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Assessment of Factors Affecting Student's Satisfaction and Loyalty on the Crossed Parking System at Residential Colleges of Universiti Kebangsaan Malaysia

(Penilaian Faktor-faktor yang Mempengaruhi Kepuasan dan Kepatuhan Pelajar Terhadap Sistem Parkir Berpalang di Kolej-kolej Kediaman Universiti Kebangsaan Malaysia)

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ABSTRACT

An increase in the number of students studying in Universiti Kebangsaan Malaysia (UKM) (the National University of Malaysia) has led to increase parking facilities requirements at residential colleges. Some colleges applied crossed parking systems to address these problems. This study aims to ensure that parking facilities provided at UKM's residential colleges are adequate in the future and explaining the impact of parking services on the satisfaction and loyalty of students. The primary data was obtained by calculating the parking turnover and questionnaire survey. Secondary data is obtained from the college's management that implement cross parking systems, namely Keris Mas College (KKM), Rahim Kajai College (KRK) and Pendeta Zaaba College (KPZ). This study has two models, the model of adequacy level of parking facilities at college and parking service quality model on student satisfaction and loyalty. This study applies the SERVQUAL and Loyalty models. Then, observation data will be analysed using EXCEL and parking plans drawn using AUTOCAD. Questionnaires were analysed by the SEM method using SPSS and AMOS Graphic software. Observation studies produce several features and behaviours of crossed parking systems. The peak hours for KKM, KRK and KPZ start at 5.00 pm-8.00 am, 10.00 pm-7.00 am and 6.00 pm-8.00 am where the number of vehicles exceeds the parking space provided. The maximum number of parking vehicles outside the bar and in the prohibited areas for KKM, KRK and KPZ are 134 and 25, 30 and 3 and 84 and 10 vehicles. This situation shows that crossed parking facilities provided are inadequate and at critical levels. Meanwhile, the questionnaire survey shows that the main determinants of parking services quality are tangible, reliability and assurance factor. These factors have a significant impact on service quality. Determinants that not significant which are reliability, responsiveness and empathy have been ignored. Finally, the respondents were dissatisfied with this parking system and refused to propose their friends to park vehicles in the crossbar area.

Keywords: Crossed Parking; SERVQUAl Model; Student's Satisfaction and Student's Loyalty

ABSTRAK

Peningkatan jumlah pelajar yang menuntut di Universiti Kebangsaan Malaysia (UKM) menyebabkan keperluan kemudahan parkir di kolej kediaman meningkat. Beberapa kolej kediaman melaksanakan sistem parkir berpalang bagi mengatasi permasalahan ini. Kajian ini bertujuan untuk memastikan kemudahan parkir yang disediakan di kolej-kolej kediaman UKM adalah mencukupi pada masa hadapan serta menjelaskan kesan kualiti perkhidmatan parkir terhadap kepuasan dan kepatuhan pelajar. Data primer diperolehi dengan mengira muatan dan kapasiti parkir yang disediakan beserta kajian soal selidik. Data sekunder diperolehi daripada pihak pengurusan kolej-kolej kediaman yang melaksanakan sistem parkir berpalang iaitu Kolej Keris Mas (KKM), Kolej Rahim Kajai (KRK) dan Kolej Pendeta Zaaba (KPZ). Kajian ini mempunyai dua model iaitu model tahap kecukupan kemudahan parkir di kolej kediaman dan model kualiti perkhidmatan parkir terhadap kepuasan dan kepatuhan pelajar. Kajian ini mengaplikasikan model SERVQUAL dan Loyalty. Kemudian, data pemerhatian akan dianalisis menggunakan EXCEL dan pelan parkir dilukis menggunakan AUTOCAD. Data soal selidik dianalisis menggunakan kaedah SEM dengan menggunakan perisian SPSS dan AMOS Graphic. Kajian pemerhatian menghasilkan beberapa ciri dan tingkah laku sistem parkir berpalang. Waktu puncak bagi KKM, KRK dan KPZ bermula pada 5.00 pm-8.00 am, 10.00 pm-7.00 am dan 6.00 pm-8.00 am di mana jumlah kenderaan melebihi kotak parkir yang disediakan. Jumlah maksimum kenderaan parkir di luar palang dan di kawasan larangan bagi KKM, KRK dan KPZ adalah sebanyak 134 dan 25 buah, 30 dan 3 buah serta 84 dan 10 buah kenderaan. Situasi ini menunjukkan bahawa kemudahan parkir berpalang yang disediakan adalah tidak

