Enhancement of business using e-commerce with point of sale

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Abstract---This paper focuses on designing, developing and maintaining an E-commerce with Point of sale. Only medical products are available. Some of the products are First aid kit, Plasters, Cotton wool, Surgical mask, Stethoscope, Oxygen mask, Thermometer, Syringe, Needle, Wheelchair, Stretcher, Scales, Cane, Pill, Dropping bottle, Paracetamol, Amoxicillin, Quinine, Nifedipine, Multivitamin etc., This work would be helpful for customer to buy the products. The rapid growth of technology restructured business transactions and operation. Different computer technologies and the internet empower businesses to centralize their operations and run their business fruitfully. Technological innovations significantly improved business efficiency and overall customer experience and satisfaction. The use of E-commerce platforms and POS system became popular with the emergence of technology and the internet. However, some businesses have not fully adopted the integration of e-commerce and point of sale systems. Some businesses are not fully geared with technology that will help them improve business efficiency, productivity, and customer relationship. This work will allow seamless operation and transaction between business operators and clients. This work will remove the manual process of inputting data of sales, stock and inventory, and payment transaction of customers. The implementation of the system will automate and ease up sales processes, tracking of stocks and inventory, purchases and payment transactions, and other business daily operations. It will improve business operations and marketing sales. The system will offer centralized business operations and transactions in an easy, accurate, and efficient way.

Keywords---point of sale (POS), e-commerce, progressive web application (PWA), API integreation, open cart.

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Introduction

E-commerce (electronic commerce) is the activity of electronically buying or selling products in online mode over the Internet. E-commerce utilizes technologies such as mobile commerce, electronic funds transfer, supply chain management, Internet marketing, online transaction processing, electronic data interchange (EDI), inventory management systems, and automated data collection systems. E-commerce is in turn driven by the technological advances of the semiconductor industry, and is the largest sector of the electronics industry. E-commerce typically uses the web for atleast a part of a transaction's lifecycle although it may also use other technologies such as e-mail. Typical e-commerce transaction includes the purchase of products (such as books from Amazon) or services. There are three areas of e-commerce: online retailing, electronic markets, and online auctions. E-commerce is supported by electronic business. Some of the features of E-commerce are user-friendly designing, mobile-friendly, multiple payment options, 24 x 7, customer service, user reviews, user features, and discounts, extensive product information. The point of sale (POS) is the time and place where a retail transaction is completed. At the point of sale, the merchant calculates the amount owed by the customer, indicates that amount, may prepare an invoice for the customer, and indicates the options for the customer to may payment. It is also the point at which a customer makes a payment to the merchant in exchange for goods or after provision of a service. After receiving payment, the merchant may issue a receipt for the transaction, which is usually printed but can also be dispensed with or sent electronically. To calculate the amount owed by a customer, the merchant may use various devices such as weighting scales, barcode scanners, and cash register. To make a payment, payment terminals, touch screens, and other hardware and software options are available. Some of the features of point of sale are invoicing, selling, buying, renting and repairing, inventory management, customer orders and suppliers orders management, Integrated Supplier Purchasing, Consistent and Customizable Reports, Multi-store Management. If E-commerce and Point of Sales system are separated, it would be difficult for the businessman to manage. So, we have proposed a "POS with E-commerce Web Application", which is designed to seamlessly integrate the e0commerce platform and point of sale systems in business operations and transactions. The system will streamline the sales processes, track the sales and inventory, purchase and payment of transactions by customers, and other business operations. Traditionally, businesses rely on operating businesses. With the advent of technology, manual methods became obsolete. Technology brought the use of the POS system in businesses. However, early POS systems offer limited features and functions that a business can use and integrate into its business. The rapid growth of technology offers more advances point-of-sale technologies along with the integration of e-commerce platforms. Businesses must adopt the use of integrated e-commerce platforms and point of sale systems.

