools to? What are we using the tools for? And how are we using the tools?” (Participant 1). Furthermore, the vendor can know the tools status when fault or damage happened. Thus, IoT could provide information for enhancing the tools and service. By using the IoT, it helps to find the correct levels of designs, according to participant 2. Besides, connecting the tools to the cell phone application make the analyzing of the crimping process show immediately. And the big data will help to analyze the environment or product.

6.2 Influence of the IoT on the customer and end user

6.2.1 Customer difficulties and issues
When the user is working in the office, the information will be accessible, but on site, it could be difficult. At the same time, the large PC is not easy to carry out of the workplace with the other equipment’s, “customer does not want to have many things” (Participant 3). The huge information for the task like (tools, cable, and connector specifications) are not easy for the user to handle it within the work, see Figure 9,10.
Some tasks have a high cost because of the location of the work, “because of that no one wants to send people without parts” (Participant 3). The difficult accessibility and high risk of the location work make customers want to have immediately responded and support with the highest priority when their incident has happened. Furthermore, evaluation of the work it’s not possible manually, “you cannot take the cable lugs and see if it is OK,” (Participant 5).

Some customers margin between vendors' production to get the lowest cost and highest quality, “we know people using our tools but not our connectors” (Participant 3).

Usually, customers do not like the new technology in the tools. It is very common that customer using the traditional tools until the tools stop working. Some customers do not appreciate providing information to the vendors or manufacturers to enhance the product because they feel that their work is being watched, “they have to feel that we are helping them, not spying on them,” (Participant 2).

On the other hand, the cost of using many sensors with IoT might be much higher than the values of the information that are being collected.

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**Figure 9, Sample of connectors information - Elpress.se**
6.2.2 Customer Demand
The customers have many demands, and some of them see it’s very important. Due to the abundance of equipment’s and information, customers do not want to have a lot of thing in the practices work. So, they need something easier and cheaper at the same time. And some of them are looking for the quality and some of them are looking for the cost. But all customer need service support and feedback about the product after buying the tools, and they consider it as it’s very important for them. For following the work, customers need reports documents to know what is made and how were they made? And the quality of that. And to complete the works in a perfect way, they need tools with high quality as much as possible. Moreover, to avoid any issues in work, they need information about the tools status to fix the error early. Accordingly, the participants believe that with the IoT, customers can be ensuring that the works have done perfectly without any mistakes. Because the mistakes will lead the customer to repeat the work, which they want to reduce it because of the cost, risk and the accessibility. The participants believe that the customer will pay for the useful things.

6.2.3 Values for the customer
IoT with the tools could provide the customer useful information such as progress and status. This information would help the customer and user to have the knowledge about the task and know what they should to do instead of calling the vendor customer service. Therefore, being connected to the internet will easily provide many supports to the customer. IoT with the tools would inform the worker about what has been done, the analysis of the crimping process will be done immediately, and the work quality report will be...
shown after task finish. The customers would receive a warning when the tool reaches defect situation so that they can avoid the cost of fixing. They can also save time. When the tools save customers’ money and time, they will be eager to have them, “it should be useful at least for the operator or most of the operators, and if it is useful they will pay money for that,” (Participant 5).

IoT would help the vendor to provide early service to the customer before the fault occurs with the crimping device. The quality of the work is one of the values, and the speed of the processing and knowing the work result. Using IoT with the sensor will help the worker to detect the cable type and size, and connector type and size. The customers need the IoT with the tools because it is useful for them. When the customers are using the IoT, they are going to save the money and time, and increase the quality and the number of the work. IoT could provide reports, tractability, and quality for the customer. It makes it possible to monitor the battery temperature, hydraulic oil temperature, and engine temperature. When the tools are connected to the GPS, it would be easy to know where the tools were used and if they were inside or outside. The customer can have a quality report by using statistical control. By using the IoT with the tools customer could reduce the repetition in the work and then they will save the money and energy, and have control in everything, and when these values be existing with the tools customer will be satisfied to have it, “it’s important to build value for the customer so that they the customer must feel this will really help me”, (Participant 2).

7 Analysis and Discussion

Cooperating with Elpress, we built a concept of the integration system through connecting their crimping device to the IT system through the IoT. This concept was built based on the practices that are used by Elpress and their customers. It was clear that the current crimping device had not used any kind of network connection before. By using the prototype, we proved the real values for Elpress, generating our result to vendors in general who were our focus in this thesis, but also came up with some interesting findings concerning customers and end users (Workers). The potential real-world values we found for vendors and other stakeholders shown in table 2.

To build an IoT connected tool with a useful specification, there must be continual communication between the vendor and the customer for a long time. It is important to have a connected product connecting with the integrator system, but this alone is not enough because the vendor needs to get some data and feedback from the customer to enhance the product. This data could be read in different ways. One way is based on vendor perspective, and another way is based on customer perspective. The latter will not be clear until some study and analysis including the customers could be conducted. Then one could get more reliable conclusions on which, and how, the information could be useful for both vendor and customer. Based on that, a web-based application could be worked out, which would handle the data and produce a useful report becoming available for both vendor and customer (see Figure 11). As Ray (2016) says, a great number of the IT-based companies is entering into a new world of the ‘IoT cloud,’ space is becoming more and more competitive with cloud aided technologies and vendors constantly emerging into the IT market. Using the cloud to provide a platform for customers and vendors to communicate thus could seem like a suitable way to go, but as we show, we could suffice from more research incorporating the customers before outlining the details of such an addition.

On the other hand, using the web-based application put to make the data in the risk of unauthorized access. This data might not be serious for the customer, but it could be serious for the vendor, and it would have an effect on the competition to the vendor and the privacy. As Saarikko et al. say "it was a serious concern for WashCo. In theory, a connected product not only enables services but also invites tampering that could
result in disabled safety features. ", (Saarikko, Westergren & Blomquist, 2017). According to participant 1, Elpress also, eager to has secure connections with the focus on crimping solutions for connecting product. It develops the product for the needs of the world.

