Saimaa University of Applied Sciences
Faculty of Business Administration Lappeenranta
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The value of CRM systems and IoT-based solutions for future prospects in pile driving industry

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Abstract

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The aim of this thesis was to present major beneficial aspects of CRM systems for piling equipment dealers and to identify practitioners in the field. Also, the goal of the research was to illustrate latest IoT innovation in the field and to discuss its value.

Data for theoretical part of this study were collected from academic sources such as books, scientific journals, theses, and from Internet sources. This data was used to empower existing knowledge of CRM system utilization in industrial B2B sector, outline principles and features of IoT technologies. For the empirical part of the research, semi-structured interviews with dealers of piling equipment and in-depth interviews with manufacturing specialists were conducted.

The results of this study reveal that there are several practitioners of CRM systems in the field. Besides, IoT innovations, being lately introduced in the field, can provide real-time and easy accessible data on equipment condition and therefore impact on cost and time savings for all parties involved in after-sales relationship as well as can increase safety and accuracy of piling works at the jobsites. Based on the research findings, from the future perspective, it means that industry players, which will rely on data gathered from both effective CRM systems and IoT devices, can benefit the most by obtaining a holistic view on the equipment sold and customers becoming proactive players in the industry.

Keywords: Customer Relationship Management, Internet of Things, Pile driving industry, Cloud-based technologies

Table of contents

1 Introduction

1.1 Background of the topic

Nowadays, accessing information and transforming it into experience is extremely important. It is widely claimed that information is essential in a way that it helps to succeed in marketing and to determine right activities for the firm. Today companies can embrace different tools for collecting and analyzing data to understand how they can serve better their customers and how they can achieve new heights.

Customer Relationship Management strategy and CRM system technology, if properly implemented, enable industry players to gain valuable customer's insight out of information CRM contains. However nowadays, in evergreen element of any CRM system, data management, it is the data quality and data security, which become more and more important. That is why it is vital to have not only a technologically advanced CRM system but also a secure data warehouse.

Along with CRM systems, Internet-connected devices will soon offer such capabilities that will definitely go beyond what the industries are dealing with today. Clearly, there are lots of prospects being explored in terms of industry-related data. In particular, new emerging ways of capturing data on product in real-time, which is immensely valuable for industry. In the nearest future, such innovations will open new business opportunities, too. And what if industry players could use the data from CRM system and Internet-connected devices altogether? How that can change the way the business is done now?

1.2 Research objectives and methodology

1.2.1 Research gap

In pile driving equipment sales CRM system's and Internet of Things (IoT) solutions which generate data are vital for running business operations in the industry

efficiently. These tools are helpful in gaining an insight out of analyzed data gathered from both sources: customers and piling machines. However, research papers covering the question of customer and equipment data storage and management within piling equipment selling intermediaries are scarce. This research aims to fill the gap with literature findings and exploration of real-life cases in the industry.

Supplementary to CRM systems, the trend of IoT is arising and IoT solutions have been already implemented in various industries. However, the development of such in pile driving industry are at early stage of mass adoption and yet are not widely discussed. Thus, it gives the researcher an opportunity to illustrate and discuss the value of early IoT features developed by OEM (Original Equipment Manufacturer) of excavator-mounted piling equipment at the very beginning of their deployment.

1.2.2 **Research objectives**

The aim of this thesis is to highlight valuable aspects of CRM systems as a business tool for dealers and distributors in pile driving industry and to identify CRM system practitioners in the field. In addition, is it the goal of this thesis to discuss the applicability and value of recently developed IoT-based solution by OEM in Finland.

Therefore, the primary research question is as follows:

Are there dealers of piling equipment which use CRM systems and how IoT solutions developing in piling equipment industry can be of value?

Furthermore, the sub research questions will support the study and they are as follows:

1. What kind of CRM systems are used by practitioners?
2. Why CRM system can be beneficial for particular business?
3. Which concerns are there regarding utilization of cloud-based technologies for data storage and utilization?
4. What is the use and value of IoT concept in industrial context?

1.2.3 **Research methods**

Initially, for conducting this research, both qualitative and quantitative methods were supposed to be used. However, due to reasons explained in delimitations and limitations subchapters, the researcher could not obtain sufficient data for quantitative analysis within suggested timeframe and therefore the scope was limited. This research followed inductive logic and was carried out by using qualitative methods.

For the theoretical part of this thesis data was mainly collected in Internet resources and academic literature, including topic-related journal articles, theses and dissertations.

For obtaining empirical evidence, the author conducted semi-structured interviews via Skype phone among dealers and distributors as well as personal in-depth interviews with specialists from manufacturer's side. The choice of semi-structured and in-depth interviews can be explained by exploratory nature of the research. Additionally, the author chose these methods of empirical data acquisition because of personal working experience in the industry and awareness of best ways of data acquisition from industry insiders in reasonable time with available resources.

1.2.4 **Ethics and confidentiality**

According to Seidman (2006), qualitative research participants have the right to privacy as well as requesting anonymity. Therefore, since semi-structured interviews are not face-to-face, participants have the right to be assured that reasonable data security is provided by the researcher (Seidman 2006). For this reason, in this thesis some informants' and companies' names remain confidential.

1.2.5 **Delimitations**

This research focuses on identification of CRM systems users only among some of piling equipment distributors and dealers of several international manufacturers whereas the development of IoT impact and features are discussed only with one manufacturer of excavator-mounted piling equipment. The research does not aim to cover the examination of all existing crane-suspended and excavator-

mounted piling equipment distributors and dealers located worldwide. In such a case, it would have made the research field too complex and large for investigation, requiring full team of professionals working in the industry and extensive resources to receive and analyze the results. The research also does not aim to cover all existing aspects and benefits of CRM systems as well as of IoT devices due to time constraints and intention of making the topic more industry- oriented and specific.

1.2.6 **Limitations**

The research is limited in terms of empirical evidence which lead to a limited generalizability of the results. Some companies, which were chosen for investigation were not willing to discuss their means of data storage or internal systems as this topic was perceived as a sensitive one. Other research implications for narrowing empirical part of the research include managers' unavailability at a given time, geographical areas variety, time-zones difference, restricted timeframe, and financial resources of the researcher.

2 Introduction to pile driving industry

The current thesis focuses on industry, which includes manufactures, selling intermediaries and end buyers of special construction equipment used for pile driving works- pile driving vibratory equipment.

According to report released by Technavio in 2016, the global pile driving equipment market is expected to grow at a CAGR (compound annual growth rate) of 6.47 percent until 2020 explained by augmented rise of investments in commercial construction projects and growth of public infrastructure constructions worldwide. (Technavio 2016.)

Construction and foundation companies are main customers that buy or rent vibratory equipment to install foundation piles for multiple construction projects. Such machinery is especially intensively used in construction of infrastructure. For instance, it can be involved in installation of canal bank protection systems, viaducts, port quays as well as perform pile driving works for offshore oil platforms

and windfarms (NPM Capital n. d.). In fact, none of the world's greatest projects like Jumeirah island located in Dubai (Figure 1) would become a reality without a deep foundation works enabled by functionalities of piling equipment offshore.

Figure 1. Jumeirah island in Dubai, UAE. (Google maps 2017)

In this industry analysts highlight the rise of innovative piling technologies that will induce growth prospects of this market in the coming years. Manufacturers of pile driving equipment are heavily focusing on developing technologies such as load and integrity testing to increase the performance and efficiency of pile driving equipment. (Technavio 2016.)

Among major trends in pile driving equipment market Technavio experts feature market consolidation. This trend emerged since many international and regional manufacturers traditionally lead global construction equipment market and with rising demand for pile driving equipment the competition became more severe. For this reason, many industry players now tend to take an option for consolidation to widen product range and to conquer new markets. Examples of mergers include US's Helical Pier Systems acquiring Landcore Technologies, Canadian

pile driving services company. Consolidations facilitate development of innovative products, providing better customer satisfaction as well as lead to achieving economies of scale. (Technavio 2016.)

2.1 Pile driving equipment specialties

There is an immense variety of different piling equipment produced like auger drivers, soil drills, impact hammers etc. Pile driver (Figure 2) or vibratory hammer is one of the major products used for piling works. In brief, it is a mechanical device, which comes as an attachment for excavator or crane and which is specifically utilized for driving or extracting piles of different kind (i.e. timber, concrete, steel, composite). Such type of construction equipment varies in models and can either be high frequency, standard frequency, or resonance-free (Technavio 2016). It is notable to mention that manufacturers strive to provide customers with piling solutions for deep foundation works even in challenging environments regardless of the weather and soil conditions (PVE Piling & Vibro Equipment 2017).

Some features of excavator-mounted and crane-suspended pile drivers are listed below:

- heavy machinery equipment,
- tailor-made equipment to cater specific project needs,
- requires a specialist for equipment installation and commissioning,
- spare parts are essential for product's lifecycle,
- some equipment requires power packs,
- some types are equipped with pressure and inclination sensors to monitor pile driving process.

Figure 2. Excavator- mounted, side-grip pile driver by Movax Oy. (Movax 2017)

Typically, the purchase of construction equipment constitutes a particularly large investment on the part of the buyer. Special machinery costs can vary from $100,000 to millions of dollars for largest pieces. (Mitchell 1998.)

Since such machinery is vital to business operations of its end-users, for instance to construction companies' operations, and cannot be liquidated easily, these machines can be referred as assets (Investopedia 2017). A distinctive feature of either crane-suspended or excavator-mounted piling equipment is that it is not a fixed asset after the purchase. Thus, its value is consumed in the production of work. These machines can undergo several repurchases, be owned by different organizations and make profit to different customers within its lifecycle. It can occur also that equipment can be kept in the storage yard for some time until its owner won a bid for specific project and the equipment can be utilized purposely. (Mitchell 1998.)

In case the equipment is owned by typical type of customers, construction companies, machines are used to perform varied tasks in distinct locations under dis-

similar conditions. Furthermore, even if assumed that most construction companies can have a centralized equipment management, actual operations can be widely scattered, sometimes across the whole country. (Mitchell 1998.)

2.2 Dealers and distributors in piling equipment sales

The dealer channel model is a typical customer support logistic model in companies involved in sales of construction and industrial equipment. Manufacturers produce and then sell machines through network of dealers, usually independently owned. Even though dealers are on the standby of customer service, manufacturers often play meaningful role in supporting them in this effort. (Gattorna 1998.)

