PROGRAMME BOOK

IC-AMME & LSCM 2021

2nd
International Conference on Automotive, Manufacturing, and Mechanical Engineering

4th
International Conference on Logistics and Supply Chain Management

Conference Topic

Enhancing Sustainability and Value-Added Creation in Smart Industries

2nd Oct 2021

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Organized By

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Message from The Organizers

I am pleased to welcome you to this joint online conference of the 2nd International Conference on Automotive, Manufacturing, and Mechanical Engineering (IC-AMME) and the 4th International Conference on Logistics and Supply Chain Management (LSCM). This conference was supposed to be conducted in 2020, but it was delayed because of the COVID-19 pandemic. Afterwards, we decide to consider this pandemic an opportunity to have our conference online because we must adapt to the new normal. The committee receives around 70 submissions and accepts 59 full papers from Brazil, France, Japan, Malaysia, Nigeria, Norway, Portugal, Taiwan, Thailand, the USA, and Indonesia.

We are honoured to have two excellent keynote speakers, Prof. Takashi Suzuki, PhD from Sophia University and Prof. Benny Tjahjono, PhD from Coventry University, that will share their lots of experience and discuss future trends in sustainable energy and circular economy.

On this occasion, I want to express my great appreciation to all reviewers that have done a great job reviewing all the submissions. Special thanks to our partners: the Indonesian Supply Chain and Logistics Institute (ISLI), Sophia University, Lusofóna University, and UCSI University for supporting this conference. I want to appreciate the hard work and dedication of all committee members.

Finally, I hope you will enjoy this one day conference. I look forward to seeing you at the next conferences.

Assoc. Prof. Dr. Didik Wahjudi

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Conference Schedule

* Jakarta Time (UTC/GMT +7 hours)

Saturday, October 2, 2021

07.30 - 08.00	Registration
08.00 - 08.15	Opening Ceremony
08.15 - 09.00	**Keynote Speaker:** Prof. Takashi Suzuki (Sophia University, Japan) **"Energy for Sustainable Future"**
09.00 - 09.15	Group photo & Session preparation
09.15 - 11.55	SESSION 1 (See the detailed concurrent session schedule)
11.55 - 13.00	Lunch break
13.00 - 13.45	**Keynote Speaker:** Prof. Benny Tjahjono (Coventry University, UK) **"Demystifying the Circular Economy Business Models in Operations and Supply Chain Management"**
13.50 - …........	SESSION 2 (See the detailed concurrent session schedule)

Conference List of Abstract

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IC-AMME & LSCM 2021

Mariana Wibowo, S.Sn., M.M.T., C.E.

As Participant

in The 2nd International Conference on Automotive, Manufacturing, and Mechanical Engineering **and** The 4th International Conference on Logistics and Supply Chain Management **Conference** on **2nd October 2021.**

Dr. Ir. Didik Wahjudi, M.Sc., M.Eng.
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Marketplace Based Application System to Improve Customer Satisfaction on Laundry Business

Djoni Haryadi Setiabudi, Michael Santoso, Mariana Wibowo

Abstract. Laundry shop customers are presently confronted with several service options, qualities, and features. This is due to the inconsistent operational management of these organizations, in delivering maximum satisfaction. These problems often lead to the unsatisfactory level of customers, as they begin to search for better laundry alternatives, which consumes much time and effort. The studies on laundry business have also been widely carried out, as they are found to only focus on the ease of management due to delivery to one shop, which is equipped with features of comfortable services and payments. However, it has not been able to handle the demand of customers and various items, which needs to be sent to different laundry shops. Based on these studies, the laundry business concept should be developed to improve service qualities, with customers having the option to distribute their items to desired shops, through the placement of one order. According to the development of this system, a sequential simplification from multi to single orders was observed, as the marketplace concept was also used. Furthermore, the manager handled and simplified the multi-order process, which was carried out by distributing orders to several shops, arranging the pick-up and delivery procedures, as well as receiving and transferring payments to all laundry services. The result showed a comparison between the mobile-based laundry business and traditional systems, respectively. This new system was found to save time and costs, as it handled simple to complex laundry needs with a single click on the application, compared to the traditional laundry business that involved multi orders.