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Customers</th>
<th>End User (Worker)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Access to full data (see 6.1.2, 6.1.3)</td>
<td>-Monitor and evaluate the work progress (see 6.2.3)</td>
<td>- Easier work (see 6.1.2, 6.1.4, 6.2.1)</td>
</tr>
<tr>
<td>-Tracking the tools (see 6.1.7)</td>
<td>-Quality reports (see 6.2.2, 6.2.3)</td>
<td>- Saving time (see 6.1.6, 6.2.3)</td>
</tr>
<tr>
<td>-Pre-fault assessment (see 6.1.7)</td>
<td>-Self-service support (see 6.2.3)</td>
<td>- Efficient and quality work (see 6.1, 6.2)</td>
</tr>
<tr>
<td>-Fast service (see 6.1.6)</td>
<td>-Easily support multiple clients (see 6.1.6, 6.2.1, 6.2.2)</td>
<td>- Immediately work report (see 6.2.1)</td>
</tr>
<tr>
<td>-Enhancement product (see 6.1.1, 6.1.4)</td>
<td>-Avoid product fault early (see 6.2.3)</td>
<td>- Reduce the repetition work (see 6.2.3)</td>
</tr>
<tr>
<td>-Long-term relationship with the customers (see 6.1.6)</td>
<td>-Saving money (see 6.2.3)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2, Potential benefits expectation of an IoT-enhanced device, as found in our study

It is hard to overestimate how innovative the IoT could be for industries and customer communications. The vendor and integrator will soon offer big solutions for companies to understand end-user needs like never-ending. Just as sports companies can compare features of athletic training to enhance performance, firms can connect data from connected devices to enhance their products.

As a state-of-the-art technology, the IoT may at current seem more exciting than it is in reality. However, through our study with company Elpress, we are now starting to see through the initial excitement and make new professional IoT models, customer value suggestions, and profits. The Elpress is setting off to best advantage and gives the impression that they will enhance their product and customer service to Identify IoT business opportunities over the next few years in IT innovation.

The IoT offers organizations a unique chance to accelerate value development and improve customer service. Vendors are integrating their products with the many different types of sensor. Traditional enterprise applications were redesigned to communicate with people; it is like now machine communications with systems by integrating sensor by using IoT. IoT increases new devices, data, and
services all demanding their own integration as well as connecting to the current complicated IT systems. However, use of the IoT's is not an easy job due to the innovation of the phenomenon, the current research with the IoT give the impression that IoT will rule against everything, from top to bottom and all over the place. It will change who business products interact with the connected devices and how the devices interact with us. The Internet, which broke down the walls and permitted vendors and customers to talk among themselves. Now, products have become an active contributor in this value chain (Bauer, Patel and Veira, 2014). This connects well to our findings, especially those of "Enhancement product" (see 6.1.1, 6.1.4).

We found out in our case study that if customers were asked what they imagine their product to look like in 20 years, they would certainly talk about the changes in connected technology. For example, from the eighteenth century, the first steam engines to the mid-1970s electronics and IT began to expand rapidly into the industry to provide value to the customer. Customers do not want to have a lot of thing in the practice work; they need something easier and cheaper. Customers are looking for the quality, and some of them are looking for reducing the cost. By the year 2020, the Internet of Things will be creating value for customers helps vendors to sell products and services by using various wireless and sensors technologies, starting from the Internet to wireless connectivity and from micro-electromechanical devices to embedded systems (Wikipedia, 2017). Moreover, security and document report is also a concern to know what was made and how it was made and the quality of the work with information on how to fix the error early. Vendors try to achieve the high quality of products as much as possible; they want IoT to ensure that the work was done perfectly without any issue to reduce the repetition in work and would save the money and the energy. While some need service support and feedback about the product after buying the tools, and they consider it very important for them (Porter and Heppelmann, 2015).

What we have learnt from previous research studies is that we live in a smart connected world where the number of devices that are connected to the internet, just recently exceeded the number of humans living on this planet and for a lot of people living here and the devices of our taking us which are being connected (Porter, 2015). Without a doubt, we are surely on the way to an IoT revolution, and this is a very interesting and moving times that in the value chain of the manufacturing firm everything is going to revolutionize from vendors to marketing and services to manufacturing and in many other areas. IoT is very big and very complicated in both understand and respond to how this is likely to change competition in the reason we know that is we've already seen it starting, and we've already seen people struggling. But if we get into the topic of IoT what we realize is it’s the “Things,” ’it’s how the things are different’ it’s ‘what the things can do differently’ it’s ‘how the engineering of those things changes and create value chain.’ The internet is a pipe for pushing information around it’s the changing nature of the product itself, (Porter, 2015).

What we have seen through our study is that vendors are constantly trying to create new value in their products with IoT which is most challenging. To create new value involves a breach of a completely new sector. In the past couple of decades many types of products have gone from being physical products to being smart products and when a product becomes a smart product by putting in sensors, logic, computational capabilities and put in software algorithms and in many cases, some type of human-machine interface/user interface it creates value to organization, vendors, and customers. Heppelmann (2015), discusses in his research that a single-car probably could send hundreds of sensors reading per second and then think of there are millions of cars and from one-year model to the next year model the sensors could all change. For example, the 2014 cars model are sending data which are completely different data of the 2015 cars model set of data, and through IoT, we can figure out how to deal with that without trying to structure and normalize it, (Heppelmann, 2015).
The value creation is a central role in our study. Creating value with IoT is ‘rethinking’ moving from a business model where the customer pays up-front for the product or service to one where the customer is paying based on usage. We can track usage and charge based on just how much the product or service is used. The good news is that the use of the data that’s being generated from all this technology to help the customer anticipate what’s going to happen in the context that they’re using the product or service. Ultimately even go to a prescriptive model where we’re giving the customer advice given what’s about to happen what are the things they can do to maximize value and charge for, that kind of additional Insight that's being provided on top of the basic product or service, (Porter and Heppelmann, 2015).