mencukupi dan berada di tahap yang kritikal. Manakala, kajian soal selidik pula menunjukkan penentu kualiti perkhidmatan parkir yang utama ialah faktor ketara, faktor kebolehpercayaan dan faktor jaminan. Faktor-faktor ini mempunyai kesan yang signifikan terhadap kualiti perkhidmatan. Penentu-penentu yang tidak signifikan iaitu faktor responsif dan empati telah diabaikan. Akhirnya, responden adalah tidak berpuas hati dengan sistem parkir ini dan enggan mencadangkan rakan-rakan yang lain memarkir kenderaan di kawasan berpalang.

Kata kunci: Parkir Berpalang; Model SERVQUAL; Kepuasan Pelajar dan Kepatuhan Pelajar

INTRODUCTION

Parking means a vehicle being stopped at a place to raise or lower people or goods. Parking facilities includes on road and off-road parking. Awang (2003) stated that there are five types of off-road car parks, surface car parking, subway parking, multi-storey car park, rooftop car park and mechanical car park. Parking system can leads to negative impacts such as accidents and pollution. Negligence in the movement of in and out of vehicles from the parking box will lead to an accident referred to as a parking accident based on Marshall et al. (2008). While, Brooke et al. (2014) states the parking also has a negative impact on the environment where it can contribute to release more carbon when the engine is start from parking. Based on a study conducted by Derahim et al. (2012), the percentage of UKM students who are very dissatisfied with the car park facilities is 17% and the percentage of students dissatisfied with the parking system is 31.9% where this percentage is the highest compared to their level of satisfaction with other infrastructure facilities . This has led the students decide to park their vehicles on the road shoulder and in the prohibit areas which causes the road congestion and accidents.

A crossed parking is defined as the time when permit's owner is allowed to park their vehicle at the permit area. The benefits of crossed parking are reducing traffic congestion, ensuring vehicle safety and reducing accident risk. Wang and Zhang (2018) said the implementation of crossed parking is important in reducing road congestion. Some of the weakness of this system is access card and bar malfunction, disturbance for rescue operation because the emergency vehicle's owner does not has the permit to access that area. Then, this system also involved high charges especially at town area and during weekends. According to Van Ommeren et al. (2011) research, although parking fees are good to overcome the lack of parking problems, not all drivers agree to pay for it, especially when charges are high.

There are a lot factors affecting the decision of the drivers to choose the parking lot. Based on a study conducted by Teknomo (1999), parking locations are very important as most drivers want parking locations close to their buildings or residential blocks. Safety factors are also particularly important in the selection of parking areas especially for women. Dark areas and not equipped with security systems such as CCTV are some of reason the drivers refuse to park their vehicles at permit area. Then, Li and Guo (2014) states the standard parking size should be minimized to maximize the use of space for parking box purposes but parking boxes should take into account the size of the vehicle and the distance of the vehicle with the other vehicle. Furthermore, additional facilities such as walking trails are required in the parking area as one of the drivers' factors refuses to park their vehicles in a particular area due to uncertain weather problems either it is hot or rainy. This facility also promotes walking practices for health purposes. In addition, Hasker and Inci (2014) explained most parking areas charge a high fee especially during peak hours and on weekends. Thus, drivers prefer to park sidewalks and some prohibited areas to avoid being charged parking rates.