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Marketplace Based Application System to Improve Customer Satisfaction on Laundry Business

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Abstract. Laundry service shop customers are presently confronted with several service options, qualities, and features. This is due to the inconsistent operational management of these organizations, in delivering maximum satisfaction. These problems often lead to the unsatisfactory level of customers, as they begin to search for better laundry service alternatives, which consumes much time and effort. The studies on laundry service shop businesses have also been widely carried out, as they are found to only focus on the ease of management due to delivery to one shop, which is equipped with features of comfortable services and payments. However, it has not been able to handle the demand of customers and various items, which needs to be sent to different laundry shops. Based on these studies, the laundry business concept should be developed to improve service qualities, with customers having the option to distribute their laundry items to desired laundry service shops, through the placement of one order. According to the development of this system, a sequential simplification from multi to single orders was observed, as the marketplace concept was also used. Furthermore, the manager handled and simplified the multi-order process, which was carried out by distributing orders to several shops, arranging the pick-up and delivery procedures, as well as receiving and transferring payments to all laundry services. The result showed a comparison between the mobile-based laundry business and traditional systems, respectively. This new system result is saving more time and shipping costs, as it handled simple to complex laundry needs with a single click on the application, compared to the old traditional laundry business that involved multi orders. It concludes that this marketplace based application new system is saving more time and cost. Because of that, the customer satisfaction on laundry business impacted to be improving also.

INTRODUCTION

The problem in laundry business includes the operational management, which is presently not satisfying the customers, due to the inconsistencies of the service options, qualities, and features [1]. This leads to disappointments being observed from customers, such as mixed-up clothes, late delivery, no detailed record of attires, and lack of notification when the service was complete [2]. Another problem is also found on the business side, such as how customers select a suitable company, regarding service quality and speed, which are often tested before obtaining results. Based on this company, the problem focuses on how perfect services are provided to customers, such as the notification of pick-up and delivery, regular schedule, cheap cost, and satisfactory qualities. This pick-up and delivery feature specifically needs the involvement of couriers, which in turn yields additional income for the third parties. Furthermore, several studies have been conducted to solve this problem, with majority focusing on the involvement of information technology.

The study of Khoirunnissa R. et al. (2016), developed a laundry management application and data integration that used web services with transaction features, expenses, as well as profit and loss reports, which includes

customers' data [3]. Furthermore, Devi, I.C. et al. (2020), also developed a web-based laundry analysis by using the waterfall method, in order to solve manual administrative processes [4]. Otawkar P., et al. (2017), further developed a web-based application to reduce manual catalogs and errors, as well as carry out automatic backups [5]. Also, the study of Shoewu, O. et al. (2016), developed a laundry management system, which determined the finish date and number of clothes washed, reduced the delay time, as well as facilitated future activities [2]. However, these previous studies generally focused their information technology on one laundry enterprise, compared to several shops such as the marketplace concept.

Based on previous presented solutions, this study develops a laundry management system, in order to improve quality services through the marketplace concept. According to previous comparisons, the advantage of this study depends on the option of vendors, due to the desire of customers. These vendors are selected by the system, due to matching the criteria being determined by the customer. Based on these conditions, baskets of laundry are being provided by the customers, due to the possibility that some clothes are likely to be completed by vendor A or B. Furthermore, the system automatically calculates order and allocate charges to each vendor, through the use of one command and payment method.

The advantages of the system offered (marketplace based application system for laundry) compared to traditionalold laundry businesses that generally exist are with only one click to order, custormer can directly order to a few laundry services with laundry variances services that the customer's needed. Another advantage from this system is by using this system, customer with one click can ask the courier service do the one time pick up for their laundry to customer dan the courier will send the laundry to send to a few address laundry service shops with only one time delivery service charge (one shipping cost). In a traditional laundry service, customer must click few times for a different laundry services and will charged the courier as many as the laundry service shops address that needed and taken. So, with the new system, it will charge the courier service to take and send the laundry cheaper (one shipping fee), more effective and efficiently to do the laundry with many kind variances services for the customer .

Several previous studies related to Laundry Business are as follow,

Guo and An (2014), demonstrated the success of verifying basic functions, such as online catalogs, price comparisons, and payments from electronic marketplaces [6]. This study showed that there were similar basic functions that was applied to all types of e-marketplaces, which included IT products, transportation, health, etc.

Nugraha A.R. (2018), tried to develop a marketplace information system for laundry, which was found to only achieve the design stage [7]. This was due to the assumptions and decisions to automate simple administrative processes, such as customer registration, locating vendors without criteria, as well as direct order and payment of products. Based on the limitation of this study, it was unclear how laundry items reached the vendor, as there was also a direct delivery process to the customer without payment confirmation from the marketplace. Furthermore, the use of multi orders in several laundry shops was another limitation, as customers were unable to place single commands.

