Mobile applications in customer relationship management to enhance empowerment of knowledge to customers

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Abstract. The mobile application is in rapid growth and dissemination in business and enhancement of customer satisfaction has emerged as a core issue. In Customer Relationship Management (CRM), customer reviews are recognized as fruitful information sources for monitoring and enhancing customer satisfaction levels, in particular, feedback of actual customers expressing their opinion reflects on core business. Customer knowledge about products or services also reflects on the business. Knowledge is one of the key factors for customer service success - most companies would empower employees with knowledge which is deemed reasonable. The knowledge of technical intricacies and variables in finding an accurate Uninterruptable Power Supply (UPS) by customers has been a challenging task. This challenge via using a UPS calculator that computes upon different back-up time and technical calculations involved, allows customers to find an accurate UPS easily and gives the customers the ownership of the knowledge. This UPS calculator has created a niche market for UPS manufacturing and distributing companies. The feedback from the telephone interview conducted in this study shows that the customer using this UPS calculator can make an accurate decision-making process of purchasing a UPS and electrical wholesalers can give advice to customers to suitable UPS and prices with an improved business process. In the future, this research would like to extend its study towards customer interaction, customer satisfaction and customer value.

1. Introduction

Nowadays all around the world, the mobile application market has rapid explosive growth because of an increasingly important role in everyone’s life. Smartphone mobile devices that are Internet of Things (IoT) are enabled for work, social media, and most importantly, with family, colleagues, friends and businesses. The mobile application comprises a different wide variety of platforms, architectures and technological choices.

Companies and organizations provide their own websites together with mobile data networks in electronic commerce and communication with digital media phones, broadband digital wireless networks, and mobile hypermedia. Mobile phones offer the mobility of users’ calls for malleable patterns of conducting electronic business because handheld portable devices are readily available. In the same way that electronic commerce catalyzed the development of Web application [10], mobile commerce may become the key driving force for developing mobile applications.

Internet of things (IoT) via mobile apps can help empower customers with knowledge (to make sales or technical decision to buy or not to buy and which product is best for them with the knowledge that they have obtained) and using the model for evaluating Customer Relationship Management CRM effectiveness as suggested by [9].
Customer relationship management (CRM) refers to the techniques that a business organization uses in interacting with customers to satisfy the customer as well as to create sales for the organization. Most business organizations have a strategic and long-term view of CRM in the sense that they use customers’ past data in finding ways of retaining them and improving or maintaining sales’ volume [6].

Knowledge is the key to customer service success—most companies would empower employees with knowledge which is deemed reasonable. However, in some circumstances (depending on the nature of businesses) empowering customers with knowledge can lead to better customer experience. In customer relationship management (CRM), the purpose is to focus on product-centric to customer-centric, and empowering customers with knowledge aims to achieve this.

For the purpose of this study, the Internet of things (IoT) and mobile apps are also defined as follows. The internet of things describes a landscape in which the internet connects physical devices and various forms of software such as home appliances, vehicles, electronics, sensors, and related items in such a way that these systems not only work in synchrony but also in exchanging data [4].

A mobile application, which is commonly referred to as an app, is a type of application software that is made to run on a mobile phone, especially a smartphone or even a tablet computer. Mobile applications help mobile phones achieve the status of functional computers [2].

This paper is organized into six sections: Section 1 is the Introduction; Section 2 contains literature review; Section 3 covers the designing of the mobile app; Section 4 is about the UPS calculator; Section 5 covers the system evaluation, and Section 6 is the conclusion.

2. Literature review
Most studies that focus on the act of business organizations empowering stakeholders focus on employees rather than customers [5]. This occurs in spite of the fact that the customer is a key contributor to a company’s brand and sales’ value. However, this is not necessarily a consequence of undermining customers. Rather, the studies do not necessarily focus on the aspect of empowering customers with knowledge. Most studies, thus, merely focus on the idea of using customer’s data to provide utility and as well as create sales for them. However, some studies focus on the power that the customers are gaining and how the boundaries that used to exist between business organizations and customers are increasingly becoming blurred [5]. For instance, users have assumed the creative roles that business organizations used to perform thereby leading to a surge in user-generated content. The phenomenon manifests in many forms. For instance, users create creative memes that can stir up laughter in people. In this sense, businesses are able to learn that users are much a participant in the critical and creative tasks that organizations partake.