Materials and Methods

(Mulyadi 2016) Sales refer to the sale of the goods and services, that are either in cash or credits. Sales include trade in goods or services to customer (Puspitawati L & Anggadini S.D. 2011). Point of sales or simply known as POS, can be defined

as software that records sales transactions. Before the development of POS system, businessmen had used cash registers, to control their businesses. According to (Ginting 2011), an automated teller machine (ATM) is an electronic banking outlet that allows customers to complete basic transactions without the aid of a branch representative or teller. Anyone with a credit card or debit card can access cash atmost ATMs. But the teller machine function is not enough, so that POS has been developed. Using a POS application, we can achieve some benefits by the adding value that can be controlled in the form of improved quality of service, improved business image, competitive advantage and decision-making processes (Saputra et al., 2013).. According to (Utomo et al., 2017), POS is a software solution that records daily sales, save history,

and generate valuable reports based on the business conditions. POS is used for accounting purposes. The generated reports can be a very useful source of data for business analysis. Earlier, the POS system was offline. In recent years, online web based systems have become more popular. By implementing a POS system in a business, a business man experience more benefits like – easy usability, real-time report generation on stock, sales report generation, visual representation of business profit or loss status, faster service, easy employee management, and easy monitoring. (Dijaya et al., 2018) showed that the POS system can be integrated with a vending machine for self-service scale micro-enterprises. (Paramatia A.S. 2019) mentioned that early technical knowledge has played an important role in cloud computing based POS system adaptation among Indonesian Small and Medium Enterprises SMEs (Shapiro R 2008), POS software helps to find "not only daily and weekly POS presentation, but also inventory levels by SKU (Stock Keeping Unit) and location, order status, in-stock percentage, warehouse and store out-of-stocks" (Shapiro, 2008). In (Casison J. 2013), research shows that a POS system streamlines the process of entering inventory into a computer upon execution of sales, thereby, allowing speed up of inventory management for companies still doing this counting manually. The inferential analysis of this work shows that security and being useful have the largest impact on customer's satisfaction (Ganguli et al., 2011). Suggesting a positive important effect of security on customers' satisfaction and loyalty. It is also in (Macgregor and Vrazalic 2005) that the large cost of Internet access and also communication infrastructures being inadequate are barrier to accepting to use the POS machines, and interest has the smallest impact on customers' satisfaction. (Kim et al., 2008) and SERVQUAL for measurement of e-service Quality of Point of sale(POS). The authors used six variables for survey of customer satisfaction. This study presents the following hypothesis: There is a relationship between customer satisfaction and reliability, responsiveness, ease of use, cost, usefulness, security of POS. According to the Bank of Canada discussion paper, almost 44% of all payments in 2013 were cash-based, while 21.2% used debit and 30.8% bused credit cards. However, the medium purchase value for cash transactions was only $9, while debit card transactions were large at $27 and credit cards at $34(Henry et al., 2013). A business model that supports an e-Commerce system controls to serve as a communication channel for bidirectional information transfer, a platform for performing, an interface for providing customer service (Quelnch, John A. & Lisa R. Klein 1996) and ease marketing initiative(Schubert, P & Selz D. 2001).The investments in time and money that are frequently required to start a commercial website and the growing

demands to see returns on internet-related investments, a powerful focus on performance and success is becoming analytical for internet-based e-Commerce(Auger, Pat 2005). However, the measurement of commercial website performance has shown to be a difficult task not only because it depends on which stakeholder position is assumed, but also because it is a multidimensional concept in (Palmer, W. Jonathan 2002) that can be estimated at different levels using different interconnected criteria (Molla & Paul Licker 2001). Executives play a major role in choosing and executing e-Commerce strategies and pursue a more active follow a most active role in deciding how, when and where IT resources should be used(Tallon, P. P & Kraemer K.L. 2002). A website is generated with a number of design elements which donate towards its overall function(Song J. & Zahedi 2001) Each website has a motive as defined by its owner. There have been a number efforts by researchers to find and classify website elements and link these with the purpose of this site. Health care organizations are noticed in marketing for the need to create revenue through marketplace replace, regulatory change that bounce the ways in which health care organizations can control, challenges to old roles and status that must be controlled through public relations and marketing efforts, etc.,(Chandran C. & Praveen Paul J. 2004). The online shopping business model is built on attracting consumers however supposed risk and trust from key factors in consumer decision making process. Finding the supposed risk and trust in online shoppinf is the important focus of this study(Kavitha Ragayogan, 2017).