Otawkar P., et al. (2017), developed an online web Laundry Service System, with features of demand, dry cleaning, express, and subscription-based services [5]. The main advantage of this system was due to its fully customized responsiveness, based on being a web-based application that reduced manual catalogs, as well as eliminated errors and backups. It was also equipped with order tracking, pick-up and delivery features, as well as payment processing. However, the disadvantage was due to the unsatisfied customer being unable to select a vendor, which in turn led to alternative searches on other online laundry sites.

Devi, I.C, et al. (2019), also developed a Laundry Information System, which possessed a feature that washed clothes shoes, and helmets [4]. This system was also equipped with a mobile application and web-based admin system, for the accessibility and management of laundry services, respectively. Furthermore, there was an application for couriers that were in charge of picking up and delivering results. However, this system only handled one laundry company, as there was no option for customers when they became unsatisfied with the services.

Furthermore, T. Rachmawati et al. (2018), analyzed customer satisfaction level on services in Small Medium Enterprise (SME) class laundry companies, considering that several organizations were in the middle category, including SMEs [8]. This study was conducted in three stages, namely developing, testing, and evaluating a customer satisfaction measurement system, respectively. Several measured factors included, employee courtesy and professionalism, speed of pick-up and delivery services, cleanliness of laundry results, and timely finishing

schedule. The results showed that the system had two types of satisfaction analysis, namely simple and complex measurements. These measurements were used to obtain present and quick information, as well as produce comprehensive data related to customer satisfaction and service.

Shin, Y. et al. (2017), examined the effect of CSMA (corporate sustainable management activities) on CRM (customer relationship management) [9]. Although few studies have addressed the three dimensions of CSMA (environmental, social, and economic), this study investigated its effect on customer satisfaction (CS), word of mouth (WOMI), and repurchase intention (RI). Based on a survey conducted in South Korea, the results showed that environmental and economic aspects of CSMA played an important role in increasing CS, which positively affected WOMI and RI.

I. Khan. et al. (2016), also explained the daily use of battery life for smartphones in laundry services [10]. Based on a large number of daily activities in using various applications, studying their effects on battery life was very necessary. The application developed was known as the Smartphone Task-based Energy Monitoring System (STEMS). This system was used to estimate the diverse and daily power consumption of smartphone usage for applications. The results of this study showed that activities that required internet connectivity were more energy-consuming than others. This was found to be useful to stakeholders, such as application designers and developers, PIM managers, and end-users.

M. Luca (2017), also explained the online sales market, where several small sellers required help in trading at low costs [11]. One major challenge encountered by marketplace designers was how to build trust, towards facilitating transactions between unknown strangers. Furthermore, this study provides an online marketplace design with a focus on trust and reputation mechanisms. The results indicate that the decisions made by the marketplace platform depend on ethical, legal, operational, competition, and public relation considerations, respectively. This study also provides insight into the principles that underlinethe design of reputation systems, in order to help reduce discrimination within the digital age.

MATERIAL AND METHODS

The new system proposed use the marketplace concept (Guo, 2014 and Nugraha, 2018) [6], [7], where the customers were served with an option of laundry business company lists. Based on this concept, the customers initially focused on the products and features from each laundry service shop, before the selection process, as presented in Figure 1. For example, laundry service shop A has the characteristic of being able to wash and dry clean clothes, while laundry service shop B has the ability to cleanse large size bed linen without having the drying feature. Meanwhile, laundry service shop C washes shoes, which its service is not carried out by laundry service shop A and B. Based on the use of one order, the customers divides the laundry items between the laundry A, B, and C shops. Furthermore, the distribution of each item was determined by the customers, due to their desire for certain types of laundry item. Based on this condition, the proposed system automatically and virtually allocated requests into 3 orders, without customers bothering to make the distributions.

Another feature was the presence of a service courier, which helps in picking up and delivering the laundry items. Furthermore, the system requires the payment with only one shipping fee, compared to ordering thrice with three delivery costs. This ensuresmore savings on the customer's side, with the aim of increasing their satisfactory level. According to the study of T. Rachmawati et al. (2018), pick-up and delivery services increased customer satisfaction [8]. The system also provided notifications when the laundry was complete, as new payments were made after the retrieval of items. This payment system was selected according to the preference of the customers, either by transfer or making a previous deposit to the marketplace admin. Based on the first picture in Figure 1, a customer was confused due to having several types of laundry item to be sent to a laundry shop. In the second picture, several options in terms of quality and price were provided to the customer. The order button was further clicked after the payment process finished, as well as selections of laundry shop and item options. This order processed by the marketplace admin, and a notification will send to each laundry shop, based on confirmation and approval of the customer's request.