Dealers and distributors are middlemen involved in the chain and these terms are many times used interchangeably. Distributors serve a larger area and there can be many dealers to whom a single distributor sells its products. Distributors are independent entities and their operations are not under the direct managerial control of a manufacturer. A dealer is also sometimes may be called a retail distributor. (Surbhi S. 2015; Inc 2017.)

Distributors can deal with more than one manufacturer, and with multiple customers. Distributors can also manage relationships with other distributors, relationships that are an example of ‘‘co-opetition’’ or, if simply put, cooperative competition (Mudambi & Aggarwal 2003). Experts emphasize that importing distributors, which can develop foreign supplier relationships based on trust, commitment, and satisfaction impact on the effectiveness and efficiency as well as overall purchasing function in a positive way (i.e. inventory reduction, rapid flow of information, supply availability on an ongoing basis) (Samiee & Walters, 2006). Meanwhile, the manufacturer may as well maintain an independent relationship with the customer, supplementary to managing relationships with other customers, other distributors and other manufacturers, too (Mudambi & Aggarwal 2003). Figure 3 stands for illustration of complex web of relationships within parties involved in selling pile driving equipment.

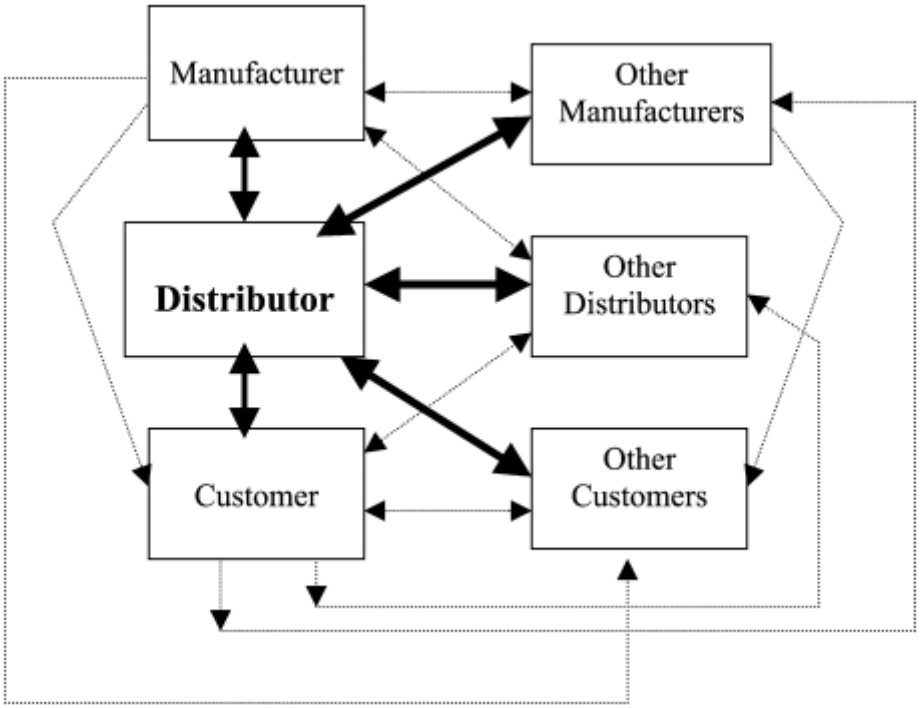


Figure 3. Web of relationships between parties involved in machinery sales. (Mudambi & Aggarwal 2003.)

Typically, relationships between all parties are of contractual nature. Distributors and dealers can be participants of manufacturer's incentive programs such as exclusive discounts, cooperative advertising, and bonuses. A distinctive feature of dealers is the right to use the manufacturer's trademarks and logos. (Inc. 2017.)

By cause of the complexity of b2b product like special construction equipment, the relationships between all parties involved in sales are continuous and usually never end after closing the deal by purchasing transaction (Egonsson, Bayarsaikhan & Ly 2013). Thus, piling equipment industry revenues are not driven only by equipment sales but are heavily influenced by high margin of aftermarket services. According to Saccani & Johansson & Perona (2007), *after-sales services for manufactured goods encompass the set of activities taking place after the purchase of the product, devoted to supporting customers in the usage and disposal of goods*. In fact, in industries such as industrial machinery companies have sold significant amount units over the years so that their aftermarkets have become four to five times larger than the original equipment businesses (Cohen, Argawal and Argawal 2006).

In addition to this, global rental report of 2016, dedicated to analysis of construction equipment rental companies, reveals that in last decade more and more companies located worldwide are becoming interested in renting equipment, providing impetus for rental activities development. (KHL Group 2016.)

Consequently, most important business components of companies involved in production and sales of piling machines include sales, aftersales and rental activities (Figure 4).

Figure 4. Components of piling equipment sales business.

Usually both manufacturers and their dealers and distributors apart from simply selling equipment and distributing assembly parts assist customers in aftersales support as well as offer machines for lease.

2.3 Importance of CRM for intermediaries

Dealers and distributors facilitate finding and selling equipment to customers. Indeed, these intermediaries are closely interacting with end customers of piling equipment daily, they operate in more locations, providing technical assistance and maintenance in areas where they represent OEM. In addition, dealers have key commercial competencies, among which is market knowledge. Market knowledge can comprise the knowledge of the major trends in the environment, deep understanding of customer needs and past behavior as well as knowledge of competitor strategy and activity (Mudambi & Aggarwal 2003, p. 321). Distribu-

tors also possess useful information sources on current and future demand, factors which affect the demand, and how to best satisfy the customer demand (Mudambi & Aggarwal 2003, p. 321).

It is undeniable fact that in marketing of industrial products, service factors and personal selling are of paramount importance (Seymour 1987). Especially for services, closeness to customers is a critical aspect because customers are often participating in service production (Saccani et al 2007). Thus, for dealers and distributors, intermediaries, which are very knowledgeable about the equipment management, to remain profitable business, it is vital to maintain durable and effective customer relationships and to excel in meeting customer needs by providing both high-quality product and service to the client. For this reason, since customer relationship management concept has been always incorporated in piling equipment sales, CRM systems, as a useful business tool can be of use for industrial selling intermediaries. CRM applications can help in that they centralize customer information in a single place and include robust querying and reporting tools for analysis (Kostojohn, Johnson & Paulen 2011, p. 25). CRM would be also one of the data sources if a fuller business intelligence program needed for more complex needs and industry analyses (Kostojohn et al. 2011, p. 25).

3 Customer Relationship Management

Customer Relationship Management is a broad and complex concept. It is a marketing paradigm, the essential idea of which is the shift of organizations from having short-term, transactional relationships to understanding the importance and building long-term, collaborative relationships with customers. The broadness of this concept implies that CRM can be perceived variously. It can be regarded as a philosophy of business, strategy implementation tool or just as an IT. (Abdul-Muhmin 2012, p.84.)

3.1 Defining CRM

Since the late 1990's Customer Relationship Management has been one of the fastest growing businesses as well as one of highly debated topics among its

practitioners and academicians. Notably indicated by Payne & Frow (2005) there is lack of agreement on the definition of CRM. (Foss, Stone & Ekinci 2008.)

Hence, in the academic sources the author found different viewpoints, descriptions and definitions of CRM.

Oxford dictionary of the Internet explains CRM as a *term used to describe the processes that are used by a company to keep in contact with their customers. It encompasses functions such as face to face meetings, phone calls, email and online services for the front office of a company and functions such as billing, maintenance, planning, marketing, and advertising for the back office* (Ince 2013).

According to Swift, *CRM is an enterprise approach, which is aimed at understanding and influencing customer behavior through meaningful communications as to improve customer acquisition, retention, loyalty and profitability. It is an iterative process, which makes customer information into positive customer relationships*. (Swift 2001.)

Kumar and Reinartz define CRM as *strategic process of selecting customers that a firm can most profitably serve and shaping interactions between a company and these customers.* (Kumar & Reinartz 2012.)

Customer Relationship Management (*CRM) is managing detailed information about individual customers and carefully managing customer touch points in order to maximize customer loyalty*. (Armstrong, Stewart, Denize & Kotler 2014.)

Academic literature also contains Kincaid's definition of CRM, which is *the strategic use of information, processes, technology and people to manage the customer's relationship with your company (Marketing, Sales, Services, and Support) across the whole customer life cycle*. (Ortega, Martinez & Hoyos 2008, p. 48.)

3.2 CRM systems

To turn the concept of Customer Relationship Management to advantage, more and more businesses of various industries are investing in implementation of

CRM system, a technology-based business management tool. The strategy component of CRMs addresses the selectivity in building and maintaining long-term, collaborative relationships with key customers (Abdul-Muhmin 2012, p. 82). Whereas the particular IT component of CRMs is related to combination of computer software systems for capturing, storing and analyzing customer data to enable firms to identify these profitable customers and to maintain relationships with them (Abdul-Muhmin 2012, p. 86).

CRM system has derived from the Contact Management in the 1980s (Lindström & Polyakova 2010, p. 2). In fact, the development of CRM systems started chronologically after the development of ERP (Enterprise Resource Planning) systems (Finnegan & Willcocks 2007). Because of its investment cost, such a tool remains to be a tool broadly utilized by large organizations, however more and more, CRM is becoming a necessity for SMEs as well (Valacich & Schneider 2015, p. 320).

As a rule, companies large and small across a variety of sectors are embracing CRM system as a major element of corporate strategy to be able to target chosen market segments, micro segments or individual customers more precisely (Payne & Frow 2013). This tool is considered to be of great managerial interest to practitioners, for example by providing a valuable platform for managers to further advance and improve on relationship marketing (Lindgreen, Palmer, Vanhamme, & Wouters 2006, p 57).

Recently the demand for CRM systems as either additional on-premise software or a cloud-based system has increased greatly. According to Forbes, worldwide CRM software sales made $26.3B in 2015, which is up for 12.3% compared with $23.4B in 2014. There are top five CRM vendors as Salesforce, Oracle, SAP, Microsoft and Adobe (Figure 4) which accounted for 45% of the total market in 2015.

Figure 4. Brands of top CRM software vendors.

Among top global vendor brands shown in Figure 4, Salesforce dominated in 2015, with 21.1% annual growth rate and absolute growth of over $902M in CRM revenue, more than the next ten providers combined did. Moreover, Gartner (2016) found that Salesforce leads in revenue in the sales and customer service and support (CSS) segments of CRM. (Columbus 2016.)

