Determining the Optimal Mode of Ordering in McDonald’s Between Kiosk Machines and Traditional Cashiers Using Analytical Hierarchy Process (AHP)

Madeline Anne Patrice C. Sy, Maryam G. Irenea, Frankern Luis S. Malabuyoc, Ma. Daniella M. Sobrevilla, and Rianina D. Borres
Department of Industrial Engineering and Engineering Management
Mapúa University
Intramuros, Manila, Philippines
mapcsy@mymail.mapua.edu.ph, mgirenea@mymail.mapua.edu.ph,
flsmalabuyoc@mymail.mapua.edu.ph, mdmsobrevilla@mymail.mapua.edu.ph,
rdborres@mapua.edu.ph

Abstract
Upon the emergence of self-serving technology along with the on-going pandemic, this study used decision analysis with the Analytical Hierarchy Process (AHP) software Expert Choice 2000 to determine the influence of five criteria (convenience, accessibility, flexibility, reliability, and accuracy) to the customer satisfaction of fast food chain consumers, then used the data from the result to identify which of the two methods between Kiosk machines or traditional cashier counters is optimal to utilize when ordering at McDonald’s fast food chain. The researchers used data from a sample of 242 respondents from a digital survey containing questions regarding the service rendered by the food-chain, which was then analyzed using descriptive analysis. Results showed that by 54.6%, utilizing Kiosk machines provide a better service for the customer based on their overall perceived satisfaction. However, there are still different factors that are not included yet it could affect the result of the study. For improvement, the researchers suggest that other factors such as the size of manpower, larger work area and price of items be included in the factors that determines the overall perceived satisfaction of the customer.

Keywords
Fast food industry, Kiosk machines, Traditional cashiers, Analytical Hierarchy Process, and Customer Satisfaction

1. Introduction
Customer satisfaction comes hand-in-hand with the customer service as the feedback regarding customer satisfaction allows the industry to enhance the quality efficiently (Aftab & Sarwar, Huma, 2016). This is affected by various indicators and according to Berry, Carbone, and Haeckel (2002), there are three categories that can affect service experience of the customers; (1) Functional clues, which are the technical quality of the service; (2) mechanic clues, which refer to the service environments including facility layout, design and ambient factors; and finally, (3) humanic clues which are the behaviors of the employees (Berry et al., 2002, as cited in Wall & Berry, 2007). In this study, only functional clues will be analyzed since functional clues determine how services are delivered to the customers and the capability of service of the fast food industry to perform competently in terms of accuracy and dependability (Garg, 2014). Functional clues involve the start of the process of ordering, which usually begins with the queuing line, transaction proper, and receiving the order itself. Since the fast food industry is defined as a “quick-service” type of service, the consumers have more expectations when it comes to their service speed where Dharmawirya, Oktadiana, and Adi (2012) stated that speed is the top one influencer as to why people choose fast food restaurants. Aside from the speed of transaction the industry offers, it is expected that with that characteristic comes with quality service that provides a transaction that is accurate to the customers’ needs.

As to why the introduction of self-service technologies boomed due to its primary objective to improve the overall quality of the function clues. Self-service technologies have claimed to be a technological interface that allows customers to produce services without the involvement of a service employee (Meutner et al., 2000, p. 50). As the food service industry expands, technological advancements that enhances service operations have become quickly developed and adopted. According to Kimes (2008), self-serving technology has the capability to magnify the speed
of service providing that there are elevated chances of more accessible customization of meals in accordance with the wants of the customers that are usually difficult when ordering via traditional cashiers, which will then reduce the rate of error and then influence the satisfaction of the customers.

With that and due to the rapid growth of restaurant industry particularly here in the Philippines, it has a high demand of customers and slow service speed that results in creating a longer queuing line and waiting time especially during peak hours. And due to this, service providers have focused and gave importance on reducing of customers’ waiting time as well as increasing the service speed of the restaurant (Taylor, 1994, Dube-Rioux et al., 1989, Katz et al., 1991 as cited in Kokkinou et al., 2012). One of the techniques that they have developed is the utilization of self-service technology in the food service industry, particularly Kiosk machines in McDonald’s.