The advantages of the system offered (marketplace laundry) compared to traditionalold laundry businesses that generally exist are with only one click to order, custormer can directly order to a few laundry services with laundry variances services that the customer's needed. This advantage is not available in an old traditional laundry service. Another advantage from this system is by using this system, customer with one click can ask the courier service do the one time pick up for their laundry to customer dan the courier will send the laundry to send to a few address laundry service shopswith only one time delivery service charge (one delivery cost). In a traditional laundry service,

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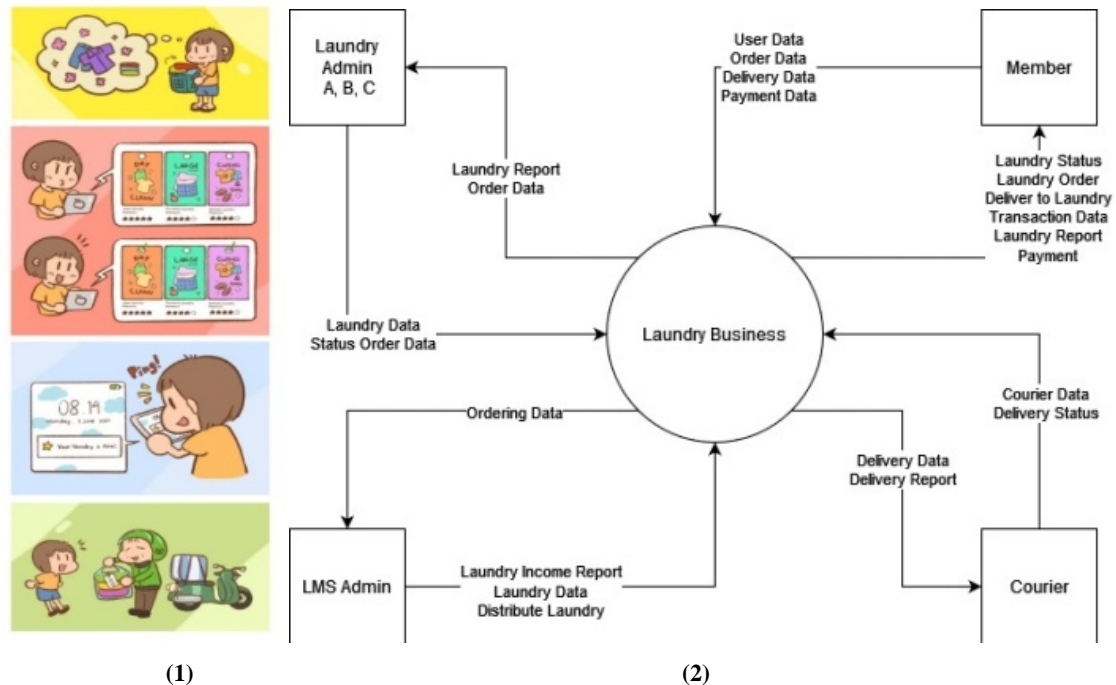

| (1) | (2) |

FIGURE 1. New Concept of Laundry Business; **FIGURE 2.** Data Flow Diagram of New Laundry Business

Based on the agreement of all the laundry service shops business, the procedure continues towards the courier search process, in order to pick up and deliver items to each shop. The system is found to automatically notify the customer after the completion of the order, as shown in the third figure of Figure 1. Therefore, the customer awaits the courier'sservice delivery. This delivery process involves the gradual collection of items from the laundry shop, which are combined and sent to the customer, as shown in the fourth picture of Figure 1. Furthermore, the use of a mobile application by involved users is another factor to be considered when making order and confirmation transactions, except for the marketplace admin that utilized web services on the desktop. Therefore, the use of smartphones in conducting transactions through an internet connection was very wasteful in battery usage [10]. This was a concern for laundry shop admins and couriers, as all smartphones were to always be on standby in receiving and processing orders from customers at any time.