CRM systems are designed to provide sales teams with support for prospecting, customer qualification, proposal development, objection-handling, deal closure and follow-up. Essentially, in CRM system each deal is tracked on the basis of contacts, outcomes of interactions with customers, and deliverables for pushing forward the project to a positive closure of the deal. (Stein, Smith & Lancioni 2013.)

All user interfaces of various CRMs are different as well as can be totally customized. Figure 5 presents an example of customer profile or visual representation of an account in CRM Salesforce.com. As shown in the screenshot picture, customer summary basically includes all information the company has about the client, starting from the contact information, purchase history, current assets, recent emails and interactions to showing social media activity involvement.

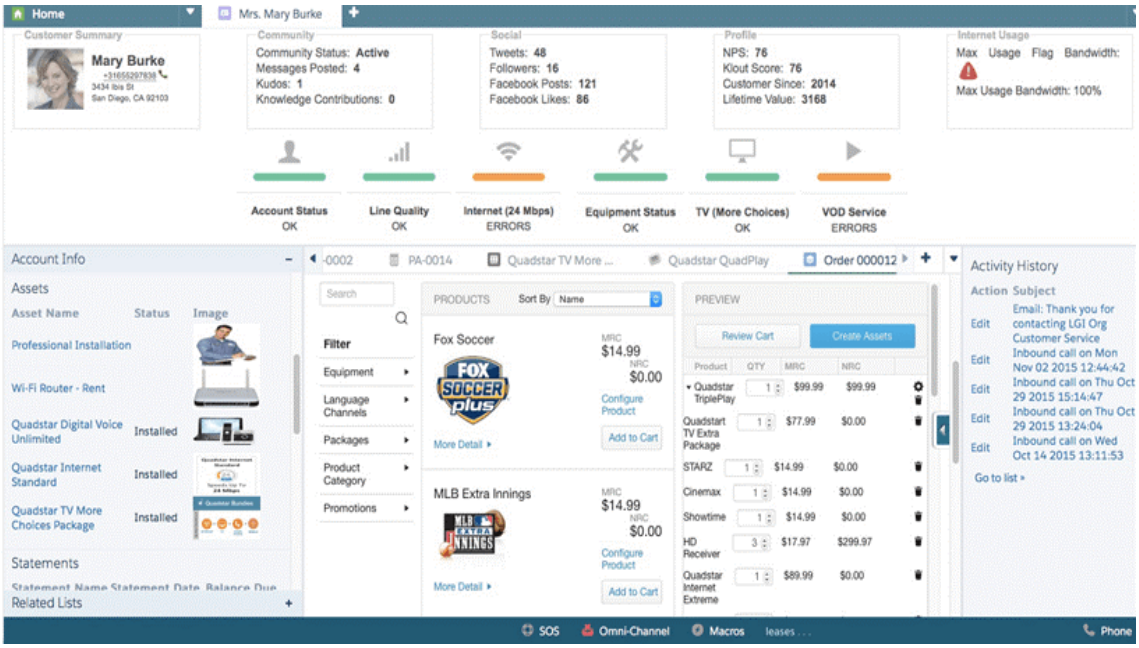


Figure 5. Example of user interface of CRM Salesforce.com. (Salesforce.com 2017)

CRM systems can be applicable for managing customer relationships in almost every business sector. There are numerous of success stories provided by vendors sharing examples of their CRM capabilities working in real life.

Architecture of a modern and comprehensive CRM system encompass three primary components:

1. Operational CRM

Operational CRM offers tools, which support day-to-day business in the areas of marketing, sales and service. For example, campaign management, sales force support or complaint management tasks by automating all processes associated with customer relations. In essence, operational CRM enables direct interaction with customers (Valacich & Schneider 2015).

2. Analytical CRM

Analytical CRM creates a link between front-office and back-office, which focuses on the preparation, simulation, analysis and optimization of customer-related decision-making processes based on customer data. All information about custom-

ers, products and markets stored in the system can be used for preparing simulations, forecasts and segmentation of customers by utilization of analytical tools such as Data Mining. Analysis of data can form the background for further CRM activities as it can reveal valuable findings about the market, customer behavior or likely future trends. (Toggler 2008.)

3. Collaborative CRM

Collaborative CRM unites the control over all communication channels with the customer in pursuit of optimization the exchange of information between the customer and the enterprise. With functionalities of collaborative CRM company can practically establish a continuous dialogue with the client via so called "Customer Touch Points", which can incorporate Internet activity of the customer, all calls, chats, emails and simply conventional contact person details. (Toggler 2008.)

3.3 Main goals of CRM systems for dealers and distributors

The principles of relationship marketing are rooted in B2B and service industry sectors, where one-to-one contact between organizations and their customers is a standard situation. In B2B context customers experience higher perceived risk for services because these are not tangible as well as can be versatile. Therefore, firms which provide services could be even more interested in adopting CRM technology. (Abdul-Muhmin 2012, p. 86.)

As Lindgreen et al. (2006) stated, customer stands at the center of relationship management due to customer's procurement of goods and services that provide organizations with an income. Therefore, to achieve benefits, organizations need to know customers and the role of information-technology tool used to assist in assessing customer relationships is crucial. (Lindgreen et. al 2006)

Speaking about distributors and dealers of piling equipment, apart from just handling their accounts, they can add value through customer building with customers the manufacturer might otherwise ignore (Mudambi & Aggarwal 2003). The distributor can build a meaningful business relationship with many customers more effectively and efficiently than sometimes the manufacturer can (Mudambi & Aggarwal 2003). This enables future growth through end-customer base

growth. For instance, distributors can more effectively cold-call on end customers, as well as proceed on working with leads generated by the manufacturers at trade shows or through incoming requests from manufacturer's web site (Mudambi & Aggarwal 2003). Assuming these facts, only a comprehensive CRM system could help dealers and distributors to manage constantly growing customer base, track all incoming and outcoming calls, track leads and make market analysis.

Dealers and distributors have extensive customer knowledge in the areas these firms operate and this knowledge can be one of most valuable advantages and resources of these companies. CRM is the tool which can be beneficial for such types of industrial players because is specifically aimed to maximize the customer knowledge through gathering customer data in advanced database and with decision-support technologies that can transform customer data into business knowledge results (Crié & Micheaux 2006, p. 282). Theoretically, eventually the improved customer knowledge should impact in better business results (Crié & Micheaux 2006, p. 282). In fact, some researchers suggest that the value of many firms' information can be even greater than capital assets and customer information orientation can impact on reduction of competitive lead times. Moreover, a knowledge advantage can significantly influence on acceleration of product development, infrastructure upgrades and relationship-building with key customers. (Stein et al. 2013.)

The clue to obtaining business insight and a significant value of CRM application is the usage well-designed reports. Likewise, for employees who do not interact with customers, the direct value of the CRM application may be exclusively that gained from CRM generated reports and dashboards. (Kostojohn et al. 2011, p. 37.)

Plus, Kumar & Reinartz (2012) suggest that the major goal of any CRM system lies down in optimization of current and future value of company's customers. By customer value is meant a marketing metric which can be a crucial decision aid and helpful tool in evaluating marketing effectiveness. Supplementary to this point of view, other researchers propose that the primary purpose of CRM sys-

tems for organizations can be adaptive learning. They refer to the process of extracting hidden predictive information from large databases in order to identify valuable customers, learn about their preferences, predict future behaviors, and estimate customer value. (Stein et al. 2013, p. 200; Kumar & Reinartz 2012, p. 22)

Indeed, determination of most valuable customers and building strategies to develop and maintain favorable relationships with them to gain more profit can be actually one of the central reasons why companies of all business fields including industrial selling intermediaries might be interested in CRM implementation.

Besides, CRM can assist in overcoming a typical challenge marketing groups can face. Usually, marketing and sales system are not connected and that prevents marketing teams to understand the revenue impact of their marketing efforts so that they cannot allocate funds to more productive programs that produce results and eliminate programs that are not that effective. CRM systems' functionalities can close this loop between sales and marketing teams and they with capabilities of such systems they can test different marketing approaches (i. e. different direct mail pieces) and measure the result through the sales cycle. (Kostojohn et al. 2011, p. 24.) It can be therefore assumed that with CRM, integration and synchronization of customer-information flows of various information systems and collaboration between departments can be eased (Lindgreen et al. 2006).

3.3.1 **Practical use after trade shows**

In industrial context, participation in trade shows, exhibitions and conferences apart from meeting customers face-to-face present vast opportunities for intermediaries such as industrial dealers. Trade shows, being some temporary marketplaces where equipment suppliers gather to showcase their products and services to target audience as potential buyers, the media, and other purchase influencers. Such events are often regarded as transaction cost–saving institutions, which at the same time and in the same place bring together various suppliers and therefore reduce the time and costs related to industrial buyers' purchasing

processes. Participation at trade shows remains to be a very important promotional instrument where companies of industrial sector builds and maintains relationships with current and potential clients. (Rinallo, Bathelt & Golfetto 2016.)

In such a case, a comprehensive CRM system with developed functionalities of industrial dealer can be a place where a salesman input the “raw” data about potential customer and then gets works with the primary data of potential account or so called “lead” after an event. Eventually, if the lead becomes the account of a company, the responsible person in the company, that already has the primary information about the account, can allocate effective direct and indirect marketing efforts suitable for particular type of customer enabled by CRM system’s functionalities. Thus, CRM system can be a mean which integrates information from various external and internal sources to supervise managers and field personnel in the development and presentation of the company’s value proposition (Stein et al. 2013).

3.3.2 **Better segmentation and campaigns**

For piling equipment dealers and distributors market segmentation is meaningful and important as this industry is very competitive, high level of satisfaction is crucial and customers’ retention is a priority for continuing the whole business. What is more, provisioning local equipment services and customer proximity remain to be equipment sales intermediaries' central assets and can be primary justification for their role in the distribution channel (Hakanen, Helander & Valkokari 2016). For this reason, these intermediaries can try to take on an even stronger role as service providers by creating segmented offerings in their after-sales activities. With developed CRM system pile driving equipment dealers may develop set of tailored offers for equipment for lease or traditional equipment maintenance and repair services.

However, it is not a simple task when it comes to segmentation of customers in industrial markets. It is very challenging due to several reasons:

- segments are more unstable
- customers stimulate back to a larger extent by communicating needs and wants directly

- relations are multiplex
- offerings are complex and frequently developed in interaction (Boejgaard & Ellegaard 2010).