After an extensive literature review, it seems that vendors with IoT thought the idea of smart connected products, which have a great effect on value creation, because as we have continuously thought of the ‘value chain’ existence around the product and product was just a stone if going through some smart ‘value chain’. Heppelmann indicates in his research; now the product has become a superb contributor to its own value chain. Products are now speaking to its makers in manufacturing and engineering. It is speaking to its workers it’s even speaking to the marketing and sales department regarding what’s the customer thinking off. The product has become a sensor device in connection with the customer, and it will change so much in the form of how IoT vendors create, sold and sales after service to attain value from it, (Heppelmann, 2015).

8 Conclusion

In this thesis, we wanted to know how vendors could benefit themselves by the use of IoT in their businesses. We formulated a number of research questions, being, based on a vendor’s perspective: why do they (vendors) need connected products; how can such products be made marketable to the customer; and what are the predicted benefits of IoT-connected products for the customers?

We have presented the benefit from IoT to create value for the vendors. The results were summarized in categories such as access to full data, tracking the tools, pre-fault assessment, fast service, enhancement product, and long-term relation with the customers.

We have further shown examples of how our concept could work for predicting vendors to support the work practices for their customer and end user. Furthermore, we have built and evaluated our concept design according to what assumed in the analysis of work practices for the vendor and end user, (see the “Conceptualization” section). By using our visualization for integrating the IoT with the work practice, we can see that the IoT can be the powerful player in the IT system when it comes to being involved in the work practices for the vendor-customer and end user. Not only that, but it also creates new and easy ways for vendors and their customers to get real information and actual statistical report about the practices and the work, which is used to develop and enhance the work for the vendor and for their customer. We conclude that, with the high quality of service that could provide through the IoT, and the different feature that the connected product provide it, the product will be more marketable among the competing products in the market.

Our suggestion for the work practice with IoT triggered a broad vision for the practices how it could look like, which help us to present the concept to the participants and help them to contribute with us in the interviews and discussions. Values were identified as both vendors and customers are looking to enhance the quality of work and saving money. Furthermore, vendors are looking to get the useful information from the customer to develop their products and provide a good service for the customers and to be a good competitor in the market. Based on our research, we conclude that IoT could be useful when it is integrated with the system, and it might change the business in the future as what which, e.g., the mobile phone has
done in our lives, and bring new high quality to the business. And the products with the IoT in future could have a lot of functions. Thus, we can see that the customer will gain a lot of values by using the IoT within the product. The co-operation between the vendor and customer will become closer; the data will be available for both stakeholders, the customer will get fast service and support from the vendor, as well as the vendors will get the useful information that they need to develop the products further. What we can see is, IoT would change the concept of the business and play an important role in the future.
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26


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Appendix

- What is your name and job?
- What do you do in your job?
- What do you know about IoT?
- Do you think you need IoT in your job? and Why?
- Do you think the IoT could affect your work processing or your worker work processing? and how?
- So, you think that some of the company they could not accept the IoT because of the cost for applying the IoT in the company? why?
- What the values that you would get it in your job from the IoT?
- What are the values that might worker got it from the IoT?
- How can you imagine the business with the IoT?
- Do you think it is possible to use IoT for all business? Why?
- Based on your perception the IoT is just for money issues or for other values?
- From your perspective why do you think your customer or company customer they need the IoT?

Set of questions that used within the interviews

- What is your name and job?
  My name is P1; I am working as an R&D Manager in Elpress

- What do you do in your job?
  I am responsible for product management and technical issues her in Elpress, so that we have the right and that the product development process is going on and working in the right way.

- What do you know about IoT?
  I know a little about it, I mean I read it in the newspaper, and I read it in the technical magazine, and I have thesis worker here working on it also and another thesis worker.
  I have not worked with it; this is the first time I am working with it

- Do you think you need IoT in your job? and Why?
  I do not need it right now as my work position is, but you never know what you need in the future, so but are mmm the tool and the machine where are have in the future probably need IoT to be successful tools.
  It will give us the possibility to have tools that are different than our competitors, so it will give us a competitive advantage to have tools that are connected. It is part of development, developing our products and our tools.
  I think it's for us mmm, it is more of mm, IoT is a new technical challenge that would like to have in our product to further enhance the product.

- Do you think the and how IoT could affect your work processing or your worker work processing?
  Yeah, sure but it too early to know that how it would change us, it is the same as the mobile phone, cell phone they have to change the lives completely, so I think the tools also when we have connected tools change the way we are doing the business and the way that we use our tools in future.

- What the values that you would get it in your job from the IoT?
  Basically, we serve our customers, and I think this would add value for our customer that is our
basic goal and that why we are doing this and of course it would also add some value for us here in Elpress.

- **How can you imagine the business with the IoT?**
  In future, I think we would have many chances to track the tools which are we selling the tools too? What are using the tools for? And how are using the tools? And that will give us useful information so that could use for enhancing our tools and our services, so we can MMS. Some ways getting mmm the customer satisfied with what given to them, hopefully, the customer will think this is a great thing and they can save both time and money so they will have it. But I think it’s like mobile phone starts using iPhone and androids. The first time you need it to know how to use them? What to use for instead of calling? Now calling with the phone it just small part what did you using for, this special this mm, aaa brunch or this aaa I mean connectors in Elpress and this mmm how would say it mmm in business it’s kind of old and conservative business, so it probably takes some time before it they will except it hopefully, we hope that they will accept it.

- **So, you think that some of the company they could not accept the IoT because of the coast for applying the IoT in the company?**
  We do not know what it would cost so that something we have to explore it to see what it would cost and what cost can the customers take how much they willing to pay for the services that they really do not know it right now but might it have it in the future, so they will give the opportunity I think both we and customer do not know about it.