A study conducted by Gragera and Albalate (2016) explains that law enforcement is indispensable for raising awareness among selfish drivers that park their vehicles at roadside. Shoup (1997) stated that if parking rates were raised would result in reduced parking demand. As parking demand decreases, the amount of parking space to be provided is minimal. Next, Caicedo et al. (2006) states the construction of underground parking certainly requires a lot of money, but the implementation of this system can address some of the negative environmental issues. In addition, Kurniawan and Puspita (2010) described the multi-storey parking strongly encouraged to be implemented especially in urban areas to accommodate large amounts of vehicles.

Structural Equation Modelling (SEM) is a method for representing, estimating, and testing the network of relationships between measurable variables or latent constructs. This method also serves as a link between the correlation of a matter with parameter estimation, direct or indirect effects, specification modelling and others (Hair et al. 2009; Kline, 2011). The SEM method is also important to strengthen and confuse uncertainties or probabilities in a study Bagozzi & Yi (2012). Livote (2009) said that SEM is a powerful technique that can incorporate models.

In a study conducted by Brady and Cronin (2001), the SERVQUAL model is often used in studies involving measurement of customer satisfaction and the quality of a product. This method can help in identifying quality problems and also improving a product in meeting customer needs. Based on the research done by Parasuraman et al. (1991), SERVQUAL is a multidimensional research tool designed to measure service quality by collecting respondents' needs and perceptions through questionnaires that have measurement scales using five dimensions of service quality which are tangible, reliability, responsive, empathy and assurance.

A case study conducted by Bowerman (2006) at the University of North Carolina-Chapel Hill campus showed increased student enrolment and support staff increased

demand for parking. According to a study conducted by Sugita (2011) at the University of Udayana Campus in Jalan Sudirman Denpasar, the lack of parking causes parking in an irregular manner and most of the roadside parking is causing traffic congestion. While, Chen et al. (2016) is conducting studies related to the efficient parking survey in smart parking systems where parking surveys are one of the most important things for managers, planners or vehicle parking system researchers.

On top of that, Derahim et al. (2012) have conducted a study on UKM as a sustainable campus where this study involves a preliminary survey of knowledge, awareness and engagement of students and staff at UKM Bangi campus. The findings reveal that there is a gap and lack of knowledge and awareness among students which is the main obstacle to forming a sustainable campus. However, the level of knowledge and awareness of the staff is good compared to the students. UKM management should devise and implement more sustainable programs to raise awareness to produce sustainable campus. Then, Jaafar (2017) conducted a study on the parking system at UKM Bangi where the study was conducted to obtain a percentage of parking loading (open parking) at each faculty. This study aims to ensure the adequacy of parking space that will be available in the future. This study involves the formation of a model to determine the effect of the implementation of parking charges or fees on modulation mode shifts. The results show that vehicle users agree to change the mode of transportation if the fee value is charged at RM2.50 / hour.

METHODOLOGY

The data collection in this study includes the primary and secondary data. The primary data is obtained by observation, pilot and survey studies while the secondary data is obtained from the college's management regarding to the number of student that registered their vehicles.

OBSERVATION STUDY

This method is conducted to study the adequacy of the parking space provided at the residential colleges involved namely Keris Mas College, Rahim Kajai College and Pendeta Zaaba College where it involves the process of calculating the number of parking lots and calculating parking traffic. The peak hours for residential colleges are expected to start at 4.00 pm until 7.00 am of the next day. For this study, data are taken every hour. The result of this observation will be used to obtain the actual capacity of the parking space required to accommodate the total number of student vehicles at the residential college.

PILOT STUDY

Pilot study is a study conducted before conducting a questionnaire to determine the suitability of the questionnaire and review the questionnaire whether it needs to be modified or retained. The questionnaire will be distributed to 30 students that distributed evenly among the colleges. By conducting pilot studies, the high level of reliability and fit in the questionnaires can be used in this study.