However, because of the on-going pandemic, many service industries – including the food industries have also experience an economic impact which. With that, research regarding self-service technology could be seen as a critical part in mitigating health risks factors amidst the pandemic. According to Shin and Kang (2020) technologies such as self-service technology could be seen as a risk-reduction strategy that will help the service sector to recover from the losses acquired during the pandemic. In addition, the researchers also stated that self-service technologies could create a greater impact on the future of the restaurant industry because of its less human interaction services, providing consumers to have certain transaction options according to their perceived health risks.

Although there are other studies providing compelling results and findings when adopting technology-based services in other industries, most research in food service industry are all about improving service quality, maximizing revenue income, as well as evaluating customer perception and satisfaction. However, there is minimal attention being paid to as what can technology-based services such as self-service Kiosk machines can do to improve service operations in the food service industry and factors associated to which mode of ordering, whether traditional cashiers or Kiosk machines, is optimal particularly in the Philippines. The study will only be focusing on the different functional clues as criteria for consumers to determine their preferred mode of transaction. In line with these, all other factors including customer and crew factors as well as the environmental factors are excluded.

1.1 Objectives

The primary objective in this study is to construct a Decision Analysis with the utilization of the Analytical Hierarchy Process (AHP) to be able to determine on whether there is a significant preference of mode of transaction at fast-food restaurants, specifically McDonald’s. Which also determines the level of the customer satisfaction when using either a self-service technology (Kiosk) and the traditional cashier and identifying which mode of transaction is more preferred by the masses by rating its functional clues, namely: convenience, accessibility, reliability, flexibility, and accuracy. Under that main objective, the researchers also aim to identify the weights of each criterion mentioned and how they affected the preference of respondents when ordering.

2. Review of Related Literature

2.1 Overall Customer Satisfaction

According to Nosek Jr. and Wilson (2001), customers’ expectation is considered to be one of the intangible elements which means it solely depends on the perceived performance rather than the actual performance which the study has also stated that it is a critical factor when it comes to affecting customer satisfaction. Customer satisfaction encapsulates numerous factors that can influence the success of a service company specifically in the fast food industry. Gilbert et al., (2004) have claimed that superior services can eventually lead to a satisfied and loyal customer (Gilbert et al., 2004 as cited in Qin et al., 2009). Moreover, one major key factor that can determine a company’s success is their customers’ satisfaction. Customers’ satisfaction and perception can also be influenced by different factors. In line with the introduction, customers’ satisfaction can be influenced by mechanic, humanic, and functional clues. Most importantly, mechanic and humanic clues have both been studied and found that there is an effect on customers’ perception and satisfaction when there is changes in either mechanic or humanic clues (Garg, 2014; Wall et al., 2007). In addition to that, Ahmad et al. (2013) stated that intangible components together with tangible factors, or functional clues as stated before, aid in the improvement of service quality which will lead to customer retention, thus, increased customer loyalty.
2.2 Emergence of Self-Serving Technologies

Technology throughout the years have become more advanced and has made it possible for the discovery of many functional and utility devices that makes our lives better and easier. That is why a lot of industries have already adopted technology as a part of their system allowing them to improve the services that they provide for their customers. One of this technology is the Self-Service Technologies (SST) which have been introduced as one of the strategies that can reduce in customers’ waiting time (Kokkinou et al., 2013). These self-service technologies involve ATMs (automated teller machines), self-checkout in groceries, electronic self-ordering kiosks as well as online services and etc. And according to Meutner, Ostrom, Roundtree, and Bitner (2000) these technology-based services are expected to be one of the long-term critical success factors in the business. There are many benefits as to what can self-service technologies such as kiosks do, According to Levy and Weitz (2008), Self-service kiosks can produce flexibility in delivering customer service. (Levy et al., 2008 as cited in Lee, H. J. Lee, M. N., & Fairhurst, 2009). In addition, Dixon et al., (2009) stated that technology-based services in the food industry have improved convenience to the customers, because customers tend to conserve their time and effort, speed transaction convenience that can increase in customers’ satisfaction and decrease customers’ waiting time. They also claimed that the use self-service technology can improve service speed, which means that with an increase of service speed, there is a high chance of serving more customers thus increasing its revenue.