- **Do you think it is possible to use IoT for all business? Why?**
  Not all business because for what we have to do in many ways is it very mechanical and how would say it mm old fashion I mean you can’t you can’t have IoT for almost everything but it can be hard to find useful ways of using it I mean you can but small sensors on over cable and connector and be able to see all the connectors in the factory, but the cost you add that is probably not aaa probably much higher than what you get in values from collecting data from cable lacks in machine or so but you never know in future I mean sensors are getting very cheap, and computer and capacities is very cheap and building software and so on it also getting cheaper and cheaper so you would never know but I think this is the start we starting with a tools that are more expensive so there is some courage in behind it’s you can maybe it is there is some rational in behind it.

- **What is your name and job?**
  My name is P2, I am the technical manager, I work under Anders, who is my boss he is the chief of technology manager, so I am the product manager under Anders in the research and development.

- **What do you do in your job?**
  I am in charge of the equipment development, we have department here with a several technician’s both technical administrative and technical electrical reporter, and we have the technician making the constructions, so we together with our the R&D manager and product manager will we analyses the markets and customer demands in the markets within secure connections with the focus on crimping solutions for connecting electrical terminals, and through connectors, we
develop the products for the aaa well, basically for the needs of world.

- What do you know about IoT? &
- Do you think you need IoT in your job? and Why?

Well, I see large benefit in that we could add customer value based on user-friendliness we could help the user with when the user tools assist them with typical follow what they should do, helping them understand what they have done, the quality of the work, they are having to gather with building this connector the different pieces together, making the smartphones for example communicate with the product information, connected with the progress and status of the tools used in the work. And then you use how I see benefit from IoT for all seek for the customer pieces, for me as within the development I really like the idea of having the support in technical development of products by understanding how the customers are using the product and processing information from the tools when they are being used would provide us with very important information when developing the new version of the tools we get to know the customers and we get to know our own tools in a better way, and it also, I also see a lot of support for the customers that with the technique not just me responsible for the development of the product because I do not think the customer is appreciating this because they there tool is able to provide me with the information about making new tools better, it is also important to find key interest point for the customer so that they feel that the new functionality with could develop within the IoT which would make the product more user friendly, something which would add additional value to the customer and by helping them finding, well, connecting what they are doing with some quality assurance, for example, they could, they get instant feedback well it was OK, it was not OK, they can report to their supervisor well look I've done this, so I would say that IoT for the customer will provide traceability, quality, and reports

- What the values that you would get it in your job from the IoT?

I am of the opinion that storage is cheap, so the more information, well if you look at big data, the more information we can collect from all the different kind of the sensor in the devices in the tools the more help we will get by analyzing the environment or product we could monitor well battery temperatures, hydraulic oil temperature, engine temperature, we could look at hydraulic pressures, we have of course clock in there, we could monitor using GPS we could see where it was used and connected to the temperature is it inside or outside, if there is breakdown we could see OK what it was temperature when the tools were used, it will help us finding the correct levels of the designs, if we know that the product is really, it’s really rare the product is used below 10 minuses for example or yah I see a lot of aaa information which would be really important to help us to design the tools and knowing where we could save some effort and save some money by perhaps not designing product to handle some sorting application when we were getting information about that this is OK where the tools is rarely used. And so...

The values for the customers I would say we have techniques where we can trace the crimping process in such a way that you could get a quality measurement if we have the pressures and we can monitor aaa today are in the large tools not the handle tools we have the possibility to connect the PC to the press equipment in an industry where you have aaaa it is too large to carry with you but adding a connecting tool where instead of the PC you could connect a cell phone to the tool and you could analyze the crimping process, you could the customer could have much more details quality report using statistical process control, you could analyze several crimps in a series and could have a statistical output from the outcome and the report telling the quality of the crimps made in a certain application, and I also see that a lot of customer are making jobs for their customers, so it is actually not only also always end customers how paying the tools from us, in
that case we see they need want some kind report document they want to know what was made they want to know was it what was the quality of the job, in that case we could provide them with the tool to present OK we made this 150 crimps in this when we building windmill for example win program and you could they could serve their customers with a quality report, also with the idea of having this communication between the tool and cell phone you obviously also direct have a connection to the internet when you selected like you have an application here the scenario when you select your cable, type, size and connector type we could easily help customer with a emerges, videos, product information from well home pages, YouTube connecting these where connecting the information with the application and the well the smartphone as a center if there is defect in the tool we could have quite complex error messages which could be handle by the cell phone and it could actually basically we could the alarm codes straight the way to ourselves and the support department might be able to respond directly oh you have this and this error message we could aaa this is you have defect part in your tool but this stand right away shorten the time or the failure ordering repair shop aaa this is straight away sending just the documents for how to send the shipment to the service shop, so you can think several applications for we could the customers would have a benefit from this because I feel it's really important that not to, it's really important to build value for the customer so they the customer has to feel waw this will actually really really help me, if we get the feeling with the customer that the customer feel ohh they are just trying find out what are doing with the tools that will help them, we have to feel ... we have to get the customer .. they have to feel that we are helping them not spying or ..., so will we have of course .. I am really interested in get their data to myself so I can learn better how the customer is using the tools, so it can give them even better tools in the future, but along the way it is really important to provide them with added values so that the customers feel this is providing them with valuable function which could save the money save the time increase the quality of the jobs.

- **How can you imagine the business with the IoT?**

I think it's since we have the technique we are in really conservative business customer can be using our tools and similar tools for a very very long time, now we have this modern well in some industries IoT has been reality for quite a long time, we have a quite modern conservative business, now it is well drawing within all-region, I think in the future it will be necessary to be to be aaa how to want to say ... high level high quality company within our business trying to use aaa the added values, we trying to build, because we, we do not want to, we do not want to be where the price pressure is highest, we want to raise our self so find added value to provide higher carve to the customers, and by doing that we ... we do not meet the same high price pressure on the products, and the amount of the competitors are reduced also since we trying to .. to find this aaa added values, and I also think in the position we want to be .. it is very important to take aaa to use this new feature then the technologies and finding this putting their effort connecting well existing smart device with a smart application with the existing quite .. well what to say it the null connected devices so and I think it is in the future for campus work be in the leader positional technical development, and we cannot afford not to be taken part of that development progress.