Moreover, different companies, which vary in size and their organizational needs even among the same sector, can prefer using different systems for company's data and there can be several systems used by different departments in the company. In such a case, for organizations whose customer information is stored in various systems, targeting customers and identifying prospects for specific marketing messages, based on their purchase history, order volume, geography, web site activity can be a problematic data management task. Centralizing customer all customer information in a CRM application in pursuit of building thoughtful integrations to other key applications such as accounting and web site analytics can ease this complex task. Having all set needed criteria for filtering and targeting specific groups within one system allows personalized marketing without a complex data manipulation effort such as combining the data from diverse systems. (Kostojohn et al. 2011, p 24.)

In 2010, students of Linnaeus University were investigating implementation of CRM systems use by Volvo construction equipment dealers. In that study there is an interview, which adds some benefits of CRM systems use reflects directly and to piling equipment industry, too. *Coping with all the difficulties, dealers can benefit a lot from the CRM implementation. Among the main benefits of CRM usage in Finland can be listed better control of the customers and machines, and also, better focused campaigns. These reimbursements result in a profit gain and higher levels of customer satisfaction*. (Lindström & Polyakova 2010.)

If speaking about personalized marketing and marketing campaigns, it can be done easier since CRM systems can be synchronized with newsletter sender application (i. e. MailChimp). Such application can assist in preparing different target marketing campaigns for existing customers based on the construction project needs, location, purchase history etc... For instance, the email templates with articles about products or product news articles sent to end customers can be designed to be dynamic and changeable upon end customers preferences.

3.4 General challenges in CRM implementation

Typically, CRM projects start with the need recognition stage, followed by design, implementation stages and, finally, evaluation (Steel, Dubelaar & Ewing 2013). To succeed in CRM implementation and to achieve its main goal of building long-term and mutually-beneficial customer relationships, many things should be considered at first stages to avoid some common pitfalls. It must be realized by decision-makers that CRM requires comprehensive changes in the company striving to switch all core processes to the new CRM system and such substantial changes for the whole organization may imply far-reaching consequences and involve high investments.

Most of CRM applications can be modified via a set of configuration tools without deep technical skills in a very limited way. Normally, implementing custom business logic to support organization's specific business goals, building integrations to other applications, or developing highly customized reports require extensive programming skills. For this reason, organizations might consider hiring software developer who will work closely with CRM administration team. (Kostojohn et al. 2011, p. 19.)

For the effective CRM implementation, both adaptive and customer-oriented organizational culture could contribute positively (Steel et al. 2013). Additionally, in successful system's implementation many academicians highlight the role of committed senior management that promote holistic CRM approach.

As data constitutes a base for all processes in the CRM system, crucial challenges during the switch to CRM system include the issue of proper data collection, organization and administration (Tuzhilin 2012, p. 585). Practically, many companies, that have decided the switch to CRM system are still at the data storing and exploratory stages (Crié & Micheaux 2006, p. 282). Moreover, few CRM adopters have the skills and resources to consistently exploit the value of data which CRM system contain. In b2b businesses, it might be the granularity of this data, which makes it a very complex task to combine it meaningfully to facilitate generalization across customer groups or segments. Since in industries, where all customers are perceived to be unique and they require very specific, demand-

off solutions, classification of them may appear to be superficial rather than strategic. In short, many tiny details associated with particular demands of every client make a process of segmentation very difficult and time-consuming. (Stein et al. 2013.)

Among other numerous factors that can significantly decrease the capabilities of data in effective CRM are:

- lack of right information in the database
- lack of implemented data quality control and knowledge management
- lack of sufficient number of trained employees for handling and analyzing the data
- lack of sufficient empowerment to correctly use information to satisfy customers. (Crié & Micheaux 2006, p. 283.)

However, since the problem of data quality can be resolved with the deployment of appropriate data standard and data mining techniques, some major pitfalls of CRM implementation can be prevented by developing new and clear strategy or restructuring the chosen one. Nowadays, though, many CRM adopters are concerned with another milestone question. With new emerging ways of data storage, it is the issue of how well the data is protected in the CRM system.

4 Cloud-based technologies for data

4.1 Cloud-based CRM

Times have certainly changed the way data is used and stored. Cloud storage is a service of cloud computing, which let the data owners to host data from their local computing systems to the cloud (Yang & Xiaohua 2013). In its broadest form, a cloud can be defined as *an elastic execution environment of resources involving multiple stakeholders and providing a metered service at multiple granularities for a specified level of quality of service* (Schubert, n.d.). Whereas cloud storage itself is a model of networked online storage, where data is stored in virtualized pools of storage which are hosted by third parties, for example by the storage service providers (Yang & Xiaohua 2013). By hosting data in the cloud,

data owners can benefit by avoiding the investment in costly infrastructure setup, large equipment and daily maintenance expenses (Yang & Xiaohua 2013).

The diagram below (Figure 6) illustrates three distinct categories of cloud offerings: Software as a Service, Platform as a Service and Infrastructure as a Service.

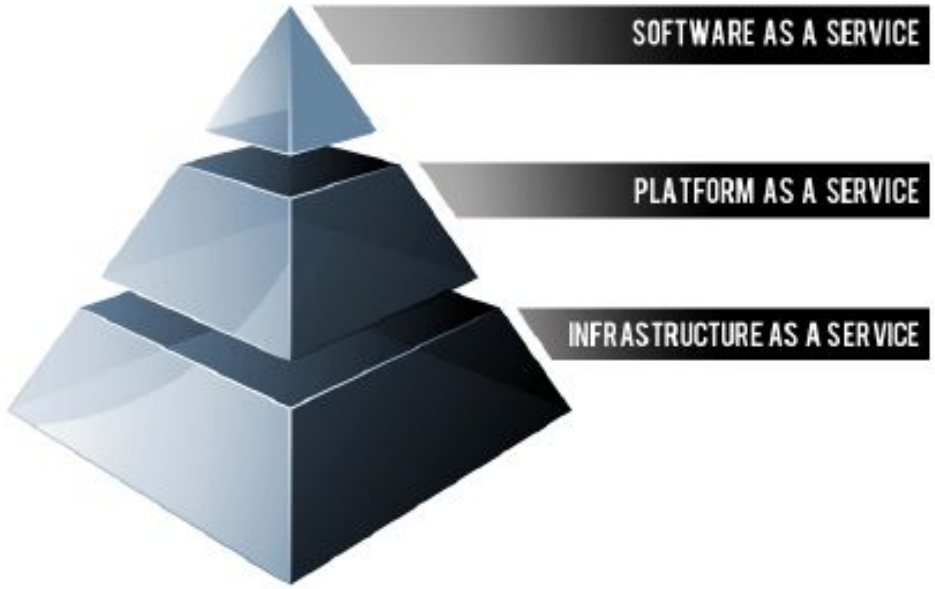


Figure 6. The Cloud Computing Stack. (Kepes 2017)

- Software as a Service (SaaS): A service provider offers software and applications through the Internet. The access to it is done either via the web or via vendor APIs (Application Program Interface).
- Platform as a Service (PaaS)*:* A service provider gives an access to a cloud-based environment where users can build and deliver applications. The provider supplies users with underlying infrastructure.
- Infrastructure as a Service (IaaS)*:* A vendor provides users an access to computing resources like servers, storage, networking on provider's infrastructure. (IBM n. d..)

Many vendors offer CRM software which can be either server-based (Microsoft Dynamics, Siebel (part of Oracle), IBM) or Internet hosted (Salesforce.com, NetSuite, Sage SalesLogix). The difference between these two is where the software itself resides. In case of on- premise CRM system, the data is stored in company's

own server. Also, on-premises CRM applications, like any enterprise software, have a set of processes needed to support them, including data backup and disaster recovery, software patching and periodic hardware upgrades (Kostojohn et al. 2011). Unlike on- premise CRM, cloud-based CRM system's data is hosted in the Internet. Such CRM software vendors are typical Software as a Service (SaaS) providers. They operate large data centers letting vendors' customers to lease storage capacity from them in a "pay-as-you-go" or also called as "cost per gigabyte-stored" business model, providing an opportunity to pay only for the space that they use. Such service providers virtualize the resources according to the requirements of their customers and expose them as storage pools, which customers can use to store their files or other data objects. Founded in 1999, Salesforce.com CRM is one of the pioneers in cloud services. (Slama, Puhlmann, Morrish & Bhatnagar 2015.)

The decision whether to deploy cloud-based CRM or conventional server-based CRM system depends on corporate needs and capabilities. Some companies may need to have access to CRM outside the office and therefore might prefer using cloud-based CRM application wherever and whenever they want. Moreover, since Cloud services eliminate the need for IT personnel to manage the hardware updates it might be a tempting option for organizations without comprehensive IT department. However, despite attractiveness of cloud- based systems on premise CRMs have one crucial advantage. The user of traditional on premise CRM has the fullest control of the data it contains as well as fully responsible for its customization and utilization without external involvement.

The diagram presented below (Figure 7) illustrates the division of responsibilities between the vendor and the customer for three abovementioned cloud offerings (SaaS, PaaS, IaaS) (Maedche, Botzenhardt & Neer 2012).