2.3 Convenience

People are willing to queue and pay to get food. Knowing peoples’ opinions on queuing is of interest to restaurant stakeholders since it and related actions have a direct effect on revenue. While most previous studies focused on dine-in restaurants, researchers observed queuing for fast food restaurants (Dharmawiryal, M., Oktadiana, H., & Adi, E., 2012). McDonald’s is well known for their package meals that are promoted as affordable and on the go. This promoted meal packages attracts more people, resulting to long queues and inconvenient waiting time (Koh, H.L., et.al., 2014). According to Dharmawiryal, Oktadiana and Adi, E., (2012), the study indicates that during lunch time peak hours, customers spent on average 5.4 minutes waiting before they could get their orders. The 5.4 minutes consisted of 2.42 minutes of queuing time and 2.98 minutes of service time. This total waiting time is only slightly below the actual expected waiting time of 5.42 minutes. In another study conducted by Koh et.al., (2014), their study indicates that having long queues and increased queue time is because of limited space. Hence, McDonald’s service quality could be improved significantly if the food preparation time can be reduced, particularly during peak period. However, this does not necessarily mean that obtaining larger workspace will reduce waiting time. It can also be correlated to the amount of manpower a chain has. Thus, providing basis that convenience has the greatest contribution to the criteria when assessing customer satisfaction in the fast-food industry.

2.4 Accessibility

According to Kumar and Hemamala, (n.d.), Service quality is the demanding success factor of fast food restaurant. Service quality is the main component in a fast food restaurant which is to be measured and improved continuously. Dharmawiryal, Oktadiana, and Adi, (2012) used the research conducted by Zhao et al. (2002) who highlighted that the research of (Katz et al., 1991; Roslow et al., 1992) has identified how speed is becoming one of the most important factors in the service industry and that customers tend to perceive waiting for service as a negative experience. There are two common approaches in dealing with the possible negative impacts caused by waiting for service. First, restaurants can design operations flow that will minimize actual queuing and service times. Secondly, restaurants can also manage customer perception. Based on their observation, by sending the customers to their seats once they made their payments and later delivering the food to their tables, restaurant C created the perception that it had a quick service and met the customers’ expectations, especially when the customers come in groups which allow them to hang out with their friends while waiting for the food. According to Jones and Peppiatt (1996), a study cited by Dharmawiryal, Oktadiana, and Adi, (2012), one of the variables that makes customers have a shorter perceived waiting time than the actual waiting time is when they are waiting with others. Based on the results of the study conducted by Dharmawiryal, Oktadiana, and Adi, (2012), service time greatly affects the overall customer satisfaction. If accessibility to a service is unavailable, it shows a significant level of negativity on the perception of the customer.
2.5 Flexibility

Payment options have evolved throughout the years from cash only payment systems to multiple options which include electronic payment methods. Flexibility, in this study, refers to McDonald’s expansion to multiple payment options presented for both traditional cashiers and Kiosk machines upon ordering since it was announced in 2019 that the expansion covers payments from PayPal, Visa, Mastercard, JCB credit, debit, and prepaid card payments (BusinessMirror, 2019). Statistics from the United States show that 44% consumers opt for debit card payment, 32% prefer credit card payment, and the remaining 18% lean on cash payments when having transactions in fast food restaurants (Payment type preference when shopping at fast food restaurants in the U.S. 2018 | Statista, 2018). Krueger (2014) identified the cost and benefits of both cash and cashless payment instruments where he conducted a survey tackling the payment behavior in Germany where it was revealed that 53% of the respondents opt to pay cash while the card usage for payment increased from 30% to 36%. PayPal, an internet payment option, was just released into the market by that time and did not present any relevance back in 2008, yet increased usage was exhibited in 2011 then further magnified.