SURVEY QUESTIONNAIRE

The percentages of respondents' errors should be less than 5% of the population of the study scope to obtain the 95% confidence level. This study took into consideration the number of students who registered their cars at the residential colleges involved. The total number of cars registered at the residential colleges involved is 510 cars representing 510 students. 510 population of students need to provide a total of 219 questionnaires. However, in order to get more accurate and balanced results between all the residential colleges involved, this study involved 300 respondents that distributed evenly among all the colleges. This study will use the SERVQUAL model which can help in identifying the relationship between aspects of service quality that will influence the level of satisfaction and loyalty of students. This model has identified five determinants of service quality, namely tangible, reliability, responsiveness, assurance and empathy. This model was formed by applying the Modelling of Service Quality (SERVQUAL) and Loyalty model by referring to a survey conducted by Awang (2015). Figure 1 shows the model framework to be used in this study which has been developed using AMOS Graphic software.

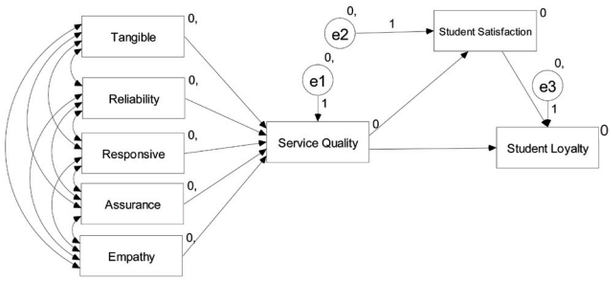

FIGURE 1. Model Framework

RESULTS AND DISCUSSION

PILOT STUDY

Tables 1 and 2 and Figure 2 showed the construction of pioneer model relationships for this study using the SEM analysis method. Predictive Power (R^2) is strong for Service Quality of 0.878, Student Satisfaction is 0.804 and Student Loyalty with value of 0.887 where according to Hair et al. (2014), R^2 values are weak (0.2-0.5), medium (0.5-0.75) and strong (> 0.75). Table 1 shows that there was a factor that was accepted and influenced by the student's decision in choosing a parking box where the student parked outside the crossed parking or a prohibited area that is a significant factor. Reliability factor, responsive factor, assurance factor and empathy factor were rejected for this pilot study because it was not significant where P value was above 5% or 0.05.

The SEM method involves several Fitness Indexes to test the integrity of the model with the data obtained. Hair et al. (1995, 2010) and Holmes-Smith (2006) recommend the use of at least one fitness index of each appropriate category. There are three categories which are Absolute Fit, Incremental Fit and Parsimonious Fit as described in Table 2. This pilot study was used to measure the relationship between the model for questionnaires using the SEM where CMIN/DF values were 0.122 < 3.00, RMSEA 0.054 < 0.08 as shown in Table 2. According to Hair et al. (2014), if P value does not exceed 5% significant, the hypothesis is acceptable. This pilot study as a whole has resulted in a P value of 0.00 at a significant 1% level of < 5% significant, then the pilot study was accepted and valid.

TABLE 1. Relationship of pilot study

Correlation	Significant (+ve/-ve)	Path Coefficient	f^2 Value	T-Statistic	P Value	Results
Tangible → Service Quality	Yes (+ve)	0.528	0.221	2.394	0.017	Accepted
Reliability → Service Quality	No (+ve)	0.062	0.191	0.326	0.744	Rejected
Responsive → Service Quality	No (-ve)	-0.632	0.438	-1.441	0.150	Rejected
Assurance → Service Quality	No (+ve)	0.368	0.312	1.181	0.238	Rejected
Emphaty → Service Quality	No (+ve)	0.130	0.454	0.285	0.775	Rejected
Service Quality → Student Satisfaction	Yes (+ve)	0.834	0.076	10.926	0.00	Accepted
Student Satisfaction → Student Loyalty	Yes (+ve)	0.623	0.228	2.735	0.006	Accepted
Service Quality → Student Loyalty	Yes (+ve)	0.872	0.212	4.119	0.00	Accepted