In our method, we have proposed a POS with an e-commerce web application. This will offer businesses to use an e-commerce platform with the point of sale system for improved and efficient business operation. The system will provide businesses with greater flexibility, control, and intelligence over their business operations and transactions. It will allow businesses to efficiently manage their daily business operations and transactions especially in attending to the customers' inquiries. The method will improve the business productivity and efficiency as well as the customers' experiences and satisfaction.

Development Tools

The system will remove the manual process of inputting data of sales, stock and inventory, and payment transactions of customers. Angular framework is used as the front end. Angular is a TypeScript-based free and open-source web application framework. For Application Program Interface (API), we have used Opencart. OpenCart is an online store management system. It is PHP-based, using a MySQL database and HTML components. For database, we have used PhpMyAdmin. PhpMyAdmin is a free software tool written in PHP, intended to handle the administration of MySQL over the Web.

Advantages

Some of the advantages of Integration of E-commerce with POS are as follows:

Automated Operations and Transactions

Business operations and transactions are done electronically, especially, sales processes, inventory purchases, and payment transactions.

Records Management

This method contains database that enters the records of daily transactions electronically, in a safe, accurate, reliable, and fast manner.

Better Customer Service

This method provides a better customer satisfaction. It integrates the online store with the POS and creates a seamless customer experience, including the following:

1) Wide variety of payment methods
2) Quick online ordering
3) Improved speed, accuracy, and security

Avoid mistakes & reduce errors

By integrating the POS with E-commerce, we will have all the data centralized and this will avoid many errors. Otherwise, need to track the data from different sources manually which besides being time-consuming, has a higher chance for mistakes. Not only does this save from unnecessary overhead, but also a significant portion of time.

Remove manual data entry

Manual data entry and synchronization are always error-prone and time-consuming. Therefore, another huge adds value of integrating an e-Commerce website with a POS system is eliminating manual data entry like:

1) Manage customer, order, and product information in one place
2) Synchronizing order information from in-store and online orders.

Features of Integration of E-commerce with POS

Some of the key features of integrated POS e-Commerce system are as follows:

1) Customer management
2) Inventory management integration
3) Returns and exchanges
4) Promotion and discount
5) Payment integration for online and mobile payments like card processing method and Apple pay.
6) E-Commerce sales reporting
7) Email marketing integration
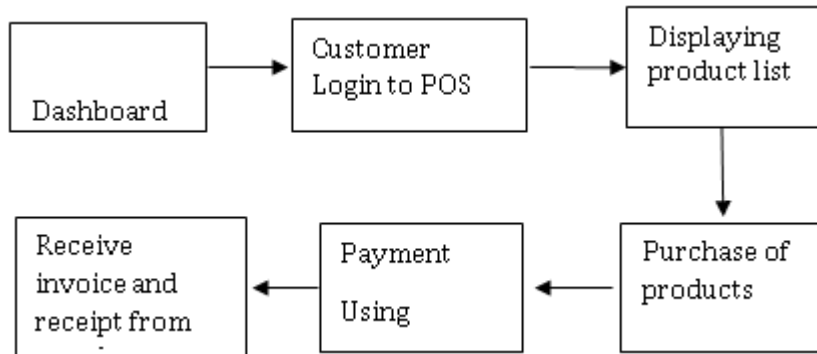8) Loyalty programs (reward points, store credit, and gift card).

System Work flow

Figure 1. System workflow

Progressive Web application

A progressive web application (PWA), commonly known as Progressive web app, is a type of application software delivered through the web, built using common web technologies including HTML, CSS, Javascript, and web assembly. It is intended to work on any platform that uses a standards-compilant browser, including both desktop and mobile devices. Since a progressive web app is a type of webpage or website known as a web application, they do not require separate bundling or distribution
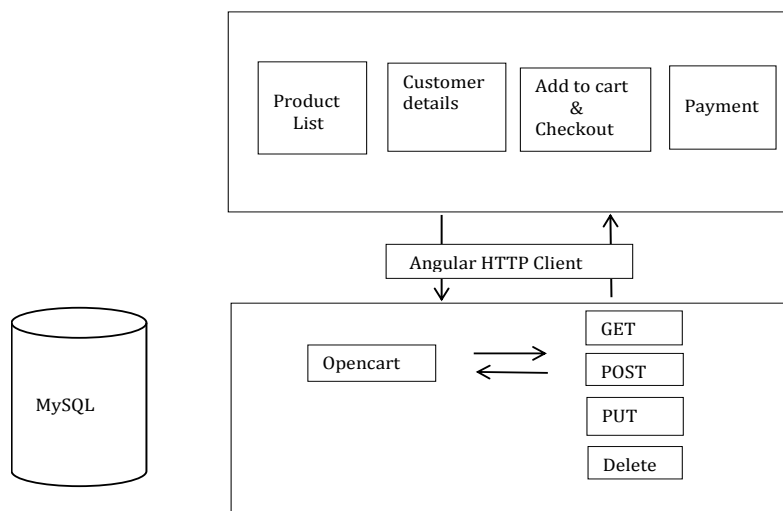
Architecture