Given the current global health crisis, provision of expansion of multiple payment options and further utilization of self-servicing technology are beneficial to avoid person-to-person contact to prevent the spread of the virus, thus, the emergence of a new normal and cashless society (The rise of e-commerce and the cashless society - Think Tank, 2020). Although evidence point to flexibility being a significant factor when purchasing services from the fast food industry, or any industry for this particular matter due to the evolving economy, it sits low among the criteria to be analyzed in this study since consumers do not have a specific preference with payment options, yet a wide variety of options possibly may aid in the increase of overall customer satisfaction either when ordering via Kiosk machines or traditional cashiers due to the emerging new systems.

2.6 Reliability

According to Omar, Ariffin, and Ahmad (2016), reliability in restaurants can be characterized on how restaurants are able to fulfill customers’ request regarding on their selected menu items and table reservations. Thus, they also have found that reliability is one of the factors that has a significant relationship with customers’ satisfaction. To support this, a study conducted by Zeithaml, Parasuraman and Berry have considered tangibles, responsiveness, assurance, empathy and reliability as an important factor to customers’ loyalty and satisfaction. and developed a systematic SERVQUAL model that allows the customer to assess the service quality of a restaurant. To which the researchers have found that customers find reliability to have a rating of 32% which makes it significantly higher than the rest of the criteria that were set by the researchers (Zeithaml et al., n.d, as cited in Shandilya et al., 2018). However, recent studies using the SERVQUAL model have found that although reliability has a significant effect when it comes to customers’ satisfaction for fast food restaurants, it has a weak relationship with customers’ satisfaction, therefore concluding that the level of satisfaction lightly depends on the reliability of a fast-food restaurant (Ngueyn et al., 2018). Yet, according to Adiele and Anyahie (2018), service reliability is a crucial factor when it comes to customers’ patronage and the overall business performance. In addition, the researchers also stated that customers of hospital industries have express their patronages towards fast food firms that is reliable and dependable. Aside from this it was also stated that an efficient services reliability tends to increase customers trust and loyalty. This was also mentioned in the study by Karatepe (2011) that an efficient service, and its reliability has a direct link to customers’ loyalty. The importance of customers’ loyalty in the fast-food industry was discussed by Ling et al. (2011), stating that customers loyalty is a key factor long-term survival since the industry is classified to be highly competitive.

2.7 Accuracy

Accuracy in the fast-food industry is usually referred to the filling of orders accurately. Several studies have already claimed that order accuracy plays an important factor when it comes to the customer experience in the fast-food restaurant (Bienstock, Mentzer, & Bird, 1997; Mentzer, Flint, & Hult, 2001, as cited in Kabir, 2016). Tristano (2013), have stated that accuracy is also a major factor when customers decided which fast-food restaurant they want to go to, and a conducted survey for the US Consumers shows that 92% agree on the importance of accuracy when it comes to fast-food restaurants (Tristano, 2013, as cited in, Kabir, 2016). Furthermore, according to Duncan (2015), restaurant operators have begun to shift its focused on completing orders accurately especially for services such as drive-thru and take out because these services could potentially affect customers’ satisfaction and patronage due to its inability to correct an incorrect order once the customers leave (Duncan, 2015 as cited in Kabir, 2016). The finding of the study by Kabir (2016) shows that order accuracy is one of the most important factors for customer satisfaction, which
supported the study made by Tristano in 2013. In addition, According to Castillio et al. (2020), improving the overall speed of service as well as the order accuracy has the potential to increase customer satisfaction. However, there is still no recent studies relating on how order accuracy influenced customers’ perception and satisfaction based on the type of transaction method (Kiosk machines or traditional cashiers) that they used.

