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Determinants of using the mobile payment to buy coffee among female college students in Saudi Arabia

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ABSTRACT

This paper explores the use of mobile payment for the purchase of coffee by college students. Mobile payment is an attractive feature to many consumers. The consumption of coffee and the number of coffee shops have increased significantly in Saudi Arabia. Young female adolescents are frequent coffee shop visitors and also savvy technology users in Saudi Arabia. Therefore, this paper investigates the determinants influencing female university students' adoption of mobile payment to purchase coffee using a logistic regression method. Research on the topic focused on "security" and "trust" issues as important pre-requisites for mobile payment adoption. However, this paper reveals a number of demographic variables that influence coffee purchases through mobile payment. The findings of this study concluded that marital status, safety, age, and monthly income are significant determinants of using mobile payment to purchase coffee. Price was an insignificant factor in students' decisions regarding mobile payment adoption. The probabilities of using mobile payment increase as students get older. Also, single female students are more likely to use mobile payment compared to married students. This study recommends that multi-perspective and multi-level research is required as consumer mobile payment adoption is a complex phenomenon in the food and agricultural sector.

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1. Introduction

Today's digital economy is characterized by the increasing use of mobile payment which can be defined as "payments for goods, services, and bills with a mobile device by taking advantage of wireless and other communication technologies" (Dahlberg et al., 2008). Mobile devices are therefore converted from simple communication devices into fast payment platforms. Thus, using mobile to make payments has been an attractive feature to many consumers. The number of mobile-phone users who used mobile payment in 2012 reached over 190 million users, which represented more than 3% of total mobile users worldwide. In an annual survey conducted by a global consulting firm with more

than 22,000 consumers worldwide, including 1,004 respondents from the Middle East, the mobile payment growth rate in Saudi Arabia was found to be the highest in the Middle East region (PwC, 2019).

Past studies in the literature on mobile payment research have shown that the two main issues that affect the adoption and use of mobile payments are "security" and "trust" (Dahlberg et al., 2015). A more recent framework developed for mobile phone payment research focused on the external environment changes in the social, cultural, technological, legal, regulatory, standardization, and commerce while the internal environment consisted of the traditional payment services, merchant power, new e-payment services, and consumer power. To add to the body of research, this paper, therefore, aims to determine the factors that influence the adoption of mobile payment by consumers.

In 2018, the statistics from the General Authority of Saudi Customs showed that residents spend more than 1.16 billion Riyals (\$310 million) annually on coffee, which is equal to 3.18 million riyals (\$850,000) per day. The Ministry of Trade and

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Investment revealed that the number of coffee shops, which were licensed during 2018, increased by 21% reaching 6,272 new stores compared to 5,125 stores in 2017. Furthermore, the young-adolescent females accounted for the most frequent café visitors and technology users in Saudi Arabia. Consequently, this research studies female university students who represent a high proportion of coffee shop customers. Thus, the purpose of this paper is to explore the factors that influence female university students' adoption of mobile payment to purchase coffee.

Research in mobile payment adoption used several models including the technology acceptance model, the unified theory of acceptance, and the use of technology and diffusion on innovation theory to understand consumer preferences (Dahlberg et al., 2015). These models included variables such as trust, security, and cost. The findings of these studies are described below.

Viehlend and Leong (2007) studied the factors such as perceived benefits and easy access to test customers' readiness to use mobile payment services. The study included exploratory external factors such as comfort, safety, and new technology that affected using mobile devices as means of payment. A self-administrated electronic questionnaire was designed for students and the academic community. The questionnaire was uploaded on a popular website on the internet and was accessible by individuals from all over New Zealand. The technology acceptance model is a theoretical model that explains users' acceptance and use of technology. Although New Zealanders found mobile payment services convenient, useful, and easy to use, the researchers concluded that these services were not widely known in New Zealand. Respondents were concerned about the safety and privacy of mobile payment services. The study recommended that more research be conducted to improve the usability of mobile payment services.

In another study using a model of consumer acceptance of mobile payment, the factors affecting consumer acceptance of mobile payment were discussed (Chen, 2008). The research was based on a sample size of 299 respondents from universities, companies, and professional organizations. Using the same model as Viehlend and Leong (2007), that is, the technology acceptance model (TAM) together with the innovation diffusion theory, the model was able to explain the factors that determine consumers' acceptance of mobile payment. Gerpott and Kornmeier (2009) explored the acceptance of the direct and indirect mobile payment system between mobile customers using 347 residential cell-phone users of the second-year students of a university in Germany, where the questionnaire was sent to them via e-mail. By applying the least-molecular squares method as a modeling technique, the researchers were able to identify the factors which explained the difference between mobile payment system acceptance programs. The authors recommended developing communication activities

that intend to influence the members of the internet societies and reduce the fees for obtaining mobile payment system services.