Four entities generally have an important role in the operation of the laundry business. The first entity is the members or end-users, which interacts with laundry business to make orders and payments, as well as information related to the user. Based on this process, members also receives updates regarding the laundry orders, as well as data related to reports, payments, and transactions. The next entity is the laundry business admin, which controlls the laundry distribution data in the multi orders and to the courier. This entity also manages the process of distributing payments from members to all laundry shops. Based on completing the distribution, a courier entity whose job is to receive the laundry items, is observes. This entity also plays a role in updating their position, as the shops and members found the location to prepare and process their transactions. The next entity is the laundry admin, whose responsibility is to manage the items. This laundry party also receives incoming order data and updates from the courier. Furthermore, laundry shops can see the sales report made in theirlaundry business, andare also can update order information to members.
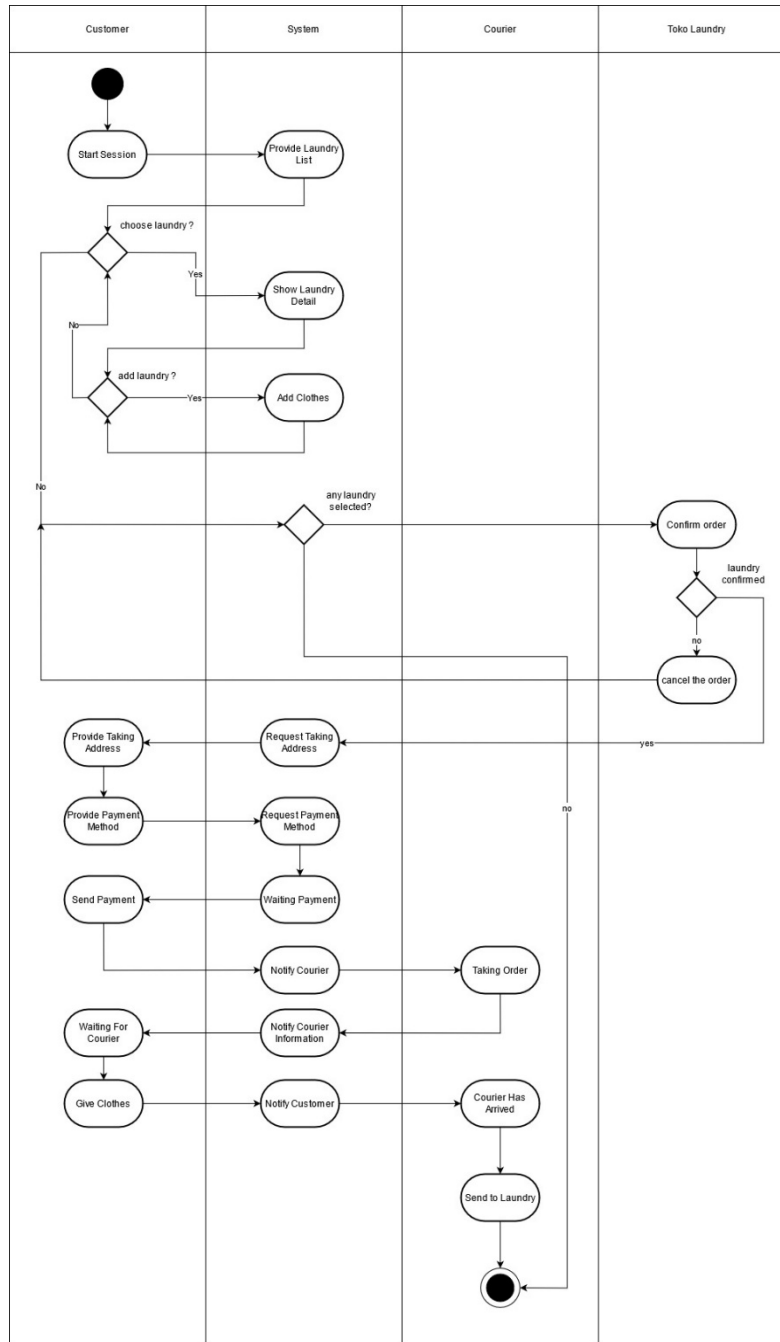
FIGURE 3. Activity Diagram for the customer, laundry shop & marketplace admin, and courier

Based on Figure 3, 4 factors are involves in the process, including customer, system (marketplace admin), courier, and laundry shop. Firstly, the system provides data in the form of selectable laundry shops, when the customer enters the page. This customer selects the shop according to their needs, as the laundry items are includes in the shopping cart. Based on this condition, the customer is entitled to enter several laundry shops in one order. When there are no more items, the process continues to the checkout page, where the address of the customer is to be inputted, in order to determine the pick-up point. Furthermore, the total costs and that of the courierserviceare displayed, with the selection of a payment method to process the order. This process continues by making a

payment, with the system notifying the nearest courierservice to receive the orders. The laundry items are further provided to the courierservice, based on being sent to the selected shops.