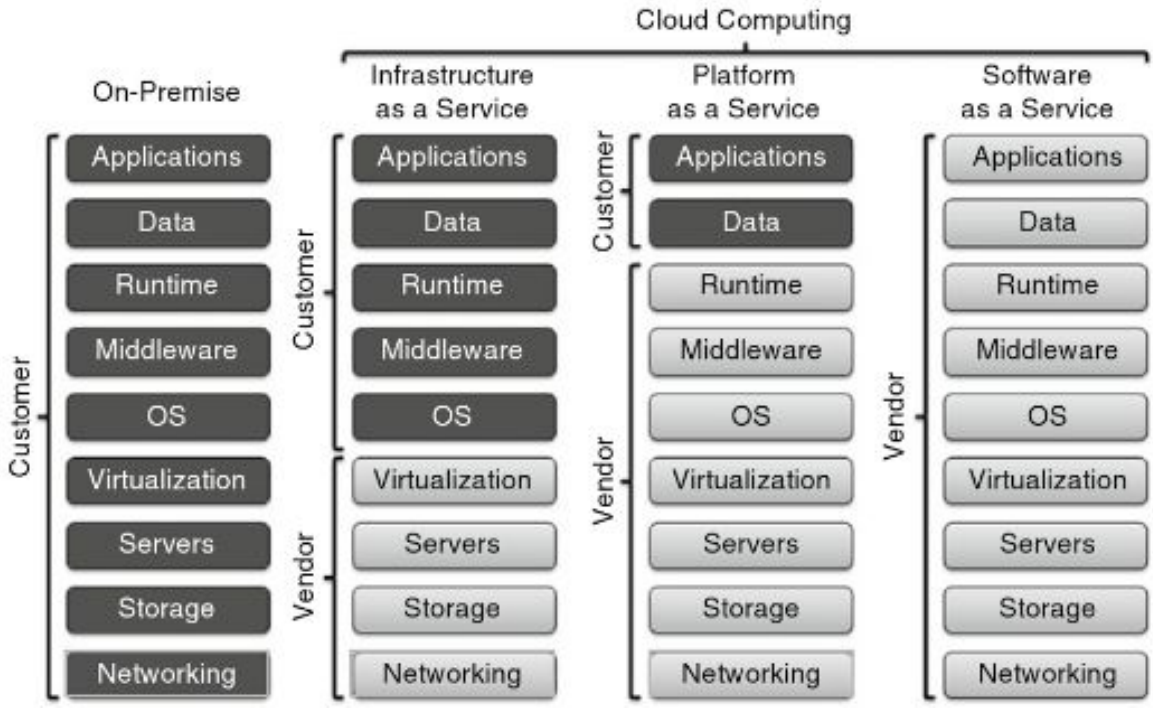


Figure 7. Distribution of responsibilities for on-premise and cloud computing models. (Maedche et al. 2012)

Typical cloud-based CRM refers to SaaS model and therefore it is the provider of such CRM who is responsible for hosting data on its central server for the customer as well as provider takes cares for supporting hardware and software and all maintenance tasks. (Maedche et al. 2012)

4.2 Data security concerns in the cloud

Even though data owners can rely on the cloud in a way that they can get an access to the data from anywhere and anytime 24/7/365, this new way of data storage security challenges. When transferring data into the cloud, data owners cannot manage the data as in their local storage systems. This is because service providers (such as SaaS) are not in the same trust domain as data owners and therefore, they cannot be fully trusted by data owners. (Yang & Xiaohua 2013, p. 3.)

What is more, in recent years, the continuous burst of cloud storage accidents lead to peoples' worries and increasing concerns about their data security in the cloud. For instance, in March 2009 Google documents leaked user documents

and in April 2011 Amazon's huge EC2 cloud services crash permanently destroyed some data (Blodget 2011).

Therefore, the cloud storage system introduces two major security concerns for data owners:

1. Protection of data integrity: data owners may worry that data stored in the cloud could be corrupted or even deleted.
2. Data access control: data owners may worry that some dishonest servers give data access to unauthorized users. (Yang & Xiaohua 2013.)

In addition, since SaaS providers operate on the data of number of customers and businesses it can be an attractive target for hackers (Maedche et al. 2012, p. 268).

5 Internet of Things (IoT)

Internet of Things (IoT) is a global trend and paradigm has become one of the most discussed topics related to IT technologies and innovations in recent years. It is a buzzword nowadays. This concept very complex to be defined because it can be seen differently from various perspectives as well as it highly depends on the context. For this reason, some holistic definitions of IoT presented by research groups and experts can seem vague.

In broad sense, Internet of Things refers to the interconnected objects, which can share and communicate data about themselves via Internet. Connected objects are regulated by logic, which uses this this data for delivering valuable output to the end user in different areas. Internet of Things devices are designed to provide a real-time data on happening processes.

To understand a bit clearer the concept of IoT, experts suggest some short definitions:

Internet of Things: *A network of internet-connected objects able to collect and exchange data using embedded sensors* (Meola 2016).

Internet of Things device: *Any stand-alone internet-connected device that can be monitored and/or controlled from a remote location* (Meola 2016).

The ultimate goal of IoT component is to enable things to be connected anytime and anywhere using network.

Typically, to become an IoT-enabled product or "smart" object, the physical elements of the product such as mechanical and electrical parts should incorporate diverse kinds of electronic components such as transmitters, memory, processors, networking components, RFID (Radio-frequency identification) to be able to communicate product data to the cloud wirelessly. (Vermesan & Friess 2014; Porter & Heppelmann 2014.)

Connectivity in smart, connected products, according to Porter & Heppelmann (2014) is presented in three forms:

- One-to-one: A object connects to the end user, the manufacturer or other product through a port or other interface.
- One-to-many: Central system is continuously connected to many products simultaneously and control them. (i.e. Tesla has a single manufacturer system, which monitors the performance, provide upgrades and service for Tesla vehicles remotely)
- Many-to-many: Multiple products are connected to many kinds of products aa well as can be also connected to external data sources.

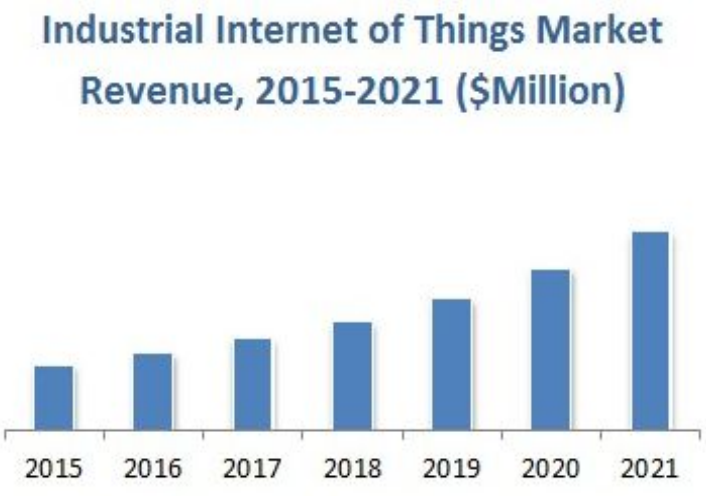
Due to connectivity in smart products, the data about them can be exchanged between the product and its maker, user, or even with other products and systems (Porter & Heppelmann 2014). Multiple interconnected devices, if they are constantly capturing and collecting real-time data, they can produce massive amount of data. Because of its tremendous volumes, it is refferred to as Big Data.

Now the development of IoT devices is flourishing and most of IoT-based solutions can be already used purposely in almost every industry. They open overwhelming possibilities are especially for retail and goods- oriented companies (Vermesan & Friess 2014).

5.1 Industrial IoT (IIoT)

IoT devices can bring value in different areas, although companies involved in manufacturing of industrial goods can benefit the from IoT devices the most. Experts name the application of the IoT solutions to the manufacturing industry as Industrial Internet or Industry 4.0 (Inductive Automation 2017). In terms of numbers of connected things, manufacturing industry had 307 million installed units in 2015 (Pettey 2015). This fact makes sense as control systems using sensors comprise internal part of manufacturing and automation processes and therefore organizations certainly can get benefits from utilizing them. The IIoT solutions promise efficiency, scalability, time and cost savings for industrial organizations. Furthermore, they affect improvements in product functionality and performance optimization.

Industrial Internet of Things market is growing and experts predict its further growth as well (Graph 1).



Graph 1. Industrial Internet of Things Market Revenue, 2015-2021. (I-Scoop n.d.)

Globally, IIoT market is going to reach $123.8 billion in revenues by 2021 (I-Scoop n.d). Indeed, industrial devices now have colossal number of sensors, processors and communications capabilities built into the product itself to produce useful data about themselves. Real- time data can be then fed for analysis. This,

in turn, open a lot of strategic possibilities for players in the value chain: assessment of product design, how they can be sold, operated, or serviced differently is critical in the IoT-influenced industrial manufacturing world. (Rotter 2015.)

5.2 Emerging need for Internet of Things (IoT) solutions

In after-sales activities all selling intermediaries and manufacturers are highly dependent on receiving relevant information about product condition to provide best technical support for the client. However, as Hakanen et al. (2016) pointed out *the more intermediaries there are between the manufacturer and the end-customer, the vaguer the customer information that a manufacturer receives may become*. Especially dispersed this knowledge may become between the companies operating in global distribution. For this reason, manufacturers constantly struggle with the coordination and collection of relevant, real-time information. (Hakanen et al. 2016.)

Commonly, information on equipment condition can be obtained either directly from the customer at the jobsite or in a result of equipment checkup. The challenge is that often the final customer and equipment itself are based at the jobsite faraway from dealer as well as from manufacturer. This implication requires technicians to travel in order to identify the problem thus provoking additional costs and time.

In a nutshell, crucial after-sales service activities and deep customer knowledge are highly dependent on receiving real-time and relevant product and customer data. At this moment, though, only IoT solutions, which, in industrial case, include machines equipped with IoT devices, enable instantly accessible and reliable data transferred via Internet.

5.3 IIoT value for the industry

IoT applications can create value in industrial context and affect many aspects. It is vital to name this value aspects because it will determine their adoption acceptance and wide use (Vermesan & Friess 2014). The diagram presented below (Figure 8) present major beneficial aspects that can be derived from utilization of IoT-enable devices in industrial context.

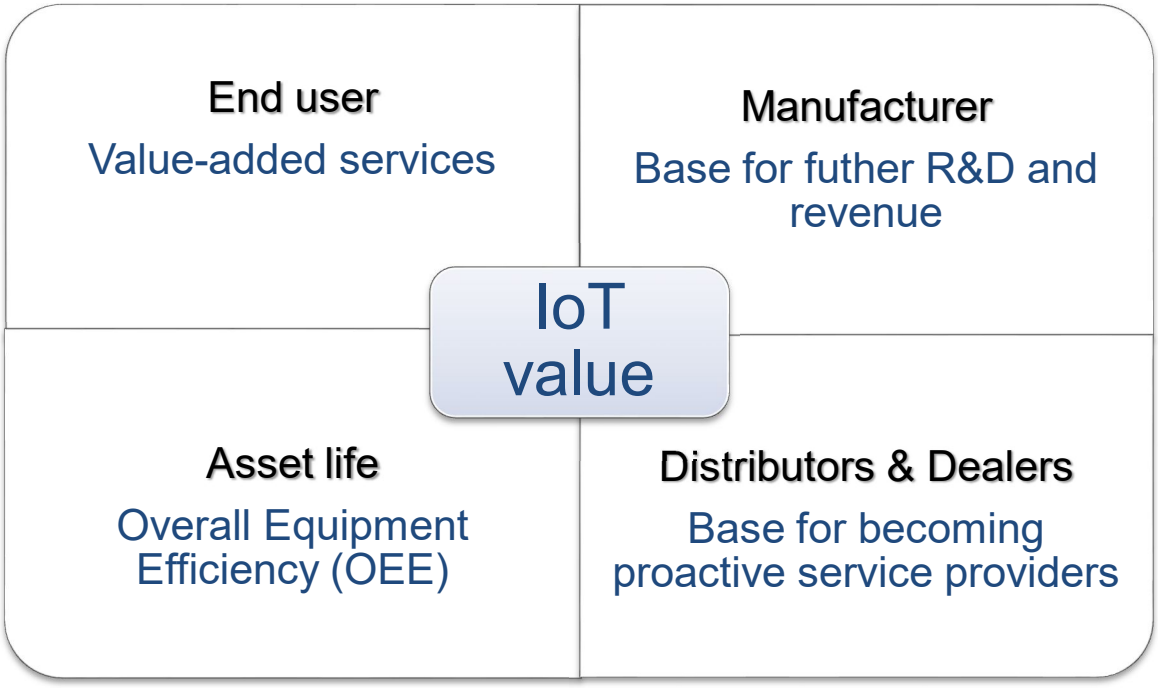


Figure 8. IoT value from different perspectives.