TABLE 2. Results of pilot study

Element	Value	Acceptance Level
Chi-square (CMIN)	4.384	–
Degree of Freedom (DF)	36	–
CMIN/DF	0.122	< 3
P Value	0.00	< 0.05
RMSEA	0.054	< 0.08
NFI	1.000	> 0.8
RFI	0.890	> 0.8
IFI	1.000	> 0.9
TLI	0.980	> 0.9
Comparative fit index (CFI)	1.000	> 0.9

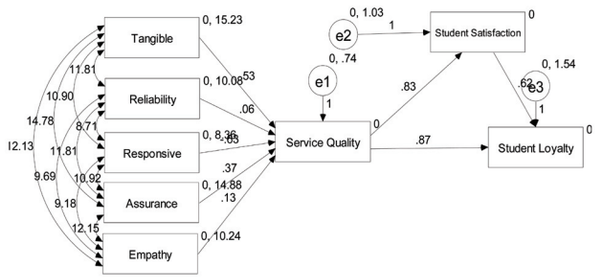

FIGURE 2. Model and results of pilot study

OBSERVATION STUDY

Observation studies produce several features and behaviours of crossed parking systems. The peak hours for KKM, KRK and KPZ start at 5.00 pm-8.00 am, 10.00 pm-7.00 am and 6.00 pm-8.00 am where the number of vehicles exceeds the parking space provided. The parking accumulation exceeds parking capacity for certain time. The maximum number of parking vehicles outside the bar and in the prohibited areas for KKM, KRK and KPZ are 134 and 25, 30 and 3 and 84 and 10 vehicles. This situation shows that crossed parking facilities provided are inadequate and at critical levels.

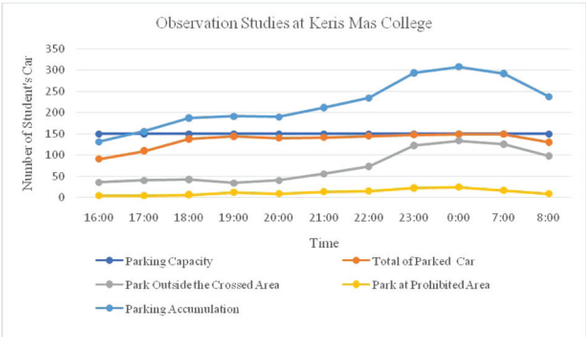

FIGURE 3. Observation studies at Keris Mas College

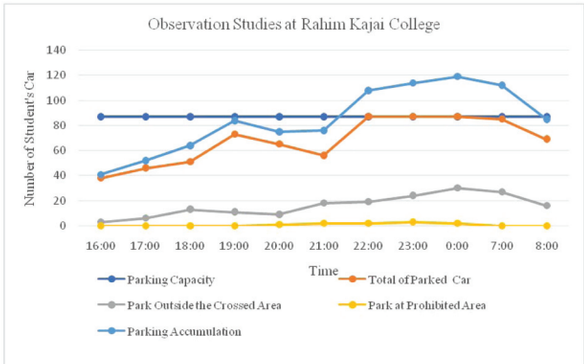

FIGURE 4. Observation studies at Rahim Kajai College

SURVEY QUESTIONNAIRE (DISCRETE ANALYSIS)

Based on the discrete analysis of quality service of parking system, the respondents disagree that the parking facilities provided are excellent and strongly disagree with the statement of parking facilities provided in the high quality of service. The majority of respondents are uncertain to believe