- **Do you think it is possible to use IoT for all business? Why?**

We have quite a different kind of customers I would say were we could use this the most is for the large industrial customers around the world, If you look at the references as we have the large customers, we have Siemens, Vestus, Alestorm, Scania, Volvo, just I have mentioned few, global companies, and they could have large industry productions in house in large factories, but they could also have for example wind power bank manufacturers they make the assembly product
inside in a desert somewhere, in a forest somewhere, in a mountain, in the middle of the forest and then the user tools some of them what is common for this customer are call is really high because the cost of the defect is always we provide critical component connectors and terminals for the power distribution, it does not matter if the gearbox of the engine fails or if it’s OK if the connectors and the terminals connecting this generator or this engine to the network where the electrical power network if the connection we are responsible for fails they will have a machine not working, so it is is a they are really quality... they aim for the high quality and really want it this to work as could as possible, so that kind of the customer would really appreciate everything we can do to make sure that the quality in the crimping process is as high as possible, then other customers might be... if you look the power networks some some machine is digging in to drown somewhere and accidentally cut some cable then they have a service department which has car's overall the country and they should be in the position within mmm perhaps one hour or few hours because the clocks start ticking, and the end customers for them will start getting paid when the energy supply stops, and in that case we see they would need another part of this not necessarily focus in the quality they would focus on where was I? What can I do? Say that they could use the GPS in the tools in order to save that I was in this position and I was repairing this connector which has been broken, I sue these terminals and they send the report, they get an amount of the money for making that job, other ways a they would reported some in the way if they could in that case serve as not necessarily providing a quality report, but they would use it in the sense that they could say where was I? What did I do? And they could use that as a receipt for receiving the money from the company for the job which made, so there are different aspect of what you could do with the IoT, and then I sure we will have customers who have been using our tool for 30 years, and they want to continue using the tools for another 10 years without using smart phone, so we would likely need to have basic aaaa level of the operation even for smart tools which will look exactly like 10 years ago, so not everyone likes new technical solutions and the new technical development.

- Based on your perspective, the IoT is just for money issues or for other values?
If I see other ways to use it for the business, I would say it will be more convenient because if when you how the tools are used we could send them an information well I have seen that you have this tool and this tools need service after 15,000 crimping cycles now you have wind power for about 12,000, you have 3,000 before service we could have a service agreement for them which would make send an empty box to them here you have an empty box put you tools in the box and send it for service as a schedule maintenance and it could be more convenient for them because very common they are using the tools until stops working and then they have aaaa well production stops until they have a new tools which were working on, so we could provide that to them as well extra support, so it is not just a money issue or just for the cost, it could be for other values like fast cover the issue or quality or ..., yah if we could have a details analysis diagnosis, diagnostics we could perhaps know quite well what was the wrong with the tools? Before it arrives at our place, also it’s more important. Otherwise, it has to open all the tool and try to figure it out what it could have happened? perhaps we could make some diagnostic survive; we could monitor OK how was the tool used? has been used for very large terminal or for very small one? It would not be very loud, perhaps we could you use the tools for only very very large terminals then you have perhaps few crimp cycles before service, we could have adaptive crimp cycles, so that if you use it only for very small terminals then it would be extended for the very long period before service.

- What is your name and job?
My name is P3; I am a constructor designer in Elpress.

- **What do you do in your job?**

What I do make a new and old product and I have customer relationships and special design they need for other customers, what I am doing is like I make design make drawings and make the construction of mechanical and electrical staff also do electrical testing for the products. And my work more with the connector and testing connector with the cable.

- **What do you know about IoT?**

Yah, but not much Mekael show me his job yesterday. It more like, I do not know how can I say it in English, you get information from the machine, and it can be added a verb in the word, so it’s like guessing much I have from this. The machine connected to the internet and you can reach it all the time.

- **Do you think you need IoT in your job? and Why?**

Depending in my office are very stationary I am on the same place every time more and less, but if I go to work in the field it should be a good idea to have it, I believe it could forward the works is on the field they don't have all the ... they don’t know how they are looking every time calling it could be unknown places they are going to, they maybe know about kind of machines there if they arrive on site, so that is nothing it could be good, because no one wants to send people without part, the tool may be shipped to some other places

- **What the values that you would get it in your job from the IoT?**

Hey, it just like speculation what it believed the values are, you can get information if you are setting in office you can directly information of how of things going on the field, so you get if someone asks you about his work proceed then then you can know is going well also maybe you know you get some more information probably for the installation ... as the .... gay who installed the crimp or connector probably can sometimes not have the total information or everything, so it’s could a nice to you the machine is telling you what really have done so.

- **How can you imagine the business with the IoT?**

I am not really right now, but I have some ideas how it could be, because if you talk to a customer for asking about they are looking for the prices, they do not want to ... if they could buy a machine the machine it’s more expensive, so it could be some kind of leasing deal you rent it something like that.

- **Do you think it is possible to use IoT for all business? Why?**

The probably is there are some part may be some problem, but I do not believe this is solution for everything, can be solution for some customer, because if you put too much information in one tool you need also applications like telephone in-app to handle it, customer does not want to have many things, they will ... some customer is like to have easy as possible cheapest.

Yah, it is the cost of 50% cost and the other looking for the quality, and they do not care about the cost of first thing, but they are the tool, 50 50 so, they are people now buying tools in China but also the market does not want to buy it they want to have service and everything, also like to know good product and they can have a service, they can call the people in charge get feedback this is
more important, so there are many things. All is going people who are looking for the cost they will think for the cheaper tools and the cheaper connection because there are many connections in the market, we know people using our tools but not our connection yea... so it is cost and quality.