For asset: Being able to continuously transmit the data about itself, smart asset will be better controlled and managed. Hence, the performance of equipment can be optimized and it can be used more efficiently during the whole lifecycle.

For end user: Assets equipped with IoT devices will communicate the data on its "health" like usage and performance allowing manufacturers as well as their service partners to reveal malfunctions remotely and to take quicker action on repairs. The end user benefits in receiving quick and quality technical assistance in shorter time. Moreover, even before having something broken, smart device can warn the equipment user about impending failure or remind about next equipment checkup. With longer the life of the asset end users can find more opportunities (Cohen, Argawal and Argawal 2006).

For Manufacturer: Real-time data on product usage and performance can influence on further product development and design. Moreover, the data might be used to identify if malfunctions happened because of inappropriate utilization or if it is the case of warranty claim. Thus, data will impact on warranty claim validation and identification of agreement violations (Porter & Heppelmann 2014). Besides, cross-selling the IoT-enabled products will definitely impact on increased

revenues and production. Especially if the product is designed to effectively assist in problem-solving and tailor-made for the customer. What is more, the cost-savings are guaranteed, as IoT solutions provide remote control and for identifying malfunctions one does not need to travel and spending additional time and money.

For dealers & distributors: In case dealer or distributor is a service provider, it can take the advantage of providing technical assistance more precisely and quicker assist in equipment maintenance. Moreover, they could gain a deep understanding of customers' technologies, processes, and plans—knowledge that rivals can't easily acquire (Cohen et al. 2006). By improving the overall service experience for their customers, they result in improved customer satisfaction and additional revenues. Alternatively, in case these intermediaries provide renting fleet, the machines will be better maintained and might serve to more customer during its lifecycle.

It can be therefore concluded that the area with mostly to gain with IoT in industrial sector is product support. The worst thing for equipment end-users and the whole construction project is unscheduled machine downtime. Therefore, the data from IoT devices is of immense value as it gives manufacturers and dealers the insight to proactively service equipment before it breaks down. In addition, while providing aftermarket support, manufacturers and selling intermediaries gain a deeper understanding of customers' technologies, processes, and plans—knowledge that competitors can't easily acquire. (Cohen et al. 2006; Rotter 2015.)

5.4 Challenges of IoT adoption

There are multiple challenges for IoT solutions development and adoption. Before even investing in IoT, industrial manufacturing companies must precisely determine the most important data to be collected by smart devices to prevent useless data flows and its data storage. With the shift to cloud storage for data there again come concerns with data security. The cloud platform shall not let unauthorized users to access the data by any means. Ultimately, the equipment with advanced capabilities will require skilled workers, which should include employees who can design and build IoT products as well as be experts in the field of its applicability.

5.5 CRM and IoT

Most of IoT solutions have to integrate with a number of firm's internal and external application such as CRM. In many cases, these applications also contain same data related to the assets. CRM system may contain the vehicle's primary data and contact data of asset's owner. The data in the product cloud will contain remote vehicle condition. Hence, the integration of all of these different data sources can provide a holistic view of the asset. (Slama et. al 2015.)

6 Empirical research

Apart from featuring in which way CRM can be a valuable tool for distributors and dealers in the industry in theoretical part of this thesis, the objective of the study was to identify CRM practitioners in this field. In addition, it also aimed to explore if industrial intermediaries are aware of IoT concept related to the pile driving industry and to outline IoT innovations, which manufacturers develop. For these reasons, the researcher decided to incorporate multiple methods.

The first part of a strategy for carrying out empirical part implied conducting semi-structured interviews with dealers and distributors. Semi-structured interviews are regarded as flexible and structured simultaneously (Bailey 2007). This kind of interviews are characterized by elements of both structured and unstructured interviews and thus contained both close-ended and open-ended questions. The first set of questions aimed to CRM practitioners' identification and the second aimed to explore awareness of IoT concept and use cloud-based technologies. Since semi-structured interviews are "non-standardized", the questions asked varied because not all target population representatives have CRM but other means for data management. In addition to this, with concern that managers might be not available for conducting interviews, all target companies were sent an e-mail beforehand. This email contained research objectives, promise of data security and confidentiality inviting potential informants to contribute to empirical part of student's research. However, only one response was received by email. Therefore, it was decided to take an attempt to reach the respondents by phone referring to email sent. Internet research was used as a secondary method to find out some background data about the respondents. The names and contacts of

these dealers were obtained from vibrohammers.org webpages where the contacts of several manufacturers' dealers classified by type of equipment are presented. The author also obtained some contacts directly from manufacturers' webpages. The researcher used Skype phone conducted interviews. Due to the asynchronous communication of place, one of the main advantages of telephone interviewing is the extended access to participants compared to face-to-face interviews (Mann & Stewart 2000). All interviews were recorded with Call Recorder and Talk Helper software. These tools were set to automatically recording of all Skype calls.

During interviews with manufacturers, the researcher asked questions about IoT features of equipment and the way these are designed to serve as a valuable solution for piling works.

6.1 Sampling method

For the initiated research, 47 dealers and distributors of two international manufacturers of crane-suspended and three manufacturers of excavator-mounted piling equipment located worldwide comprised a target population for the research.

In order to define the sample out of target population, the researcher decided to use purposive sampling method, because it allows concentrating on people with particular characteristics who are able to assist with the relevant research. This method is typically used in qualitative research also to identify and select the information-rich cases for the most proper utilization of available resources. Additionally, it involves identification and selection of individuals, which are proficient and well informed with a phenomenon of interest.

Table 1 presented below contains information about interview participants who expressed their willingness to participate and contributed to empirical findings.

Actor	Description	Location	Interviewee
Company 1	Distributor of excavator-mounted piling equipment	Europe	Managing director

Company 2	Distributor of excavator-mounted piling equipment	Europe	Sales Manager
Company 3	Distributor of excavator-mounted piling equipment	Europe	Managing director
Company 4	Distributor of excavator-mounted piling equipment	Europe	Marketing Assistant
Company 5	Dealer of crane hanging piling equipment	Europe	Sales Manager
Company 6	Dealer of excavator-mounted and crane hanging equipment	Europe	After-sales Manager
Company 7	Dealer of excavator-mounted and crane hanging equipment	USA	National Sales Manager

Table 1. Interview participants among dealers and distributors.

The author tried to reach all 47 dealers inviting to take part in interviews by email and then if no response was obtained the researcher attempted to reach them by phone. It is notable to mention that all dealers who participated in the research are independently owned and companies of the field varied on number of decision makers and personnel. In some cases, firms are very small businesses with less than 10 employees where the CEO of the company also acts as main salesman.

6.2 Interviews summary & findings

The main outcome of conducting these interviews is that despite diversity of dealers and distributors the researcher managed to identify several practitioners of CRM systems across countries. In total, five companies among those interviewed have CRM application. Due to limited amount of answers received one cannot

generalize and state that companies of this type use comprehensive CRM systems on daily basis and that CRM applications serve as an effective tool for managing profitable relationship with customers. Nevertheless, in cases where CRM system is implemented, it plays a role of an additional application to the companies' processes due to the nature of business, which is heavily based on interpersonal relationships with customers. During interviews, nearly all respondents emphasized that meetings with customers face-to-face are at the core of daily business:

Meeting clients is the best way to gain proper insight into how they can be better served.

Some interview questions seemed a bit inappropriate for respondents due to the fact that all CRM systems can vary in their architecture and inner functionalities as well as highly dependent on organizational needs. For this reason, many questions (Appendix 1) were left unanswered. Some questions that were covered in the first part during semi-structured interview by all respondents are as follows:

1. **Do you have Customer Relationship Management system/software in your company?**

Dealers who were defined to be practitioners of CRMs were asked to share names of vendors' brands of CRM software and they are as follows:

- E-way CRM (Cloud-based CRM)
- Business Contact Manager for Outlook (Server-based CRM)
- MCS (Server-based CRM)
- Act! (Server-based CRM)
- Salesforce.com (Cloud-based CRM)

In most cases the informants told that all information about customers that is available is crucial to be tracked in the CRM. Besides, interviewees mostly emphasized the importance of contact information. Among answers received about crucial information that needs to be tracked author also received these insights:

7. In your opinion, which information is crucial to be tracked about your customers?

How they (customers) found out about us – so that we can evaluate our marketing efforts. Patterns of spending.

CRM helps to keep an eye on each business. To track some changes that happened to businesses of our customers is important.

Nearly all respondents told that their CRM is synchronized with MC Outlook. In addition, some of companies' representatives have a mobile access to CRM.

The send part of interview questions mainly consisted of questions regarding IoT. Again, some interview questions in this part were left unanswered. The very first one aimed to find out whether representatives know what does IoT concept mean. For 4 respondents, this concept was familiar and the answer was "yes". Although all interviewees indicated that it will be definitely valuable addition to processes to get the seamless data flow from sensors.

It is notable to mention that some companies' representatives are suspicious about using cloud-hosted platforms due to security reasons and preferring to keep information on the server:

5. Have you ever considered the whole switch to using cloud services and platforms?

Not at the moment- not fully anyway. Possibly in some areas. Security is important to us and I think there is still a wariness surrounding cloud -based storage.

The same refers to using cloud applications such as Google Drive or Dropbox. During interviews only two companies were identified as users of cloud-based CRM systems.