3. Methods

3.1 Conceptual Framework

![Figure 3.1. Conceptual Framework](image)

Figure 3.1 shows the conceptual framework of this study where it shows the three (3) levels of the decision analysis using the Analytical Hierarchy Process (AHP). Level I determines the goal of this study which is to determine the optimal mode of ordering at the fast-food restaurant chosen, which is McDonald’s. Level II shows the five (5) criteria applicable and used to compare the level III entries, which are the alternatives offered to consumers when ordering which are through traditional cashiers and Kiosk machines.

3.2 Analytical Hierarchy Process (AHP)

This study aims to create a decision analysis to determine which mode of ordering is preferred and optimal for consumers. Given that, the criteria used in this research are based on literature reviews in other studies. The following criteria are considered in the determination of the optimal mode of ordering:

- **Convenience:** This pertains to the queuing line measured in minutes and this is considered as the top priority of the fast food restaurants due to its very nature of being denoted as the “quick-service” industry.
- **Accessibility:** This refers to the time spent by the consumers upon stating respective orders also measured in minutes. This comes second when compared to other criteria, again, due to the very nature of the industry.
- **Flexibility:** This indicates the number of payment options available. However important this is, consumers do not mind significantly how many options fast food restaurants offer yet when there are numerous options given to consumers, it still influences the increased customer satisfaction. Thus, this sits low on the hierarchy of importance.
- **Reliability:** This refers to the precision of the orders placed and inputted for both methods which is measured in percentages observed by the consumers. This comes next to accessibility since customers react negatively when there are incorrect orders placed yet can be corrected.
- **Accuracy:** This pertains to the correctness of the orders received after the transaction made by the customer which is also measured in percentages observed by the consumers. This comes next to reliability in the hierarchy of importance since the precise orders must be invoiced into the system for processing then given to the customer for completion of service.

3.2 Treatment of Data

Descriptive statistics was mainly used for the treatment of the data. Afterwards, Analytical Hierarchy Process (AHP) was used as a main tool for the decision-making process. According to Vargas (2010), AHP is being used for decision
making in a complex environment that involves several criterions that will be considered when selecting an alternative method or projects. The AHP has the capability of transforming empirical into numerical values which will be used for the comparison of different criterions – which is why it is the most suitable comparison technique for the study.

4. Data Collection

This study aims to determine the optimal mode of ordering in McDonald’s where the source of data is based on the customer satisfaction. Due to that, a digital survey was constructed in Google Forms which was then distributed to 242 respondents. The type of sampling used was convenience sampling as it allows researchers to collect data from any individual who has experienced ordering at any McDonald’s branch. Respondents rated each criterion based on their perceived level of satisfaction. There are four (4) levels of rating which depends on the perception of the consumer in regard to their satisfaction, 1 being the lowest rating and 4 being the highest.

5. Results and Discussion

5.1 Numerical Results

Table 5.1.1. Respondents' Profile

<table>
<thead>
<tr>
<th>Respondents' Profile</th>
<th>Category</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred Mode of Ordering</td>
<td>Traditional Cashiers</td>
<td>124</td>
<td>51%</td>
</tr>
<tr>
<td></td>
<td>Kiosk Machines</td>
<td>118</td>
<td>49%</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>113</td>
<td>47%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>129</td>
<td>53%</td>
</tr>
<tr>
<td>Age</td>
<td>Below 18 years old</td>
<td>21</td>
<td>9%</td>
</tr>
<tr>
<td></td>
<td>19-29 years old</td>
<td>190</td>
<td>79%</td>
</tr>
<tr>
<td></td>
<td>30-40 years old</td>
<td>14</td>
<td>6%</td>
</tr>
<tr>
<td></td>
<td>Above 40 years old</td>
<td>17</td>
<td>7%</td>
</tr>
</tbody>
</table>

Table 5.1.1 shows the basic demographic information of the respondents. It was seen that out of 242 respondents, 51% opt for traditional cashiers when ordering while the remaining 49% utilize Kiosk machines. 53% are female respondents while 47% are male. Majority of the respondents are 19-29 years while there are respondents that are aged below 18 years old, 30-40 years old, and above 40 years old. This means that consumers of any age or sex are capable of ordering for both methods.