- **What is your name and job?**

  My name is P4; I am design engineer,

- **What do you do in your job?**

  I am contracting a different kind of connector and develop it; I make special connector for the customers

- **What do you know about IoT?**

  I hear little bit about it, I was on fair last week, and I understand that it’s by construct right now, In future it will be very very well measured by.... We have to everything in app cloud, and we can use it to make better machine and work better, and you can save the energy.

- **Do you think you need IoT in your job? and Why?**

  Well, in my job no, but in our customers job maybe it will be useful, But I use the IoT now you can say, but I am not working with machine like that I mean just design seems that, and I am controlling and so on, for me not necessary but for my company where they work for our customer they will need it but not me.

- **From your perspective why do you think your customer or company customer they need the IoT?**

  I mean they need the information that they are collecting, and they will be getting information that if there is something wrong they will need they will get it they will have that they want that information so they can stop it and fixed the wrong thing before bad big damage

- **What the values that you would get it in your job from the IoT?**

  They get information about the work it is done, and they will get ensure that this work well is done, and they want that so if damage happens they can say that not because of that but it is because of something else and so and I mean it is very helpful for them to get the job and so.

- **How can you imagine the business with the IoT?**

  I do not know,

- **Do you think it is possible to use IoT for all business? Why?**

  When we work with the energy and you have to save the energy it is very good to have the IoT I think that.
Based on your perspective, the IoT is just for money issues or for other values?

I think they wanted because they will get insurance that this well-done work and they can save money and have control of everything.

What is your name and job?

My name is P5, I am a design engineer.

What do you do in your job?

I am a designer, just tools for crimping, cable lugs, machine designer, and connector designer.

What do you know about IoT?

I hear about it but, I do not know so much.

Do you think that you have the IoT in something in your life?

No, not so far.

Do you think it is possible to use IoT for all business? Why?

In my job for myself I do not need it so far, but I can see the possibilities for our tools to have it, because I can make it so much easy for the operator, instead of picking up the telephone and ask, he can look at mobile phone and read about this, push to take different phone catalog of the tools, he can have it online and always at information. And this operator is customer operator.

What are the values that might operator got it from the IoT?

The values are the quality, because it is huge mode of possibilities to tool such things, and only 2 3 4 things to do, and I have to take out this form in huge amount of possibilities, that is not easy for the operator, because a huge amount of possibilities in the Elpress system ... huge huge ... information and manuals, and so you have other systems, not Elpress say ... (mean take it). And you have to choose the right one. So, the quality work will be one of the values for the customer, and the speed of the processing and one of the biggest values is the operators know that it’s right. But you never got paper it’s right, you must cable plug in the cable And that is you do not know in work you see on the ..... Because you can first see the reality if the people do this work its work or its fault.

Can the worker check the crimping done successfully or not? not really or they can do this not possibility. Can only check the right connection to the right cable with the right equipment and then you would because all test how was done in the past say yes it was it is the case you can suspect two work other ways you have no possibility, you cannot take the cable lugs and see if it is OK.

So, by using the IoT with the machine, it would be easy for the worker to know the work done OK or not?
It is easier, of course, you can see in the future, because in this case (the Elpress IoT prototype) write manually what they use, if I read in this application it is cable lugs and so, put it in the phone and then I use this one (mobile application) IoT never see this, it the same for the cable you have the cable fault but you have to choose which it is, you can say it is 40 mm but you never sure so you have to know it is for number one and next for number … you have one and not … you check if you have the application.

- **How can you imagine the business with the IoT?**

In the future, for example, cable lugs, cable, dice, and the tools it is not possible today because it costs too much but in the future (it can be fair) so tool can read which cable, which cable lugs, which dice, and in case of this say OK or not OK.

- **Do you think it is possible to use IoT for all business? Why?**

Yes, because on business you have to use the possibility of the IoT or at least the information. So, it could be possible.

- **Based on your perspective, the IoT is just for money issues or for other values?**

It is not a money issue, it has to be useful at least for the operator or most of the operators, and if it is useful, they will pay money for that. The first value is to be better competition, and then, of course, it is money cost when it takes the IoT, so in the first year it could cost more but then in a long time it will pay in the future and if the IoT makes different against the competition to make money or you do not lose money which the same as making money.

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<thead>
<tr>
<th>Coding Categories</th>
<th>Code</th>
<th>Finalizing code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vendor practices</strong></td>
<td>- Constructing new product for the customer and their customer</td>
<td>- R&amp;D analyses the market and customer demands</td>
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<tr>
<td></td>
<td>- Design, drawing and constructing mechanical electric</td>
<td>- Drawing, design, and constructing new mechanical, electric and product for the customer and their customer</td>
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<td>- Vendor workers have Little knowledge about the IoT</td>
</tr>
<tr>
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Vendor workers have little knowledge about the IoT.
- Using researcher to have knowledge about the IoT.

**Tools with IoT features**

- When the machine connected to the internet, it's reachable all the time.
- The values of the IoT could not be clear at the beginning.
- IoT might not be a solution for everything.
- A lot of information with the tools need a lot of application to handle it.
- Add customer values.
- Show with the IoT you could have produced more user-friendly.
- storages are cheap.
- It is easy to connect the PC to the press equipment's in an industry.
- Providing new idea of having communication between the tool and cell phone.
- IoT has been reality for quite a long time for some industries.
- Using IoT to have high level, high quality in the business.
- IoT connected to the tools help customer workers know where they were? What can they do?
- IoT not just for money but for other values like fast response, quality.
- IoT using to have better machine, better work, and save the energy.
- The useful information that is gotten by using the IoT is used to monitor the quality assurance of the work.
- The useful information that is gotten by using the IoT is used to detect the cause of the fault and fix it.
- Evaluation of the work it's not possible, but with the sensor and IoT it is possible to get the result of the work quality.
- Using IoT with the sensor will help the worker to detect the cable type and size, connector type and size.
- Providing new idea of having communication between the tool and cell phone.
- IoT not just for money but for other values like fast response, quality.