In a consumer acceptance study, Schierz et al. (2010) analyzed the factors that determined the acceptance of mobile payment services that led to increased usage and approval of this service in Germany. The sample consisted of 1,447 respondents and data was collected from people who were using mobile applications in Germany. The authors used the structural equation modeling method to test the acceptance of mobile payment. The results showed strong support for the effect of compatibility (the degree to which mobile payment can be reconciled with the conditions, values, behavioral patterns, and experiences), individual mobility (the degree to which an individual relates to the mobility lifestyle), and the self-base (the degree to which an individual looked throughout the social environment to pay by mobile as desirable). The researchers recommended conducting similar studies to determine consumers' acceptance in other countries. Bamasak (2011) reviewed consumers' acceptance and concerns to explore the state of mobile payment in the Kingdom of Saudi Arabia. A sample of 200 respondents from different shopping centers participated in a survey. The survey questionnaire comprised of three parts. The first part involved demographic data collection, such as gender, age, level of education, and income. The second part explored the behavior of mobile phone users like their awareness of the functions of their mobile phones, and the third part was related to the experience of the participants in online-shopping and electronic payments. Using the descriptive-analytical method, the study concluded that electronic payment in the Kingdom of Saudi Arabia is very likely to soar as the majority of respondents were willing to adopt mobile payments. The authors concluded that the results of the research could help the market's stakeholders to understand the needs and interests of potential customers.

Liu (2012) addressed the factors that affected consumers' intention to use mobile payment services in China. The researcher applied the theory of the electronic acceptance model as well as the theory of spreading innovation on a sample of 177 respondents. The sample comprised of university students. The results of this research indicated that mobile payment service was able to generate a large amount of revenue and boost the business industry.

In a study by Teoh et al. (2013), the factors influencing the perception towards electronic payment (e-payment) of Malaysian consumers were investigated. The results of the multiple linear regression model revealed that benefits, self-efficacy, and ease of use significantly influenced consumers' perception of e-payment. However, trust and security were insignificant factors and hence warrant further investigation.

Furthermore, to study the impact of risks and confidence on consumers' dependence on the use of mobile payment, Mingxing et al. (2014) focused on

three main dimensions. The first was mobile payment, the second was mobile network operators, and the third was application service providers and financial organizations. The study was conducted on a sample of 196 respondents using the technology acceptance model. The results of this study showed that the benefits, easiness of use, expected risks, and confidence of consumers in mobile application services had a significant impact on the intention of consumers adaptation of mobile payment. The users' confidence in mobile network operations did not have a significant impact on consumer dependence on mobile payment. Similarly, Cobanoglu et al. (2015) discussed the factors that influence consumers' acceptance to pay by mobile in restaurants. The study used a sample of 258 participants from internet research companies and mobile phone users only. The researchers used the classic technology acceptance model and extended it further by adding four variables related to the hospitality sector. The results of this research indicated that lifestyle compatibility was the strongest indication of consumers' intention to adopt mobile payment technology in restaurants, followed by the perceived benefit, personal standard, security, and previous experience in mobile payment.

Also, Alyabes and Alsalloum (2018) developed a conceptual model to examine the significant factors that influence consumers' perception of e-payment in Saudi Arabia using a multiple regression model. Their sample consisted of 229 respondents. The results indicated that benefit, ease of use, and self-efficacy influenced Saudi consumers' perception of e-payment systems while trust and security were not significantly associated with consumers' perception of e-payment.

In a similar study to investigate the intention of adopting mobile payment services, Park et al. (2019) collected 361 valid responses from potential users of mobile payment in the United States of America via an online survey. A model based on mental accounting theory and structural equation modeling was used. The results indicated that the impact of technological concerns on the benefits of mobile payment services was not significant. Other studies investigating mobile payment adoption from a behavioral perspective and individual psychology indicate that social influence and personal traits are potentially important variables in technology adoption (Yang et al., 2012).

In a more recent study predicting the determinants of mobile payment services in Oman, the authors used a hybrid structural equation modelling-Neural network model and concluded that self-efficacy and mobility have a positive impact on the ease of use of mobile payments (Sharma et al., 2019). The study revealed that the awareness of benefits, ease of use, and customization influence the usefulness of mobile payments in Oman. Finally, the results of the research revealed that perceived trust, perceived usefulness, and perceived security have a

significant effect on the use of mobile payment services.

The female campus's coffee shops at King Faisal University (KFU), which is a public university in Saudi Arabia, suffering from the long queue and long waiting time to place an order. Some of the reasons contributing to this issue are the unavailability of exchange with either the buyer or seller, non-functioning credit or debit cards, and unacceptably damaged currency. This study hypothesizes that the use of mobile payment will make the payment process smoother and eventually reduce the required time to pay for an order, therefore improving consumer satisfaction. Therefore, this paper aims to examine the factors that affect the use of mobile payment among KFU's female students. The results of this paper are of great importance to the decision-makers in Saudi universities, specifically, and in other public universities worldwide, to remove mobile payment adoption barriers and hence spread the usage of mobile payment in female campuses.

2. Material and methods

A random sample of 438 female students from different colleges in KFU participated in a survey on the use of mobile payment. After eliminating missing and incomplete responses, the total number of observations reached 425 female students. Table 1 shows that 28% of the sampled students use mobile payment while 72% do not use mobile payment. Also, 40% of the respondents have knowledge about using mobile payment, and 62% of them prefer purchasing coffee from a café rather than making coffee. Respondents were asked to indicate their feelings towards the safety of using mobile payment. Seven percent felt extremely unsafe, 3.5% unsafe, 30.55% safe, and 24.16% very safe. The majority of respondents receive a financial stipend from the university and consume one coffee on daily basis.