Table 5.1.2. Summary of Average Ratings per Criterion

<table>
<thead>
<tr>
<th></th>
<th>Convenience</th>
<th>Accessibility</th>
<th>Flexibility</th>
<th>Reliability</th>
<th>Accuracy</th>
<th>Overall Customer Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Cashiers</td>
<td>2.0645</td>
<td>2.2500</td>
<td>2.4355</td>
<td>3.2016</td>
<td>3.4274</td>
<td>3.1371</td>
</tr>
<tr>
<td>Kiosk Machines</td>
<td>2.7203</td>
<td>2.6102</td>
<td>2.8814</td>
<td>3.7712</td>
<td>3.8475</td>
<td>3.7288</td>
</tr>
<tr>
<td>Ratio</td>
<td>1.3178</td>
<td>1.1601</td>
<td>1.1831</td>
<td>1.178</td>
<td>1.1226</td>
<td>1.1886</td>
</tr>
</tbody>
</table>

Table 5.1.2 shows the summary of average ratings per criterion for this study. The ratio was used as the rating per criterion for the analysis of weight of the mentioned criteria. The researchers used the specific calculated ratios due to the minimal decimal point differences and cannot be rounded up since the differences will not be seen when compared in the AHP software. This shows that Kiosk machines are 1.32 times better than traditional cashiers when it comes to convenience, 1.16 times better for accessibility, 1.18 times better for flexibility, 1.18 times better for reliability, 1.12 times better for accuracy, and 1.19 times better for the overall customer satisfaction.
Table 5.1.3. Criteria and Alternative Weight

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Criteria</th>
<th>Weight</th>
<th>Alternative</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine Optimal Mode of Ordering in McDonald's</td>
<td>Convenience</td>
<td>0.292</td>
<td>Kiosk Machines</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Traditional Cashiers</td>
<td>0.121</td>
</tr>
<tr>
<td></td>
<td>Accessibility</td>
<td>0.247</td>
<td>Kiosk Machines</td>
<td>0.135</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Traditional Cashiers</td>
<td>0.116</td>
</tr>
<tr>
<td></td>
<td>Reliability</td>
<td>0.221</td>
<td>Kiosk Machines</td>
<td>0.121</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Traditional Cashiers</td>
<td>0.102</td>
</tr>
<tr>
<td></td>
<td>Flexibility</td>
<td>0.097</td>
<td>Kiosk Machines</td>
<td>0.503</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Traditional Cashiers</td>
<td>0.045</td>
</tr>
<tr>
<td></td>
<td>Accuracy</td>
<td>0.143</td>
<td>Kiosk Machines</td>
<td>0.078</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Traditional Cashiers</td>
<td>0.069</td>
</tr>
</tbody>
</table>

Table 5.1.4. Overall Alternative Weight

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Weight</th>
<th>Priority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kiosk Machines</td>
<td>0.546</td>
<td>1</td>
</tr>
<tr>
<td>Traditional Cashiers</td>
<td>0.454</td>
<td>2</td>
</tr>
</tbody>
</table>

Tables 5.1.3 and 5.1.4 are the values obtained when the rating per criterion was inputted in the AHP software named Expert Choice 2000. The weight of the criteria was based on the hierarchy based on the level of importance mentioned in the methodology. In addition, the weight of each alternative computed based on each criterion that was established on the rating as mentioned above, with an inconsistency judgement of 0.01 which is considered ideal since it is less than 0.10. There were significant differences seen in the preference of the respondents which can be seen in table 5.1.3. The Kiosk machine is seen to have a higher rating than the traditional cashiers in almost all of the criteria. Thus, the result of the overall alternative weight, shown in table 5.1.4 shows that customers leaned on Kiosk machines as their preferred method of ordering, resulting to a higher overall weight as compared to traditional cashiers.