Angular

Figure 2. Angular and Opencart communication Architecture

API Integration

An Application Programming Interface (API) is an interface that facilitates communication and connectivity between two or more software applications. API Integration refers to this seamless connectivity that allows organizations to automate business processes, and enhance the sharing and embedding of data between various applications and systems. In this work, we have used API integration to get products list, options, customer details, cart, checkout and payment details from the Opencart applications.

API To get Products list

```
getProducts(): Observable<Product> {
return
this.httpclient.get<Product>(AppConfig.serviceApi+"index.php?route=extension/smartiapps_pwa/product")
    catchError(this.errorHandler)}
```

Http Client Module

The HttpClientModule is a service module provided by Angular that permits to perform protocol (HTTP) requests and simply manipulate those requests and their responses.

Results and Discussions

API Testing

API testing is a software testing practice that tests the APIs directly from their functionality, reliability, performance to security. In this method, to test the Opencart API with the help of Postman application which is a scalable API testing tool. With the help of the http methods such as GET, POST, PUT and DELETE testing of API is done.

Comparison

The accessibility of E-commerce with POS and Without POS are compared using Lighthouse testing report. Accessibility is the practice of making the websites usable by as many people as possible. We traditionally think of this as being about people with disabilities, but the practice of making sites accessible also benefits other groups such as those using mobile devices, or those with slow network connections.

Building accessible sites benefits everyone:

- Semantic HTML, which improves accessibility, also improves SEO, making the site more findable.
- Caring about accessibility demonstrates good ethics and morals, which improves the public image.