The 21st century forced the organizational landscape to transform [6]. In turn, organizations had to find ways of cutting down on costs and finding ways of developing a close relationship with their customers.

Empowering customers with knowledge is one of the techniques of developing intimate relationships. Such a move is essential since customers have become a major determinant for a companies’ ability to stay in the market as well as generate sales.
And suggestion by [9], are as shown in Figure 1, illustrates the importance of knowledge about the customers and increasing customer’s knowledge and correlating with customer interaction to targeted products, services, marketing programs and increasing customer value (such as increasing customer loyalty and improving customer acquisition) and finally having positive impact on overall customer satisfaction.

To increase customer knowledge is one of the factors suggested by [9] model. This is evident these days as learning and development realm has emerged in companies, and organizations seek to educate all levels of the workforce and stakeholders [2]. In most of these cases, customers have become a key target of such initiatives. Companies such as Werner and Apple are currently operating programs of training for their customers [1].

However, the research conducted by [1] found out that among the 400 business organizations that were under the sample of the study, slightly more than half of them did trained customers. This thereby indicates that a bigger number of companies are focusing on this aspect of CRM, that is training the customers. Organizations differ in the techniques they choose to train external stakeholders although all of them have converging goals in mind. Most of these goals pertain to trimming costs, spreading brand awareness, generating revenue, and reducing reliance on help desks. Apple is an example of such a company that has taken empowering customers with knowledge to the next level. For instance, customers pay a fee of $ 99, in its One to One program, and access a tutor that guides the customer in setting up the Mac computer and related activities such as syncing the software with iCloud (Apple Inc., 2019). On the other hand, Werner has free online training programs for its customers. Werner’s idea is frequently used by most organizations mostly as a way of familiarizing customers with complex products.

In addition, there are varying needs about companies employing training programs on customers; they seem to converge about sustaining relationships, making the consumers in-charge of processes, and driving sales [2]. In a sea of competitors, organizations are in constant anxiety about losing their customers or even customers forgetting about them.
In this sense, there are certain activities that companies need to partake in the process of empowering customers. For instance, there is a key need to focus on proper content. In this sense, proper content emphasizes on the audience and the goal that ought to be achieved such a process [6]. For instance, if the training program aims at helping customers understand the complexity of a system, it is necessary to divide the process into several stages for customers to understand each of them. Besides, it is important to capture and collect data about customers. Apart from direct customer interactions, companies have a wide space within which they can attain knowledge about customers. This pertains to the phenomenon of Internet of Things (IoT) where companies attain knowledge through the interconnected landscape aided by the internet such as social media, purchase history through mobile phones, and even websites [4]. However, such knowledge is also becoming expensive as the marketplace realizes its value. In this way, there are several entities that have sprung up to gather data, synthesize them, and sell such data. Companies, thus, do not rely merely on their data, but the data it also accesses from such entities. Besides, it is essential for companies to emphasize listening to customers [4].

Furthermore, it is important to personalize content to customers [6]. One of the chief ways of humanizing the experience of training is avoiding technical terms and jargon. Some companies, therefore, have of late adopted a more informal and street approach to language and content offering.

In addition, companies that seek to optimize the outcomes of training offer such training immediately. The idea of immediate is offering the content in a timely manner such that the customers use it when they need it. In turn, companies ought to direct customers to content immediately after they made their purchase.

In addition, organizations also ought to optimize the outcome of learning by keeping their content short and direct [3]. This is because studies show that customers need to learn on their schedules and that they need to quickly get into the material they are researching [3]. Besides, training content needs to focus on the key areas of the products that may require explanation, as it has been shown that human beings have mild attention spans.

3. Designing the mobile app
Based on the CRM evaluation model in Figure 1, we proposed the framework and developed mobile app for Android and IOS operating systems that include (a) mobile app framework, (b) key design principles, (c) development life cycle and (d) system implementation as described below:

3.1. Mobile app framework for enhancing customer knowledge
We proposed a framework (figure 2) to develop mobile apps for customers who want to get information about UPS products that includes product classifications and prices. Customer order option is found on the menu with sub-selection on the mobile screen.

The order is then received by the main server in the office which connects to (a) customer relationship management that manages customer enquiries, emails and also (b) connects to the sales support such as maintaining customer account, bill, sales, delivery, orders, products and shipping data.
The server provides 24/7 access for customers enquires, bill payments, frequently asked questions (FAQs), purchasing and quoting the products.