The final weights of each criterion measure the relative performance of each alternative and it is seen that Kiosk machines ranked first. Thus, proving that consumers prefer ordering via Kiosk machines 1.20 times more than traditional cashiers. With that, these findings can aid in consumers and service providers for the decision-making yet do not replace the decision-maker itself.

5.2 Graphical Results

![Figure 5.2 Performance Sensitivity Graph Kiosk Machines vs. Traditional Cashiers](image-url)
Figure 5.2 exhibits the performance sensitivity graph for the comparison of Kiosk machines and traditional cashiers based on the data gathered and analysis on the Expert Choice 2000 software. It can be seen that in all criteria, Kiosk machines have a higher weight and there were no intersecting points due to results showing the Kiosk machines have higher ratings in every criterion in comparison to traditional cashiers. The performance sensitivity analysis shows all sensitivity information in this chart with the given alternatives for the main objective which is then linked to vertical bars containing the criteria used in this study. This shows how a change in a criterion weight influences the final weights of the alternatives.

5.3 Proposed Improvements

In this study, the researchers focused on the utilization of Analytical Hierarchy Process (AHP) in determining the optimal mode of ordering in McDonald’s between two methods such as Kiosk machines and traditional cashiers. Using convenience, accessibility, flexibility, reliability, and accuracy as the criteria. However, there are sub-factors that could affect each factor. For improvement, the researchers suggest that other factors such as larger space and price be included in the factors that determines the overall perceived satisfaction of the customer. In addition to that, size of manpower could also be utilized in order to identify if it affects the queuing time and waiting time of the customers.

Furthermore, since the study only focuses on the aspect of functional clues, future researchers should include other factors such as humanic clues for both customers and service crew, which can tackle factors such as the customers age and the tenure levels of the service crew. Aside from this, mechanical clues may also be included especially for the kiosk machines – this could tackle about how the design of the Kiosks affects the consumers’ perception and satisfaction.

5.4 Validation

The decision analysis was validated using the Analytical Hierarchy Process (AHP) software named Expert Choice 2000. The weight and ratings used to evaluate each criterion are supported by previous studies conducted shown in the literature. It is also based on the level of importance per criterion. The software utilized was able to show the difference between the five criterions (convenience, accessibility, flexibility, reliability, and accuracy), then it was used to identify which of the two methods (Kiosk machine or Traditional cashier) is more optimal in ordering at McDonald’s. However, it must be taken into consideration that the validity of the results is merely dependent on the survey conducted that tackled thoroughly the qualities considered as criteria. Given that, the quality of the and results of questionnaire and the values set for the criteria are assumed to be a sufficient representation of the sample while not entirely disregarding any chance of error.

6. Conclusion

In this study, the researchers obtained 242 respondents from different demographics such as age and sex. Utilizing the Analytical Hierarchy Process (AHP) software named Expert Choice 2000 to determine the differences between the criteria (convenience, accessibility, flexibility, reliability, and accuracy) then used the data from the result to identify which method are more optimal to employ. The demographics are collected since it could have had an effect on the data since there are differences in time management practices between different personal perception of each demographic. In addition, the basic demographic information of the respondents supports that any age group whether male or female are capable of using Kiosk machines and traditional cashiers when ordering.

In this study, five (5) criteria mentioned were used to analyze the customer satisfaction and compare the results of the Kiosk machines and traditional cashiers. The weights of the mentioned criteria are based on a hierarchy based on the level of their importance considering that the average of the overall customer satisfaction for Kiosk machines is 3.73 and for traditional cashiers is 3.14. It was concluded that 29.2% of the customer satisfaction is based on convenience, 24.7% based on accessibility, 22.1% on reliability, 14.3% on accuracy, and the remaining 9.7% on flexibility. Given the weights and ratings based on the survey, the overall weight of the Kiosk machines is 54.6% while the overall weight of traditional cashiers is 45.4%.