Learning IoT from the fair.
- Expectation for IoT to be in everything.
- IoT using to get information from the machine.

- IoT Add customer values.
- When the machine connected to the internet, it would be reachable all the time.
- Show with the IoT you could have product more user-friendly.
- IoT connected to the tools help customer workers know where they were? What can they do?
- IoT is using to enhance the product and have a better machine, tracking the work and make it better, and save the energy.
- With the IoT and sensor the checking of the crimping, it would be easy.
- The useful information that is gotten by using the IoT is used to monitor the quality assurance of the work and detect the cause of the fault and fix it.
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**First opinion:**
- IoT might not be a solution for everything
- IoT not for all business

**Second opinion**
- It is possible to use the IoT with most of the business
- IoT could change the business as the cell phone change the lives completely
- Using IoT to have a high level and high quality in the business
| IoT for vendor | - IoT has been reality for quite a long time for some industries  
- IoT with the tools, in the beginning, will be like the mobile phone, in the beginning, using for few things.  
- IoT with the tools in future would have a lot of function like the mobile phone  
- IoT could not be used with vendor practices  
- A lot of information can be collecting from a different kind of sensor and store it in big data  
- Big data will help to analyze the environment or product  
- Knowing the tools status when fault or damage happened  
- By using IoT, it helps to find the correct level of designs  
- Connecting tools to the cell phone could analyze the crimping process  
- Vendor support department can have a quickly respond to help the customer  
- Sending warning to the customer when the tool would reach defect situation  
- Using IoT to have high level, high quality in the business  
- Making an effort to find added values for providing higher curve of the service to the customer  
- Using IoT to find more values for the customer and make the vendor competitor  
- IoT could help the vendor to service the customer before the defect acquires  
- Good service from the vendor by using IoT would avoid the customer to lose a lot of money and time in the job  
- IoT will help vendor to get full information about the tools before it arrives to workshop for fixing  
- Getting full information about the tools before arrives at the workshop will save the time and the cost of fixing  
- IoT not for the vendor but for the customer  
- IoT needed for vendor customer, not for vendor worker  
- Vendor worker does not need the IoT with their work practice  
- IoT could be with the tools that vendor make it  
- Vendor must use the IoT to be a better competition  
- Using IoT make the vendor different from |  

- A lot of information can be collecting from a different kind of sensor and store it in big data  
- By using IoT vendor can be able tracking the tools (What are using the tools for? And how are using the tools?)  
- Knowing the tools status when fault or damage happened  
- IoT provide information for enhancing the tools and the service  
- By using IoT, it helps to find the correct level of designs  
- Big data will help to analyze the environment or product  
- Connecting tools to the cell phone could analyze the crimping process  
- IoT needed for vendor customer, not for vendor worker  
- Vendor workers do not need the IoT with their work practice  
- IoT could be with the tools that vendor make it |
| other competitors  
- IoT give vendor competitive advantage to have connected tools  
- Using IoT to add values for our customers and for vendor also  
- By using IoT vendor can be able tracking the tools (What are using the tools for? And how are using the tools?)  
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- Using IoT with the business need some courage |  
<table>
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<tbody>
<tr>
<td>IoT, vendor and competitive</td>
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</table>
- Vendor must have the IoT to be a better competition  
- Using IoT make the vendor different from other competitors  
- IoT give vendor competitive advantage to have connected tools  
- Using IoT to add values for our customers and for vendor also  
- Using IoT to have elevated level and high quality in the business  
- Using IoT with the business need some courage  
- Using IoT to find more values for the customer and make the vendor competitor |  
| IoT, Vendor and Customer service |  
- Vendor support department can have a quickly respond to help the customer  
- IoT could help the vendor to service the customer before the defect acquires in the tools by sending warning message  
- Making an effort to find added values for providing higher curve of the service to the customer  
- Using IoT to find more values for the customer and make the vendor competitor  
- Good service from the vendor by using IoT would avoid the customer to lose a lot of money and time in the job  
- IoT will help vendor to get full information about the tools |
<table>
<thead>
<tr>
<th>Vendor Requirement</th>
<th>before it arrives to workshop for fixing</th>
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<tbody>
<tr>
<td>- Support technical development of product by understanding how customer behavior</td>
<td>● Getting full information about the tools before arrives at the workshop will save the time and the cost of fixing</td>
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<tr>
<td>- Developing new version of the tools based on the getting information from customer</td>
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<tr>
<td>- Getting know the tools in better way</td>
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<tr>
<td>- Get some important information which would help to design the tools and knowing</td>
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<td>where could save some effort and save some money</td>
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<tr>
<td>- Analyze several crimps and have statistical output from outcome</td>
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<tr>
<td>- Report shows the quality of crimping</td>
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<tr>
<td>- Looking for real and high values for the customer so he feels that he really need that</td>
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<tr>
<td>- Should build trust between vendor and the customer</td>
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<tr>
<td>- Vendor interesting to get the data from the customer to enhancement the tools</td>
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<tr>
<td>- To make different against the competitions and do not lose money it is the same as making money</td>
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<tr>
<td>- Basic goal for the vendor is the customer</td>
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</tr>
<tr>
<td>- Vendor needs to understand the customer behavior and gets some valuable information about the performance of the tools for build new version of the product with could save effort and money</td>
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<th>IoT for customer</th>
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<tbody>
<tr>
<td>- IoT with the tools could provide the customer useful information</td>
<td>● IoT with the tools could provide the customer using information like (progress and status).</td>
</tr>
<tr>
<td>- Tools help the user what they should do</td>
<td>● IoT would help the customer and user to have the knowledge and know what they should do instead of calling the vendor customer service</td>
</tr>
<tr>
<td>- Tools help them to understand what they have done and the quality of the work</td>
<td>● Being connecting to the internet will easily provide a lot of support to the customer</td>
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<tr>
<td>- Smartphone communicate with product information (progress and status)</td>
<td>● IoT with the tools would inform the worker about what has been done, and do analyze the crimping process, and show work quality report</td>
</tr>
<tr>
<td>- Connecting tools to the cell phone could analyze the crimping process</td>
<td>● Sending warning to the customer when the tool would reach defect</td>
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<tr>
<td>- Fixing the error early to avoid extra expenses</td>
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<tr>
<td>- When the customer using the IoT, he is going to save money and time, and increase the quality and the jobs</td>
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<tr>
<td>- IoT could help the vendor to service the customer before the defect acquires</td>
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<td>- IoT will help the customer to have the</td>
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knowledge instead of calling the vendor customer service
- IoT with the tools will give the quality of the work
- Quality of the work is one of the values and the speed of the processing and the knowing of the work result
- Using IoT with the sensor will help the worker to detect the cable type and size, connector type and size
- Customer needs the IoT with the tools because it is useful for them
- Using IoT with the tools make the customer saving money and time
- When the tools will save the money and time the customer will be great to have it
- IoT with the tools would inform the worker about what has been done
- A lot of support for the customer
- IoT adds values for the customer when it's connecting the work to the quality assurance
- IoT providing reports, traceability and quality to the customer
- Able to monitor battery temperature, hydraulic oil temperature, engine temperature
- Monitor hydraulic pressures
- Monitor the tools using GPS, so you know where it was used and it was inside or outside
- There is a technique how can trace the crimping process to get a quality measurement
- Customer can have quality report by using statistical process control
- The customer cold serves their customer with a quality reports
- Sending warning to the customer when the tool would reach defect situation
- Tools connected with the GPS and IoT help customer to know where their tools are and fixed the issue as soon as possible
- IoT connected to the tools help customer workers know where they were? What can they do?
- Good service from the vendor by using IoT would avoid the customer to lose a lot of money and time in the job
- Customer need to use the IoT with the tools to reduce the repetition in the work and then they will save the money and the energy and have control in everything