3.2. Key design principles
Designing a mobile app includes providing value for the user and which is fast, natural and easy to use. Successful mobile apps may, of course, have desirable features. They may provide information for user needs and wants on situations. Based on [12], we have defined seven principles for highly goal-driven mobile services:

1. They should provide information to non-technical users.
2. The services should be easy to use.
3. The service should include relevant information for user and technical people.
4. They should provide the terminology to use for users to identify.
5. They should provide FAQs to help the user
6. User can locate stores, maps (navigation) provides GPS.
7. The services provide for both iOS and Android

We apply these above principles to develop mobile apps for UPS product calculations based on power usage and prices to purchase.

3.3. Development life cycle
The app was to empower customers on getting access to the knowledge to understand technical intricacies and variables a UPS has, such as the power factor that varies upon different time and the calculation involved and be able to find an accurate UPS that can be installed in any given network scenarios. The app was developed to help customers to find the devices with the correct technical capabilities, and at a price, they can afford. The customer uses the calculator to input the number of voltages, amperes, devices needed to be backed up and the run-time needed. The resulting outcome is that the customers are given access to knowledge to make technical and sales decision on a device from a list of devices that they can choose from their requirements. Figure 3(a) [13] and Figure 3(b) [14] represent life cycle for UPS mobile apps for both android and iOS respectively.
Figure 3. (a) Life cycle for apps development for Android (b) Life cycle for apps development for iOS

3.4. System Implementation
Mobile app development is a critical issue for the developer. We investigated the mobile phone industry to analyse two major phones as Android (Smartphone) and iOS (Apple phone) for developers. We classified two different mobile apps to develop as follows.
3.4.1. Android apps. We used Microsoft Visual Studio, which is an integrated development environment (IDE) to do mobile apps for android mobile phones. It includes a code editor supporting IntelliSense (the code completion component) as well as code refactoring. The integrated debugger works both as a source-level debugger and a machine-level debugger. Visual Studio supports 36 different programming languages and allows the code editor and debugger to support (to varying degrees) nearly any programming language, provided a language-specific service exists. Built-in languages include C++, C++/CLI, Visual Basic .NET, JavaScript, TypeScript, XML, XSLT, HTML, and CSS. iOS Apps

3.4.2. iOS apps. iOS is the mobile operating system that runs on Apple’s mobile devices, i.e. iPhones and iPads. It’s the main software that allows you to interact with Apple phone or tablet. CodeRunner is a lightweight editor that can write and run multiple languages, and it can execute multiple language code without installing additional locales. The main features of CodeRunner: Support for multiple languages: CodeRunner supports AppleScript, C, C++, Java, JavaScript (Node.js), Lua, Objective-C, Perl, PHP, Python, Ruby, and Shell by default.

3.5. UPS calculator

We developed the UPS calculator for both Android and iOS mobile app. The UPS calculator is an interactive tool and customers can download and install it on their mobile phones. The objective of the calculator is to support customer needs and want to purchase UPS that include prices, input voltage, output voltage for electrical equipment.

![Figure 4. UPS calculator menu](image1)

![Figure 5. UPS calculator for computer and printer to calculate output voltage and ampere](image2)
Figure 6. Power calculator for runtime of UPS duration of power

If a customer needs UPS for a client-server network, add the numbers of computer, server machines, printers, scanners and monitors, the numbers of hours for run time, the calculator provide types of UPS in different models and prices to choose for purchase. Figure 4, 5, 6 and 7 show various calculations based on individual network blueprint for an accurate UPS information.

Figure 7. UPS calculator for network server output voltage, ampere and duration of power.

4. Case study and analysis

This is just a preliminary study as it is a brief overview of the insight of Sydney UPS Distributors Pty Ltd case study, keeping in mind the need to further explore the potential that this research would have in the future. In the future, we would like to apply the model by [9] to understand the relationship between this empowerment of knowledge had on customer interaction, customer satisfaction and customer value.