During one interview, in case where CRM system is not implemented, author proceeded straightly to the second part of the interview dedicated to IoT concept awareness and identified the first dealer who will provide equipment with latest IoT features to end customer. This fact changed the original preset of questions

and lead author to ask about expectations out of using equipment with IoT capabilities and these are as follows:

- *Better control over equipment- making sure it is regularly maintained*
- *Ability to diagnose the equipment remotely*
- *Reducing the amount of warranty claims eventually*
- *Record the performance of piling works*

All in all, these forecasts about future utilization of IoT-enabled product reflect directly to what industry insiders from manufacturer's side told the author about IoT innovation (6.4.1 subchapter).

6.3 Supplementary empirical evidence

Due to gaining empirical evidence only from a very small portion of the whole target population with only seven dealers interviewed, it would be considerable to add case study and to show a more detailed example of CRM system implemented in dealer company that also represent a target population of this research.

6.3.1 Company X Case Study

The example of implemented CRM can be found in international group of companies represented by foreign distributor of pile driving and vibratory equipment and two dealers. The distributor and dealers have specialized in the provision of piling driving equipment for foundation works since 2004. Official dealers represent several manufacturers of special foundation equipment located worldwide selling both excavator-mounted and crane-suspended attachments to their customers. Dealers also provide installation, maintenance and repair services for all special construction equipment sold. Having less than 50 employees in all branch offices this group of companies is a SME. As to strategic issues of business relationships, they are usually defined on the CEO level.

For this group of companies Russia is an important market for sales of pile driving equipment. Main customers of the company are different construction companies, which are involved in building of industrial infrastructure.

6.3.2 **CRM as a solution**

The primary need for company X, which lead to planning of CRM system implementation lies at understanding the amount of existing customers company deals within all branch offices, clients' data unification and availability in one single place. Furthermore, the main market for the company is widely geographically dispersed and managers use to travel across the whole country to meet the decision-makers of final customer, to agree on equipment installation and decide other issues. In this case if a manager could upload all customer data and brief project description using phone or laptop with Internet connection right after meeting with customer, branch offices, having instant access to this data via Internet can take the next action right away. Notably important to mention that, since the company also offer piling equipment for rent, it was vital important to collect and gather all customers' assets data in one place.

The summarized goal of appropriate CRM solution according to the preliminary CRM plan of the company was to maximize existing customer relationships. (Figure 9)

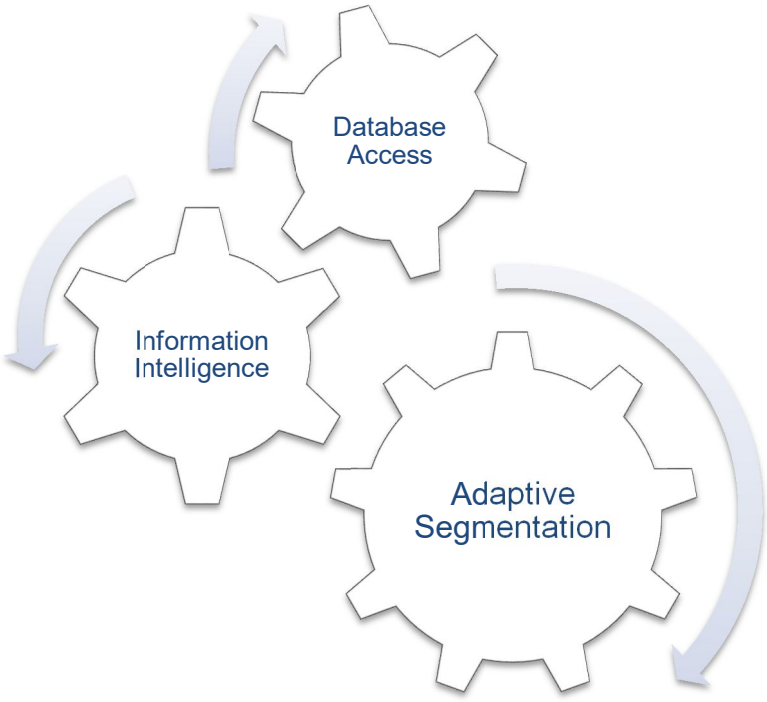


Figure 9. Main goals of dealer's CRM.

To achieve this objective, chosen CRM system supposed to allow company to get a database access and through information intelligence provided by the system get an insight of adaptive segmentation as well as enable to use data-rich reports.

6.3.3 Salesforce.com project

Taking into consideration that each decision of CRM system implementation varies by specific needs, therefore it is usually a long-term as well as tailored project for the company and this case is not an exception. The project of implementing CRM Salesforce.com has been initiated in 2013 and is still ongoing. This project would not be a reality at all without several preparation stages. First steps included project planning, collection of data, translation of all equipment items and assembly parts to standard language of use in the system as well as general CRM system's customization with the help of external specialists, who provided Salesforce.com system integration. Other steps included creating user manuals and basic training of all employees of all branch offices.

6.3.4 Project challenges

The current CRM project is experiencing a greater difficulty in being a supportive daily-basis CRM tool for all employees of the company. Specialists of the company have many years of experience on management piling equipment, but they do not truly use the CRM system on daily basis and unfortunately the availability of data, even if updated in CRM, comprise just a mere helpful part of the whole business and therefore, the utilization rate is low. Furthermore, both complexity and project scale provoked additional time and costs time for system's development making this project reality a lot longer than expected.

6.3.5 Current state of the CRM project

Even though the system has not reached the goals of its full functionality, CRM’s customer base has gradually enlargened since the project has started and now it serves as an extensive cloud library of customer profiles. Besides, newsletter campaigns are tracked in the system due to synchronization with newsletter

sender application, though it does not show the revenues or effectiveness of campaigns but only the “opening rate”. Currently CRM developer and project team are focused on improving the system so that it would be easier to use it and more supportive in sales processes. Hence, new training sessions and development stages are ahead.

6.4 Movax Case Study

During conducting the research thesis author had a chance to visit premises of Movax Oy in Hämeenlinna for pre-arranged interviews with industry experts. For the research purposes the managing director of the world leading developer and supplier of excavator-mounted piling equipment, marketing manager and R&D manager explained the essentials of their businesses, shared opinions on developing business towards IoT and discussed challenges. Unstructured interviews were informal and that allowed the author to explore in depth the idea and purpose of IoT-based solution applicable for the industry.

6.4.1 How IoT trend is shaping up Movax business now?

The present focus of Movax as a leading and innovative manufacturer has been concentrated on getting instant and easy accessible information about performance of equipment working at the construction job site. With receiving right data at the right time, Movax will be able to address challenges more rapidly, moving towards being proactive instead of reactive. Hence, the operations will be *business wise*. Moreover, Movax is targeting at providing customers with integrated solutions for piling works rather than just machines.

According to managing director of Movax the expected results of providing customers with equipment with IoT-based device are as follows:

- online trouble-shooting,
- optimized and monitored performance of equipment,
- preventive maintenance alerts,
- cost- efficiency for all parties involved,
- increased safety for construction projects.

Another huge way data from equipment could bring impact is construction infrastructure monitoring. As stated by managing apart from just observing the product condition with the data provided by control systems and its embedded devices, it is important to use the data to ensure the superior quality of the pile driving works when building foundation. The managing director of Movax clearly emphasized:

IoT is the tool, the data is at the core of it.

The principle of data flow that is shared between operators and engineers is shown in Figure 10. This data contains information piling process. Ideally, since product cloud can be accessible to end users, distributor and manufacturer the data in the product cloud can be checked by all parties.

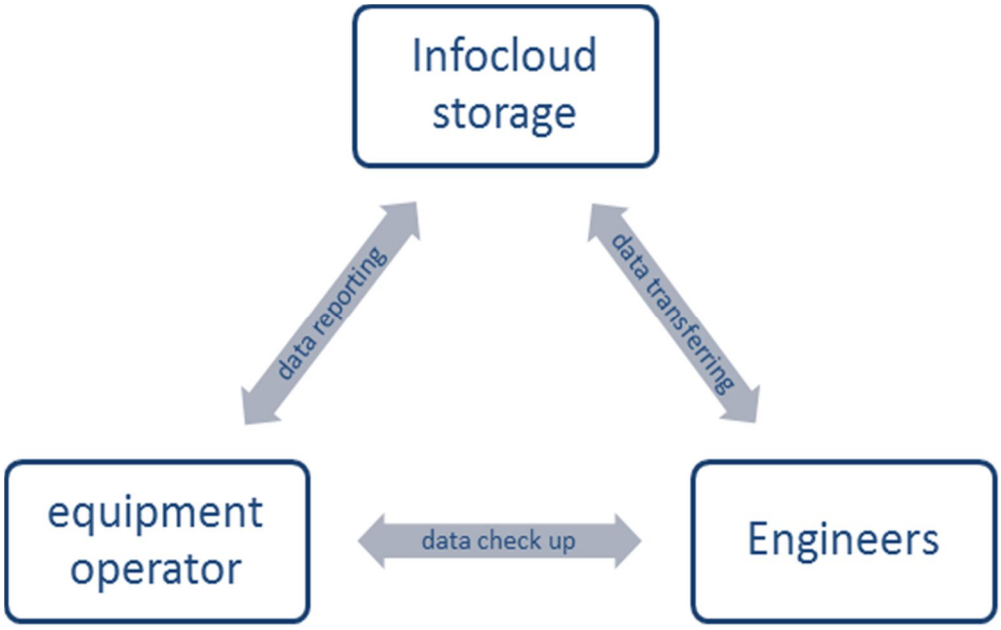


Figure 10. Principle of data flow and exchange within users of equipment.

Construction companies that are building highways, bridges and roads would be able to rely on data received from equipment devices and ensure adequate construction implementation and lifecycle. Therefore, with more available information received, the more accurately the processes can be done.

It is essential for Movax to constantly improve productivity of equipment through innovation. In addition to this, it is one of the goals of Movax as a manufacturer to be a leader of making effective use of intelligent and advanced technologies.

6.4.2 **Which IoT innovations Movax holds for piling works?**

Recently Movax has been focusing on the information, which company gets from its customers and their practical experience directly from jobsites. The new developed solution for obtaining this seamless data flow from the jobsite regarding equipment condition and performance are advanced Movax Control systems (MCS) (Figure 11). MCS is a device, which links the excavator with pile drivers or other Movax' machine. The system is specially designed to control auxiliary hydraulics of the excavator and all the functions of piling and drilling equipment. When purchasing Movax' piling equipment customer automatically gets MCS Lite with necessary controls to operate the machine. Two other MCS systems with extended features range are more advanced and these include additional sensors providing added information and intelligence concerning the piling process.