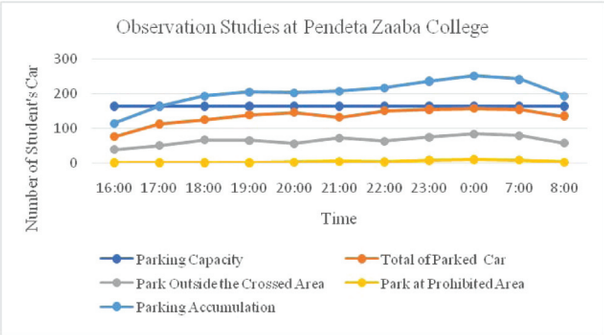

FIGURE 5. Observation studies at Pendeta Zaaba College

that college management can provide better parking services in the future. Then, discrete analysis of student satisfaction showed that the respondents disagreed with the fact that they made a wise choice of parked vehicles in crossed parking area and disagreed with the statement they believed the action was correct by parking their vehicles in crossed parking area. They are also dissatisfied with crossed parking facilities at the residential college involved. Finally, the discrete analysis of student loyalty states that the respondents are uncertain whether they will use these crossed parking facilities when the number of parking lots is adequate if other factors are not improved. The majority of respondents are also uncertain about the crossed parking facilities that can provide good services to students. Respondents did not agree to suggest parking services crossed to their friends. Therefore, the crossed parking system needs to be improved in the future.

SURVEY QUESTIONNAIRE (STUDY MODEL)

Table 3 shows that there are six accepted hypotheses and two rejected hypotheses. Significant hypotheses will be accepted while hypothesis that not significant will be rejected. The rejected hypothesis involves factors affecting the quality of parking services which are responsive and empathy factors. This study shows the tangible, reliability and assurance factor are important factors in student parking selection. R^2 value for Service Quality is 0.855, Student Satisfaction is 0.857 and Student Loyalty is 0.831 which is a strong power forecast (> 0.75) as stated by Hair et al. (2014). It also shows that the quality of parking services will affect the level of satisfaction and loyalty of the students in line with Caruana's (2002) study stating that the quality of service will affect indirect service compliance through customer satisfaction. Table 4 shows that the questionnaire results in the CMIN/DF value of 1.796 < 3 and the value of RMSEA is 0.062 < 0.08. The value of P for this analysis is 0.00 which is below 1% significant (Hair et al. 2014) has shown that this analysis is valid and acceptable.

TABLE 3. Relationship of study model

Correlation	Significant (+ve/-ve)	Path Coefficient	f^2 Value	T-Statistic	P Value	Results
Tangible → Service Quality	Yes (+ve)	0.700	0.096	7.301	0.000	Accepted
Reliability → Service Quality	Yes (-ve)	-0.567	0.119	-4.760	0.000	Accepted
Responsive → Service Quality	No (+ve)	-0.246	0.158	-1.556	0.120	Rejected
Assurance → Service Quality	Yes (+ve)	0.516	0.103	5.023	0.000	Accepted
Empathy → Service Quality	No (+ve)	0.140	0.133	1.057	0.291	Rejected
Service Quality → Student Satisfaction	Yes (+ve)	0.924	0.022	42.260	0.000	Accepted
Student Satisfaction → Student Loyalty	Yes (+ve)	0.412	0.086	4.774	0.000	Accepted
Service Quality → Student Loyalty	Yes (+ve)	0.861	0.086	9.989	0.000	Accepted

TABLE 4. Results of study model

Element	Value	Acceptance Level
Chi-square (CMIN)	79.043	–
Degree of Freedom (DF)	44	–
CMIN/DF	1.796	< 3
P Value	0.00	< 0.05
RMSEA	0.062	< 0.08
NFI	1.000	> 0.8
RFI	0.870	> 0.8
IFI	1.000	> 0.9
TLI	0.972	> 0.9
Comparative fit index (CFI)	1.000	> 0.9