RESULT

The design and activity diagrampreviously described are implemented on mobile devices by using Android and Visual Studio, which involves the customer, laundry shop, and courier. Meanwhile, the admin process algorithm is implemented in the form of a web. Furthermore, application testing is carried out in a limited area within the same city, namely Surabaya, Indonesia, due to the use of motorbikes by the delivery service couriers. This indicates that the laundry marketplace system is only feasible to be implemented in a limited area of 20-30 kilometers in diameter.

Figure 4 shows the option of laundry service shops and categories, as the customer selected more than one location with different items.
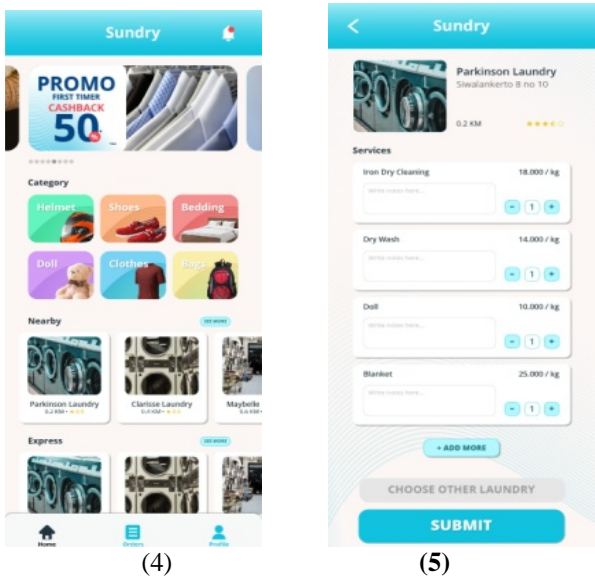

(4)   **(5)**

FIGURE 4. Selection and category of laundry service shops; **FIGURE 5.** Features for laundry shop

Customers can choose the desired feature based on each laundry service shopthat needed, as shown in Figure 5.
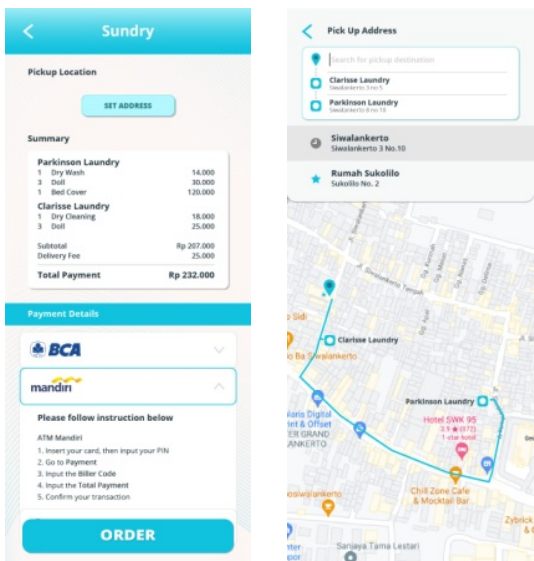

FIGURE 6. Process of Check Out and Payment (left) and Laundry delivery/pick-up process monitored from Google Map(right)

Based on Figure 6 (left), the customer can input the address and selectthe payment method, after choosing the desired laundry itemsand servicesin more than one laundry service shop.Although there was more than one laundry service shop option being clicked and chosen, the customer still paid only for one shipping fee. This system indicated that they will save more on shipping cost, compared to the old traditional system.