Figure 11. Display of latest MSC Pro+ auto (Movax 2017.)

Latest advanced MCS versions can be now equipped with Movax Remote©. It is a remote diagnostic tool. In case of Movax Remote tool installation, the MCS can communicate information about equipment by being wirelessly connected to the Internet. MCS is capable to capture and transmit the data in all areas where good covering network signal is provided without additional hardware as memory stick or server. The recorded on-line-performance data and the stored historical data is accessed through web-based, password-protected user interface (Figure 12) and is kept in the cloud. The monitored and stored data includes information about working hours, vibration hours, pressures, angles, frequencies and impact energy depending on Movax' piling equipment. The information can easily and quickly be accessed by Movax Oy's specialist, Movax Oy's local service partner and the end-user. The overall goal of Movax Remote diagnostic tool is to assist in troubleshooting, analysis of piling works and fast and efficient problem solving. Due full integration of Movax remote with GSM/GPS-system, it provides the remote connection (GSM) as well as gives the precise location of the excavator and Movax piling equipment. The Movax remote module also includes the GPS-antenna installed on the excavator.

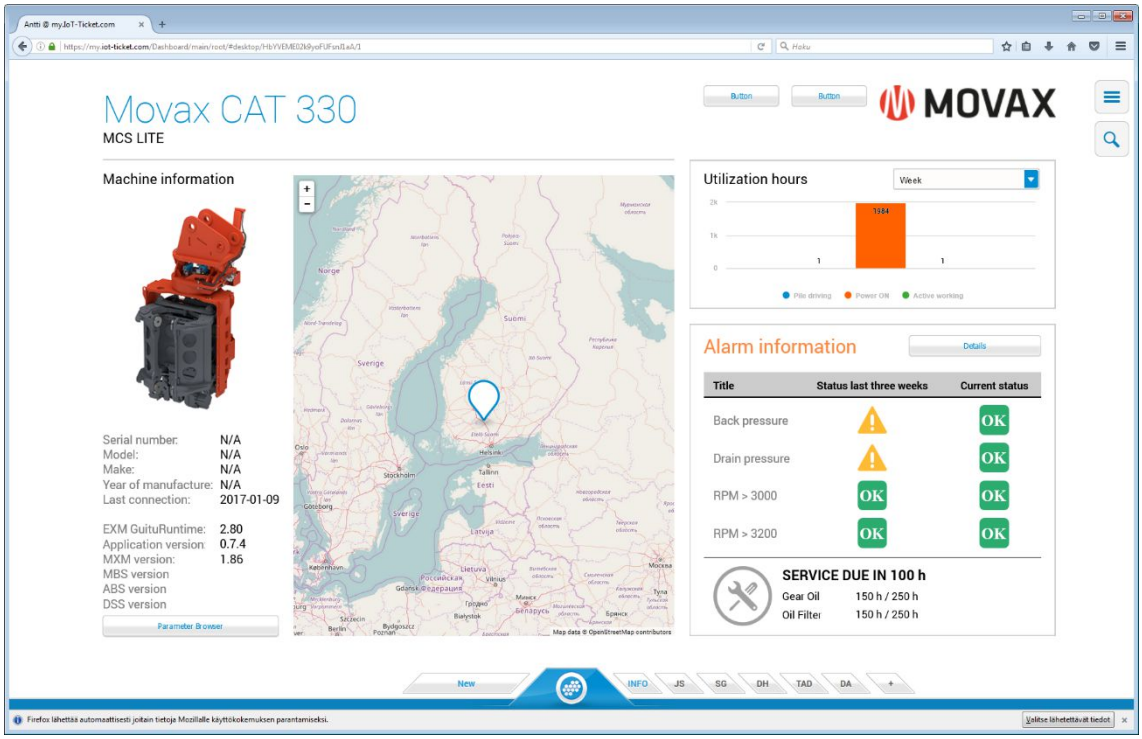


Figure 12. User interface of Movax Remote. (Movax 2017)

It is significant to note that the product manager of Movax Oy expressed no concerns of breach of data security in the cloud and in long-term period, he sees cost-saving benefits of cloud storage usage in comparison with servers. Since instant data updates are available for both parties this innovation is supposed to result in proactive collaboration e. g. fast recognition of need for additional spare parts, overhaul reminder, malfunctions identification without an engineer at the jobsite and therefore impact immensely the time and costs savings.

However, despite promising benefits from instant data access, product manager emphasized that beforehand, such issues as ability of the device to define, capture, track and communicate only right and necessary data flow shall be addressed. Product manager also pointed out that the overall goal of devices' network-connectivity is to send less but most useful information about equipment and piling works at the right time, accessible via Internet. One of the questions to be solved if there will be high demand for this innovation and it will be used intensively, is the costs occurrence for covering the net usage and extensive cloud storage.

7 Summary and Discussion

The current thesis was performed in very specific industrial sector, which has not been yet neither broadly discussed in academic literature nor was investigated from business point of view. Thus, due to personal working experience of the author in pile driving industry and closeness to every-day processes of distributor's activities, the author decided to present such an important industrial sector, showing how meaningful it is, who the industrial players in this field are and how information technologies and advances such as CRM systems and IoT innovations are assisting and of beneficial use for achieving superior business results.

The ultimate goal of this study was to to highlight valuable aspects of CRM systems as a business tool for dealers and distributors in pile driving industry and to identify CRM system practitioners in the field. In addition, it was the goal of this thesis to discuss the applicability and value of recently developed IoT-based solution by OEM in Finland.

By contacting various dealers and distributors worldwide as well as interviewing experts of world's leading developer of excavator-mounted piling equipment, the author covered all research questions and achieved original objectives of the thesis. Moreover, experts' latest knowledge of the field lead to gaining insight of latest innovations and basics of business relationships in the field and resulted in new findings. Broad review of industrial b2b marketing articles, topic-related books and Internet sources supported the research with the core concepts of CRM, Cloud-based technologies and IoT. In addition to this, it allowed to explain in which way utilization of CRM systems can be beneficial for dealers and distributors as well as discuss the value and impact of IIoT for the whole industry. Throughout this research, the focus was made on data that CRM system and IoT technologies can provide as well as how it can impact further actions.

It became apparent from industry representation and theoretical part of this thesis that CRM systems can provide certain benefits to the industry players: creation of well-designed reports, ease of communication of information among departments and better segmentation were discussed. Although system's implementation can be challenging and industrial context might affect greatly on the implementation results. Nevertheless, while conducting empirical part of this study the researcher discovered that among dealers and distributors of piling equipment there are adopters of CRMs. In fact, both cloud-based and server-based cases were identified. However, business processes for dealers and distributors are heavily dependent on direct communications with customers and meeting them personally. It can be explained by complex needs of customers that require tailored solutions for their projects. For this reason, in most cases, CRM system is not a comprehensive tool but supplementary application. However, the example of implemented CRM in company that represented the target population for this research provided a good representation of transition process to comprehensive CRM in this industrial sector. The issues discussed regarding project flow of CRM in Company X highlighted quite typical challenges and situations while shifting to CRM.

Probably the most important part of this thesis was the discussion of IoT technologies value and the illustration of real-life example of developed IoT-based solution at Movax Oy. The theoretical part of this study was necessary for highlighting the critical change that development of smart devices from manufacturer's side can provide for all parts involved in equipment sales. Main benefits with developed IoT solutions can be achieved in aftersales field. Real-time data impact proactive servicing, accuracy and safety of piling works and increased revenues to manufacturers and dealers in the researched industrial sector.

Research focus and process have changed several times during thesis timeframe and author ended up with a very broad topic to cover. Performing the first part of the empirical study was especially challenging due to selling intermediaries of the field being widely dispersed around the globe and due to busy working lifestyle of the managers. Therefore, little empirical evidence from dealers and distributors worldwide was obtained and not all interview questions were answered by contacted companies. Hence, there is always room for improving chosen research methods and skills to obtain more empirical evidence. The author recommends setting more precise and realistic objectives for thesis topic that comprise several broad business concepts.

Regarding further research opportunities, the author would suggest narrowing down this research into parts and investigate in detail such concepts as CRM, Cloud, Big Data and IoT in industrial sector. For instance, focusing on finding and providing real-life examples of IoT-based technologies from other manufacturers of construction equipment would be of immense value, too. Lastly, with extensive human and financial resources this topic could be covered more globally.

To conclude, it must be acknowledged that industrial b2b sector is experiencing fast-moving times and is being transformed with latest innovations. The critical importance of data in industrial sector is rising as real-time data forms the base for fast solutions. For manufacturers of piling equipment, it is the know-how and ability to provide innovations is the core asset and strength. Especially, the ability to create smart products that can communicate data. Meanwhile for their dealers

and distributors the core asset is customer's insight and valuable market information. Therefore, for maximizing the effectiveness in the field, the usage of both CRM systems' and IoT-enabled devices is valuable.

Figures

Graphs

Tables

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Appendices

Appendix 1

CRM systems' usage. Semi-structured interview questions.

1. Do you have Customer Relationship Management system/software in your company? If yes, could you tell the name of CRM vendor?
2. Is it a cloud-based (data stored in the Internet) or on-premise (data stored on company's server) CRM?
3. Was it a customised solution for the company? Why?
4. Which applications are synchronized with your CRM? (Outlook? Mailchimp? Others?)
5. Does any of your company's employees have a mobile access to it?
6. Do you think you have an insight how you could serve your customers better with CRM? If yes, is it because of the data in the reports created with CRM?
7. In your opinion, which information is crucial to be tracked about your customers?
8. Do you have separate monitoring processes on machines and spare parts sold?
9. Does your system tracks company's internal (i. e. between sales managers) and also external (clients, leads) interactions (like emails sent, tasks delegations, chats)?
10. Do you upload the media files directly to your CRM system? Which ones? (schemes, photos, videos)

IoT awareness. Semi-structured interview questions.

1. Do you know what does IoT concept mean?
2. Are you aware of which sensors/data tracking devices are there in the equipment sold?
3. Do you think it would be valuable addition to your processes to get a seamless data flow from these sensors?
4. Which cloud based application you use and who takes care of keeping these cloud apps (marketing managers? IT department?)
5. Have you ever considered the whole switch to using cloud services and platforms?