Thus, it can be concluded that the optimal mode of ordering in McDonald’s is through the utilization of Kiosk machines due to the higher rating for each criterion as well as the overall customer satisfaction it has in comparison to the traditional cashiers. With that, in relation to the current global health crisis, McDonald’s from any branch and possibly other fast food chains can install and implement these changes to minimize physical and close contact when customers are ordering from traditional cashiers since it was proven that consumers prefer the said mode of ordering.
by 1.20 times as compared to the other alternative. Aside from that, this also promotes cashless transactions given the expanded payment options and faster waiting lines along with transactions. This can further improve the perceived customer satisfaction when applied but should be used as a model for decision making only.

References


© IEOM Society International 1885


Biography

Madeline Anne Patrice C. Sy is a 2nd year undergraduate college student in Mapúa University - Intramuros, taking a degree in Bachelor of Science in Industrial Engineering. She is a current member and the Business Manager of Production and Operations Management Association of the Philippines (PROMAP) – Mapúa Intramuros Chapter. She took Practical Research in her years as a Senior High School student in Mapúa University – Intramuros. Her previous studies tackle about disciplines with regards to student and school environment. Her recent work is titled “Effects of Online Classes on the Perceived Mental Fatigue: A Case Study of Undergraduate College Students of Mapúa University.”

Maryam G. Irenea is a 2nd year undergraduate college student in Mapúa University - Intramuros, taking a degree in Bachelor of Science in Industrial Engineering. She is a current member and the Financial Manager of Production and Operations Management Association of the Philippines (PROMAP) – Mapúa Intramuros Chapter. She took Practical Research in her years as a Senior High School student in St. Paul University. Her recent work is titled “Effects of Online Classes on the Perceived Mental Fatigue: A Case Study of Undergraduate College Students of Mapúa University.”

Frankern Luis S. Malabuyoc is a 2nd year undergraduate college student in Mapúa University - Intramuros, taking a degree in Bachelor of Science in Industrial Engineering. He is a current member and one of the Logistics Manager of Production and Operations Management Association of the Philippines (PROMAP) – Mapúa Intramuros Chapter. He took Practical Research, and Capstone in his years as a Senior High School student in Don Bosco College – Canlubang. His previous studies tackle about agriculture, social media, and other factors involving human’s well-being. His recent work is titled “Effects of Online Classes on the Perceived Mental Fatigue: A Case Study of Undergraduate College Students of Mapúa University.”

Ma. Daniella M. Sobrevilla is a 2nd year undergraduate college student in Mapúa University - Intramuros, taking a degree in Bachelor of Science in Industrial Engineering. She is a current member Philippine Institute of Industrial Engineers (PIIE) – Mapúa Students Chapter. She took Practical Research in her years as a Senior High School student in Mapúa University – Intramuros. Her previous studies tackle about service improvement, and transportation system. Her recent work is titled “Effects of Online Classes on the Perceived Mental Fatigue: A Case Study of Undergraduate College Students of Mapúa University.”

Rianina D. Borres is an Assistant Professor of School of Industrial Engineering and Engineering Management at Mapua University in Intramuros, Manila, Philippines. She has earned her B.S degree in Industrial Engineering (IE) and Masters of Engineering Program major in IE from Mapua University, Intramuros, Manila, Philippines. She is a Professional Industrial Engineer (PIE) with over 15 years of experience. She has taught courses in Probability and Statistics, Methods and Time Study, Systems Engineering, Operations Research and Computer Integrated Manufacturing. She is a part-time consultant that specializes in improving different systems/processes which includes re-layout, computation of manpower requirement, establish Job Description, etc. She has done research projects in operations research, production and human factors and ergonomics. She is a member of Philippine Institute of Industrial Engineers (PIIE)