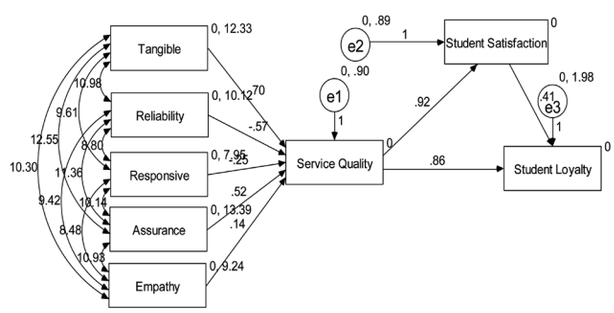

FIGURE 6. Model and results of study model

SURVEY QUESTIONNAIRE (IMPROVEMENT MODEL)

Table 5, Table 6 and Figure 7 show the model relationship constructs using the accepted hypotheses in the original model. Overall, Table 5 shows that the six accepted hypotheses of the original model were significant and accepted. All hypotheses have a 1% significance value with P = 0.00 < 0.05. In conclusion, this study shows tangible, reliability and assurance factors that are the main factors that are taken into account by students while parking their vehicles in the crossed parking area. The quality of parking services greatly influences the level of satisfaction and student loyalty as well as the level of student satisfaction also affects student loyalty by having a strong R^2 power predictive value. R^2 value for Service Quality is 0.854, Student Satisfaction is 0.857 and Student Loyalty is 0.831 where all of these values are within the range of > 0.75. Table 6 shows a CMIN/DF value is 2.410 < 3 and value of RMSEA = 0.077 < 0.08. The value of P for this analysis is 0.00 which is below 1% significant (Hair et al. 2014) so this analysis is valid and acceptable.

TABLE 5. Relationship of improvement model

Correlation	Significant (+ve/-ve)	Path Coefficient	f^2 Value	T-Statistic	P Value	Results
Tangible → Service Quality	Yes (+ve)	0.702	0.095	7.396	0.00	Accepted
Reliability → Service Quality	Yes (-ve)	-0.626	0.103	-6.066	0.00	Accepted
Assurance → Service Quality	Yes (+ve)	0.492	0.077	6.375	0.00	Accepted
Service Quality → Student Satisfaction	Yes (+ve)	0.924	0.022	42.260	0.00	Accepted
Student Satisfaction → Student Loyalty	Yes (+ve)	0.412	0.086	4.774	0.00	Accepted
Service Quality → Student Loyalty	Yes (+ve)	0.861	0.086	9.989	0.00	Accepted

TABLE 6. Results of Improvement Model

Element	Original Model	Improvement Model	Acceptance Level
Chi-square (CMIN)	79.043	65.073	-
Degree of Freedom (DF)	44	27	-
CMIN/DF	1.796	2.410	< 3
P Value	0.00	0.00	< 0.05
RMSEA	0.062	0.077	< 0.08
NFI	1.000	0.840	> 0.8
RFI	1.458	0.875	> 0.8
IFI	1.373	1.000	> 0.9
TLI	1.464	0.930	> 0.9
Comparative fit index (CFI)	1.377	1.000	> 0.9

FIGURE 7. Model and results of improvement model

CONCLUSION

As conclusion, the peak hours for KKM, KRK and KPZ start at 5.00 pm to 8.00 am, 10.00 pm to 7.00 am and 6.00 pm to 8.00 am where the number of vehicles exceeds the parking space provided. The maximum number of parking vehicles outside the bar and in the prohibited areas for KKM, KRK and KPZ are 134 and 25, 30 and 3 and 84 and 10 vehicles. This situation shows that crossed parking facilities provided are inadequate and at critical levels. Meanwhile, the questionnaire survey shows that the main determinants of parking services quality are tangible, reliability and assurance factor. These factors have a significant impact on service quality. Determinants that not significant which are reliability, responsiveness and empathy have been ignored. Finally, the respondents were dissatisfied with this parking system and refused to propose their friends to park vehicles in the crossbar.

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