Figure6 (right)shows that the delivery process to the selected laundry service shops monitored in the customer's smart-phone screen, after the courier service picked up the laundry items. Therefore, the courier service sends the laundry items to the first and second laundry service shops, respectively. With this new system, customer can save more time to do their laundry, to send and deliver back their laundry. By saving more time, customer satisfaction to this laundry business is increasing also.
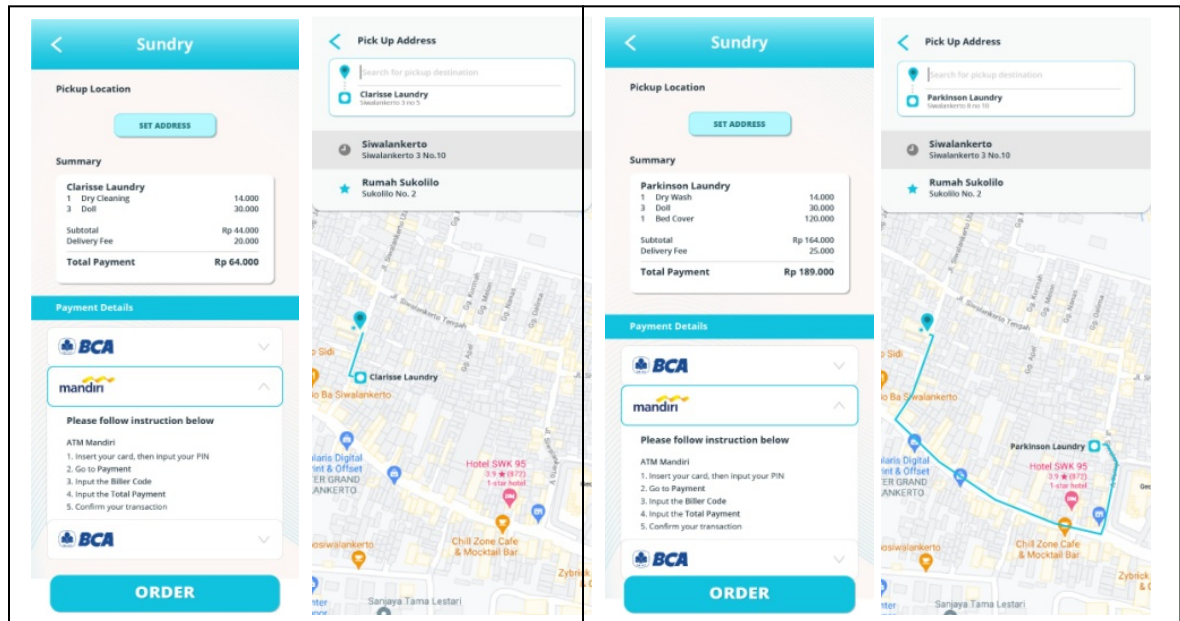
(7)   (8)

FIGURE 7.(Left) Order Fee from Laundry 1 with the old traditional system, and laundry delivery/pick-up process monitored from Google Map(right); **FIGURE 8.**(Left) Order fee to the 2nd laundry shop with the old traditional system and laundry delivery/pick-up process monitored from Google Map(right)

Example from Figure 6, 7 and 8, showthe difference consumption oftime and cost for the customer in using the old systemvs thenew system.In the old tradional system, if the customer want to order laundry service from 2 laundry shop the courier service cost will take charge double time.So the courier cost will be Rp.20.000,- (because of the distance, the customer must pay the minimum delivery cost of Rp.20.000,-) to 1st laundry shop and Rp. 25.000,- to the 2nd laundry shop (10 km distance). The total courier service cost will be Rp.45.000,- by using the old traditional system.Usually, courier service cost ± Rp.2.500,- /km with minimum order Rp.20.000,-. Delivery service with distance from 0 km until 20 km will be charged Rp.2.500,- until Rp3.500,- per km.

With the new of marketplace basedapplication system, if the customer want to order laundry service from 2 laundry shop, the customer will only take one time order. It save more time for customer to do this.And from this example in Figure 6, the customer will pay the courier service cost only Rp.25.000,- from 2 laundry shopsby using the new system because it directly to two places (10 km distance).

From this example in Figure 6, 7 and 8, the new system with one time order, can saving more cost Rp.20.000,- for the customer. This new system result is effectivelyand efficiently save time and cost for the customer. Because of that, this proposed marketplace basedapplication system result isimprovingcustomersatisfaction on laundry business.

DISCUSSION

Based on comparisons with previous studies[1]–[5], [7], [8], some of the improvements made in this study are summarized in Table 1.

These comparisons are made with the assumption that the customer has several items to be washed, such as: daily (shirts, pants), party clothes, curtains, blankets, shoes, suitcases, jackets, and bed covers.