Sydney UPS Distributors Pty Ltd is a transnational entity that designs and manufactures UPS (Uninterrupted Power Supply) machines. We designed and developed a mobile app both for Android and IOS operating systems. The app was to empower customers to gain access to the knowledge to understand these technical intricacies and variables. UPS has the power factor that varies upon different back-up times and the calculations involved and enables to find an accurate UPS they can install in any given network scenarios, from the variety of UPS devices that the company sells. In this way, the app was developed to help customers find the devices with the correct technical capabilities, and at prices, they can afford. The app works in such a way that the customers' inputs respective variables in a UPS Calculator. For instance, one may input the number of voltages, amperes, devices needed to be back up, and the run-time (for how long the backup is needed for).

The resulting outcome is that the customers are given access to this knowledge to make technical and sales decisions on a device or a list of devices they can choose from, considering now they know how the power conversions within UPSs are carried out and the topology the UPS works on, such as line-interactive UPSs 1/3 phase, online UPSs 3/3 phase, double-conversion UPSs and many more.
Certain feedback via questionnaires provided some insights from the customers for a period of 6 months. Many factors were identified such as stating that the app helped them choose the products they want instantly. In the past, one has to go through the electrical wholesalers who did the UPS Calculation and stated the price. This creates a complicated purchasing process and wastes customers’ time. Customers, thus, reported that it has become easier to make a purchase order directly.

In addition, customers reported that the app made them feel empowered in regard to the decision-making process of purchasing that they have on their hands. In this sense, the customers could get what they want by not relying on a different party, but through inputting the variables they had in mind, and finally getting a product that they exactly need. In turn, they reported that the process created more transparency and eliminated the fear of the unknown. In addition to this report, customers felt that the UPS calculator has simplified the whole process and is delivered in simple manner, even a non-technical person can use it. Training provided to our customers through YouTube App demonstration and face-face as well by salesman working in the field was well-received.

More essentially, the app was calculated to have resulted in a 25 per cent increase in sales. This was an outcome of a YouTube demonstration of the App, as well as through direct marketing and training of the App provided by salesman. The awareness led to a sizeable improvement in sales that now there has been a call for development of the app for other products too.

5. System evaluation
The online value proposition (OVP) is what the company can offer in the way of content, products, services and experiences to engage online customers. The OVP extends the difference in that it identifies the reasons why customers will register or buy from the company website and ideally feel motivated enough to share their experience. The customer value proposition should state the intrinsic benefits a visitor will get from the site, content, web service, and how that ties to company’s overall product or service. The company website and mobile app are designed to develop on customer value proposition to enhance knowledge about UPS calculators to calculate voltage, ampere, battery power and the run time duration for what customer needs and wants.

The system evaluation is based on customer enquiry for product orders and prices. These data are received and stored on a database in the main office server. This Mobil apps helps novice customers without knowledge about UPS to download the application and to order and purchase without assistance anywhere and anytime. Customer enquiry through order forms such as categories of UPS, power, ampere, size and prices provide to enhance customer knowledge to purchase UPS using mobile apps.

Customer FAQs data survey and Google Analytic data shows customer knowledge and location buying powers around suburbs and states around Australia. This analyzed data provides the sale department, accounts department, delivery and warehouse department meaningful information in their decision-making processes.

6. Conclusion
In turn, other companies may engage in the employing or building of such an app to connect to customers to have a better customer experience. To begin with, in as much as it is essential to have a goal of sales in mind, it is necessary to realize that the customer is interested in acquiring knowledge for the navigation of particular intricacies. In such a way, content should be directed towards helping a customer easily understand the process of doing something.

Therefore, an organization should work to ensure that content is brief and delivered in a simple manner such as the UPS calculator used in Sydney UPS Distributors Pty Ltd. Making content brief pertains to only working with essential parts while leaving out irrelevant or unnecessary information. It is also essential to humanize the experience, which may not seem necessary but is primarily as a means of satisfying the customers’ psyche of having an emotional experience. Some of techniques in achieving a personalization effect are relying on humor and maybe street language to pass the message across to their audiences.
When such information is organized and synthesized, business organizations can better understand their customers’ needs and attitudes toward offering the kind of products they exactly need. Businesses should also not wait for customers to demand training. Rather, training should be ready such that the customer accesses it anytime they need the content after a purchase has been made. Making customers in-charge of processes enables them to activate their desire to be involved, and this is not just directly empowering, but it also helps the customers feel connected to the company. Human beings have an innate need to be in charge of their lives, and this is one of the aspects that training focuses on, in such a sense that the customers can learn by themselves as well as applying what they have learned and is finally satisfied with the outcome of their learning.

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\(^1\) Due to company policy company real name was not published