situation to avoid the cost of fixing, so the customer can save money and time
- When the tools will save the money, and time the customer will be eager to have it
- IoT would help the vendor to serve the customer before the defect acquires
- Quality of the work is one of the values and the speed of the processing and the knowing of the work result
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- IoT providing reports, traceability and quality to the customer
- Able to monitor battery temperature, hydraulic oil temperature, engine temperature and by using GPS with the tools we can know where it was used and if it was inside or outside.
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| Customer difficulties and issues | - When the worker be in the office, the information will be accessible, but our site, it could be difficult  
- Some customers margin between vendors productions to get the lowest cost and highest quality  
- Customer does not appreciate providing information to the manufactories  
- Large PC not easy to carry it to the workplace with the equipment  
- Some works have high cost because of the location of the work  
- Providing immediately respond and support with high priority because of the difficult accessibility and the high risk on the location  
- Some customers they do not like the new technology in the tools  
- Very common customer using the tools until stop working  
- A lot of forms and details for the tools, cable, and connector  
- Huge information for the work which is not easy for the worker to handle it within the work  
- Evaluation of the work it’s not possible, but with the sensor and IoT it possible to get the result of the work quality  
- Worker cannot check the crimping done successfully by just looking  
- The cost of using a lot of sensor with IoT it might be much higher than the value of the information that is being collected |
| Customer Requirement | - Customer will look for the price when IoT comes with the tools  
- Customers they do not want to have a lot of thing in the practice work  
- Customers need something easier and cheaper  
- Some customer is looking for the quality, and some of them are looking for the cost  
- Customer still need service after buying the tools |

- Customers do not want to have a lot of thing in the practice work  
- Customers need something easier and cheaper  
- Some customers are looking for the quality, and some of them are looking for the cost  
- Customer needs service support and feedback about the product
- Customer needs service department to get feedback about the tools and its operations
- Feedback and the support it is very important for the customer
- Report shows the quality of crimping
- Customer needs a report document to know what was made and how it was made
- Customer want tools with high quality as much as possible
- Customer need the information to fix the error early
- Customer needs the IoT to ensure that the work was done perfectly without any issue
- Customer needs to reduce the repetition in work, and then they would save the money and the energy.
- Customer will pay for the useful things

| Vendor difficulties and issues | - Expensive tools might lead to losing the customer
- Tools from China are cheapest
- It is important to find interesting point for the customer to collect the information from them
- Large PC not easy to carry it to the workplace with the equipment
- The competition makes vendor to reduce the price of tools and add more values for the customer
- The competition makes the vendor for looking for the latest technologies
- Using IoT to find more values for the customer and make the vendor competitor
- When the vendor does not use the latest technologies, this will make the vendor out of the competition
- Vendor has customer around the world
- Vendor cannot imagine the IoT cost with the tools at beginning
- IoT for the vendor is new and cannot imagine cost for that
- At beginning with the IoT vendor cannot know how many customers should pay for the service
- Customer might pay for services which do not exist right now
- Finding useful way for using the IoT it could be hard
- The cost of using a lot of sensor with IoT it | - Expensive tools might lead to losing the customer
- Tools from China are cheapest
- It is important to find interesting point for the customer to collect the information from them
- Large PC not easy to carry it out to the workplace with the equipment
- The competition makes vendor reduce the price of tools and add more values for the customer
- The competition makes the vendor looking for the latest technologies
- Using IoT to find more values for the customer and make the vendor competitor
- Some vendor has customer around the world which make the competition more difficult
- Vendors cannot imagine the IoT cost with the tools at beginning because it is new for them, then they cannot say how much should charge the customers
- Customer might pay for services which do not exist right now

after buying the tools, and they consider it very important for them.
- Customer needs a report document to know what was made and how it was made and the quality of the work.
- Customer want tools with high quality as much as possible
- Customer need the information to fix the error early
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