TABLE 1. Comparison of Concepts Between the Old Laundry Business and The Proposed Laundry Business

Item Compared	Previous Laundry Business	New Laundry Business Concepts
Number of laundry service shop/orders	One laundry serviceshop	More than one laundry service shop
Type of laundry items	One type of laundry item	Various type of laundry item
Number of order	Multi orders	Single order
Number of courier service involved	Many courier services	Only one courier
Cost		
Time	More Expensive	Cheaper
Payment amount	Relatively long	Relatively short
	Multi payment	Single payment

Based on the old traditionallaundry business system, Table 1 shows that customers are forced to divide their items into several laundry service shops and to do that, it will take more time. Meanwhile, one shop was unable to provide services for some specific items, such as washing for shoes and suitcases, which requires a special service company to handle the laundry process, by using the right equipments and expertises. Furthermore, the old traditional system forced the customer to send different items to several shops, which automatically consumed much time and cost. However, they only need to place a single order in the new laundry business system towards washing complex items, while sending simple laundry to the old shop based on expectations and quality. The customers also can choose the cheapest laundry service shop, as apick-up process is found to be needed in the old traditional system.

Based on the limitations of this study, the application of the new laundry system isonly effective in a limited area. Another obstacle was the difference in the work speed of each shop, which led to the possibility of different completion time. Based on this condition, the courier should wait for the latest results time before making a single delivery. Furthermore, the pick-up and delivery costs were slightly expensive when the selected shops are located far apart. The system also charges fees according to the distance travels by the service courier, which allows optimization based on the shortest distance. Therefore, the pick-up and delivery routes should be optimally calculated by using an algorithm, which should be consider during the processes of future studies.

CONCLUSIONS

Based on the concept of the newly develops aboutlaundry business system, this study proves that the new system has succeeded in simplifying the process of laundry's process and delivery, compares to the old traditional system. In the old traditional system, customers had to carry out multi orders to several laundry service shops, which has been simplified to a single command by the new system, with the ability to distribute laundry items to many laundry service shops. Besides that, customers also can choose these laundry service shops according to customer's desire, quality, and price, by using the marketplace concept. Another advantage is that the new system only needs one service courier for all laundry shops, which in turn speed ups the search process also. Based on the financial of the old and new systems, the customer previously had to make several separate payment and now only do the single payment system to each shop. Furthermore, the task of the marketplace admin is to distribute payments to each laundryservice shop. Meanwhile, the effectof this new system is the increased task complexity of the marketplace admin, which should be able to handle several shops, based on laundry to payment distributions.And it can be handled by development of the marketplace admin system.

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REFERENCES

1. A. Jamgade, K. Gawande, S. Shingade, and P. Anjankar. E-Laundry Portal-A Review. *International Journal of Engineering Science and Computing* (2016) doi:10.1257/aer.104.5.489.

2. O. Shoewu, N. T. Makanjuola, D. A. Phillips, and A. Emmanuel. Design and Implementation of a Laundry Management System. *The Pacific Journal of Science and Technology* 12: 197–202 (2016).

3. R. Khoirunnisa, R. R. Isnanto, and K. T. Martono. Pembuatan Aplikasi Web Manajemen Laundry dan Integrasi Data dengan Web Service. *Jurnal Teknologi dan Sistem Komputer* 4: 93–101 (2016).

4. I. C. Devi, F. H. Zhafirah, and R. I. Farian. Analysist Web-Based of Laundry Information System. *Conference SENATIK STT Adisutjipto Yogyakarta* 417–426 (2019).

5. P. Otawkar, D. Darde, N. Gondke, M. Rokade, and P. M. Kulkarni. Laundry Service System [LSS] (Web Application). *International Journal of Scientific Research in Computer Science, Engineering and Information Technology* 2: 936–938 (2017).

6. T. Rakhmawati. A Case Study on E-marketplace Basic Functions. *The Fourth International Conference on Business Intelligence and Technology (BUSTECH 2014)* (2014).

7. A. R. Nugraha. Perancangan Sistem Informasi E-Marketplace Original Clothing Indonesia Berbasis Web. *Jurnal Manajemen Informatika* 5: 11–20 (2018).

8. T. Rakhmawati. Designing Customer Satisfaction Measurement System for a SME Laundry Services Company Tri Rakhmawati. *Proceedings of the International Conference on Industrial Engineering and Operations Management* (2017).

9. Y. Shin, V. Van Thai, D. Grewal, and Y. Kim. Do corporate sustainable management activities improve customer satisfaction, word of mouth intention and repurchase intention? Empirical evidence from the shipping industry. *International Journal of Logistics Management* 28: 555–570 (2017).

10. I. Khan, S. Khusro, S. Ali, and A. Ud Din. Daily life activities on smartphones and their effect on battery life for better personal information management. *Proceedings of the Pakistan Academy of Sciences: Part A* 53: 61–74 (2016).

11. M. Luca. Designing Online Marketplaces: Trust and Reputation Mechanisms. *Innovation Policy and the Economy* 17: 77–93 (2017).