- Other good practices that improve accessibility also make the site more usable by other groups, such as mobile phone users or those on low network speed.
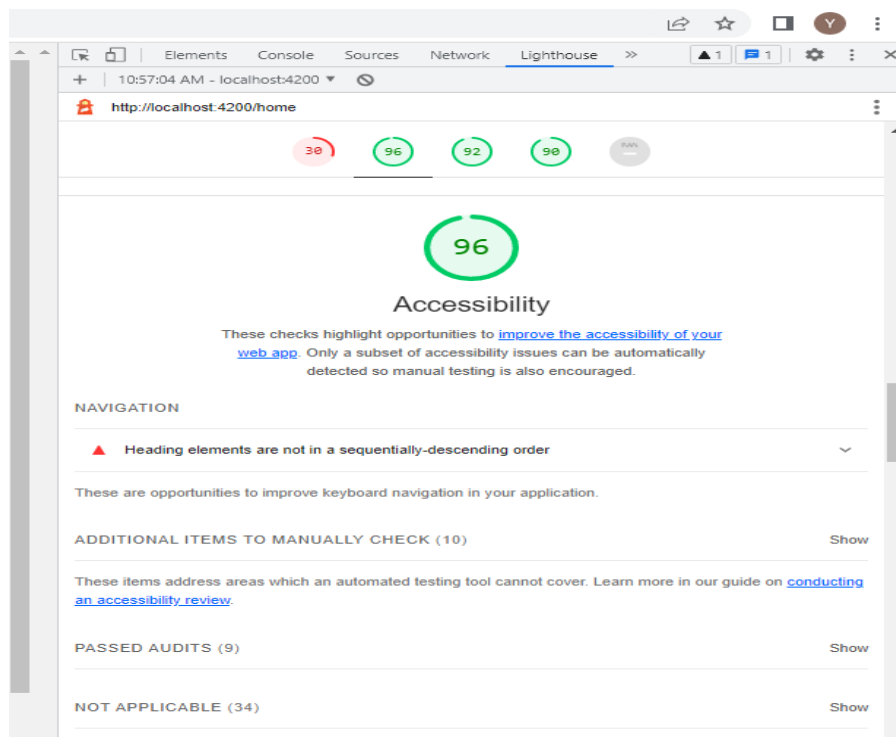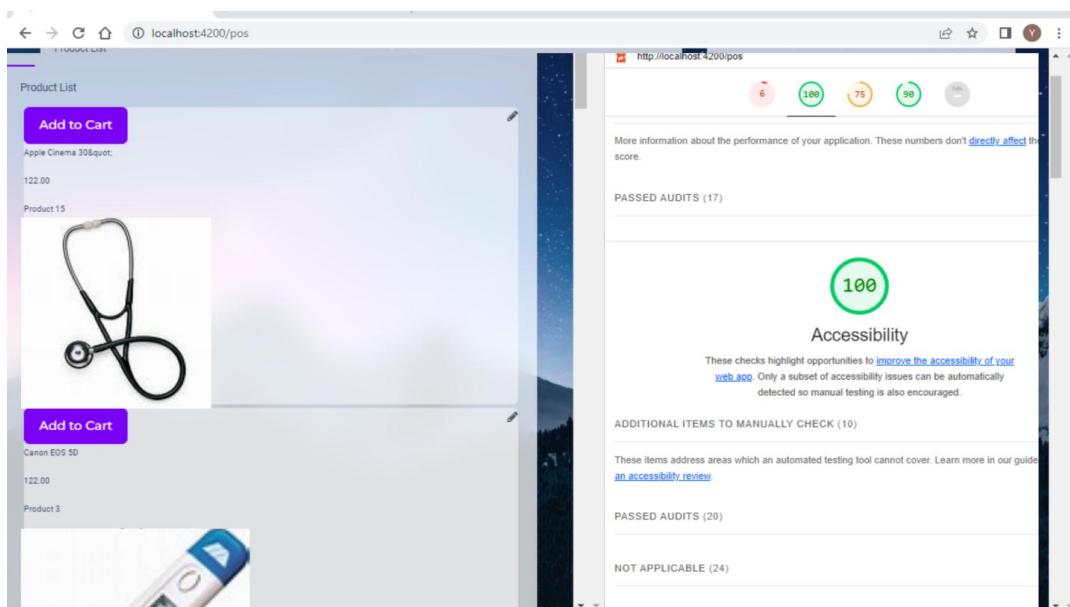

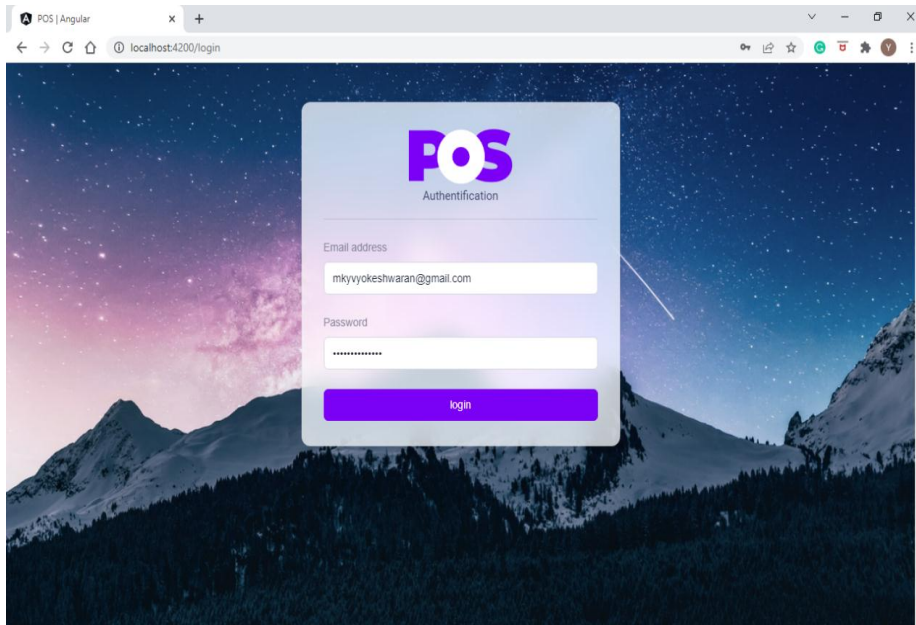Figure 3. E-Commerce without POS

Figure 4. E-Commerce with POS

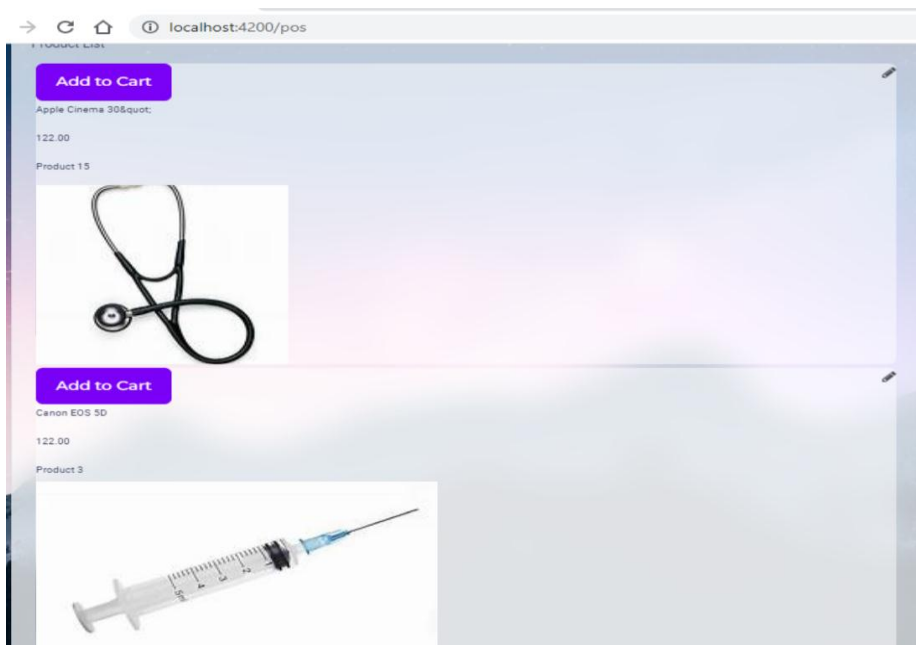**Result**

Figure 5. User Login page
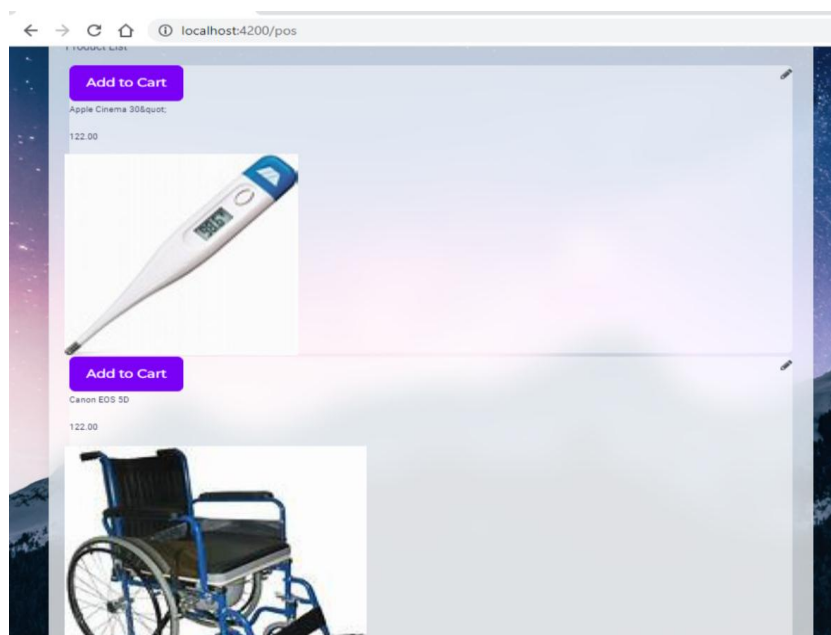

Figure 6. Product list Page

Figure 7. Product list Page

Conclusion

Integration of E-commerce platform and Point of Sale System will significantly improve business efficiency, customer satisfaction and empower business. The result of this project showed that the developed web application provides the needs and requirements of the intended users and respondents. Hence, we conclude that the developed web application will further improve and enhance business operations and transactions. The web application will remove the manual process of inputting sales, stock and inventory, purchase and payment transactions of customers. The Web application will allow seamless transactions between businesses and clients.

References

Auger, Pat (2005), "The Impact of Interactivity and Design Sophistication on the Performance of commercial Websites for Small Businesses," Journal of Small Business Management, 43(2), 119.

Casison, J. (2013). Retail Technology Update 2013. Gifts & Decorative Accessories, 114(8), 36.

Chandran C. & Praveen Paul J. " Management and Marketing of the health care system - The changing paradigm vol. 4 no. 2, 2004.

Dijaya R. et al., "Integrated Point of Sales and Snack Vending Machine based on Internet of Things for Self Service Scale Micro Enterprises," J. Phys.Conf.Ser.,vol. 1179, no.1,2019.

Ganguli et al., (2011). Generic technology-based service quality dimensions in banking: Impact on customer satisfaction and loyalty. International Journal of Bank Marketing, 29(2), 168-169.

Ginting, "Rancangan & Implementasi Point of Sales (POS) Berbasis Web," Skripsi, Progam Studi Sistem Informasi STMIK AMIKOM, (2011).

Henry C. et al., (2013). 2013 Methods-of-Payment Survey Results. Bank of Canada.

Kavitha Rajayogan (2017), Online Shopping: "A Study On Risk Perception with Special Reference to Tamil Nadu". Vol. 4, No.3 , (2017).

Kim R.G. et.al., (2008). An empirical examination of the acceptance behavior of hotel front office systems: An extended technology acceptance model. Tourism Management, Vol, 29, pp, 500-513.

Molla & Paul Licker (2001), " E-Commerce system success: An attempt to extend and respecify the Delone and Mclean model of success," Journal of Electronic Commerce research, 2(4), 131-41

Mulyadi, Sistem Informasi Akuntasi, Jakarta: Salemba Empat, 2016.

Palmer, Jonathan W. (2002), "Web site usability, design and performance metrics," Information Systems Research, 13(2), 151.

Paramita A.S. , "Cloud Computing-Based Point-of-Sales Readiness for Surabaya's small/Medium Enterprises,"Int. J. Adv. Trends Comput. Sci. Eng.,vol. 8, no. 1.5, pp. 333-338, Nov.2019.

Puspitawati L. & S. D. Anggadini, Sistem Informasi Akuntansi, yogyakarta: Graha Ilmu,2011.

Quelch, John A. & Lisa R. Klein (1996), "The Internet and International Marketing," Sloan Management Review, 37(3),60-75.

Robert et al., (2005). A basic model of electronic commerce adoption barriers: A study og regional small businesses in Sweden and Australia, Journal of Small Business and Enterprise Development, vol. 12(4), pp.510-527.

Saputra C. E. & Rokhman, "Rancang Bangun Aplikasi Point of Sales Perlengkapan Baltia pada UD. Matahari Jaya Malang," Undergraduate thesis, STIKOMSurabaya., 2013.

Schubert P. & Selz D. (2001), "Measuring the effectiveness of e-commerce Web sites," in E-commerce & V-Business, S. and Hunt Barnes, B., Ed. Oxford: Butterworth-Heinemann.

Shapiro, R. (2008). How to Use Pos Data in Demand Planning. Journal of Business Forecasting, 27(4), 36-38.

Song, J. & Zahedi F. (2001), "Web design in e-commerce: a theory and empirical analysis," in International Conference on Information Systems. New Orleans, LA: AIS eLibrary.

Tallon P. P. & Kraemer K.L. (2002), "Executives'Perspectives on IT: Unraveling the Link between Business Strategy, Management Practices and IT Businness Value," in America's Conference on Information Systems (ACIS2002), AIS,. Dallas, TX, USA

Utomo H.S. et al .., "Implementation of mobile-based monitoring sales system in Semi Tani Shop," in 2017 International Conference on Sustainable Information Engineering and Technology (SIET).