As the dependent variable in this study is a binary variable that only takes two values, where $y=1$ if the respondent uses mobile payment and $y=0$ if the respondent does not use mobile payment, binary logistic regression was used (Khalid et al., 2020). The general representation of the logistic regression model can be expressed as follows (Asteriou and Hall, 2011):

$$\text{logit}(P_i) = \ln\left(\frac{P_i}{1-P_i}\right) = \beta_0 + \sum_{i=1}^n \beta_i X_i + \mu_x \quad (1)$$

where $\ln\left(\frac{P_i}{1-P_i}\right)$ is the natural logarithm of the odds, B_0 is the intercept of the model, B_k represents the slope coefficients of the model, X_i is a set of all the explanatory variables of the model, and μ_x is the error term of the estimated model. The independent variables in this paper are the price of coffee, income, marital status, safety, and age.

Table 1: Summary of survey results

Variable	Percentage	Variable	Percentage
Using mobile payment		Do you purchase coffee frequently	
No	72.04	No	57.07
Yes	27.96	Yes	42.93
Knowledge about Using mobile payment		Daily coffee cups consumption	
No	14.74	1	71.73
Maybe	45.14	2	14.29
Yes	40.12	3	10.64
		4	1.98
		5	1.37
Marital Status		How much on average do you pay for a coffee cup?	
Divorced	1.98	<10	29.98
Married	28.27	11-20	63.83
Single	69.60	>21	6.18
Widow	0.15		
Education level		Buying the coffee inside the university's campus	
Bachelor	87.99	Always	13.98
Postgraduate	12.01	Sometimes	62.92
		Never	23.10
Do you receive a stipend from the university?		How much do you spend on coffee in a week?	
No	23.10	<20	26.73
Yes	76.90	21-40	16.67
		41-60	23.27
		61-80	4.72
		>81	28.62
Do you have a personal source of income?		Favorite way to pay	
No	48.78	Cash	36.93
Yes	51.22	Credit/debit card	46.35
		Phone	16.72
Monthly income		Do you feel that using mobile payment is safe?	
<500	68.24	Very safe	24.16
500-1000	21.12	Safe	30.55
>1000	10.64	Neutral	34.65
		Unsafe	3.50
		Extremely unsafe	7.14
Age		Do you feel enjoyment or interest in using mobile payment	
18-23	84.44	Enjoyment	27.81
24-29	13.27	Interest	72.19
>30	2.29		
Do you like buying or preparing coffee?			
Buying	62.31		
Prepare	37.69		

3. Results and discussion

The results of the estimated logistic regression coefficients and odds ratio are reported in [Table 2](#). The results indicate that age is a significant factor that affects the likelihood of purchasing coffee among female students in KFUPM. However, the price was found to be an insignificant factor in influencing respondents' decision whether or not to use mobile payment to purchase coffee. Moreover, single female students are more likely to use mobile payment compared to married female students. The

respondents who think that using mobile payment is extremely unsafe, unsafe, and neutral are less likely to use mobile payment to purchase coffee compared to respondents who think it is very safe. Respondents who have personal income over 500 SAR are more likely to use mobile payment to purchase coffee compared to respondents who have personal income less than 500. By looking at the odds ratio, we can say that the odds for using mobile to purchase coffee increase by 9.9 percent for an additional year increase in the students' age.

Table 2: Coefficient and odds ratio results of the logistic regression

Independent variables	Coef.	Odds Ratio	Std. Err	Z	P>z	[Odds Ratio 95% Conf. Interval]	
Age	0.091	1.093	0.033	2.94	0.003	1.030	1.160
Price	0.021	1.015	0.015	1.02	0.310	0.986	1.044
Marital							
Married	Reference						
Single	-0.507	0.610	0.131	-2.31	0.021	0.401	0.928
Divorced	-0.500	0.612	0.404	-0.74	0.457	0.168	2.228
Safe							
Very safe	Reference						
Safe	0.160	1.167	0.273	0.66	0.507	0.739	1.845
Neutral	-0.693	0.498	0.124	-2.80	0.005	0.306	0.811
Unsafe	-1.932	0.144	0.112	-2.49	0.013	0.032	0.661
Not very safe	-2.845	0.058	0.060	-2.74	0.006	0.008	0.444
Monthly income							
0-500 SAR	Reference						
500-1000 SAR	0.977	2.700	0.598	4.48	0.000	1.749	4.171
Over 1000 SAR	0.623	1.908	0.566	2.18	0.029	1.067	3.412
Intercept	-2.879	0.062	0.047	-3.65	0.000	0.014	0.275

Fig. 1 shows that the probability of using the mobile payment to purchase coffee increases with the increase in students' age. For example, the probability of using the mobile payment for an 18-year-old student is 23%, while for a 31-year-old student, the probability is 34%.

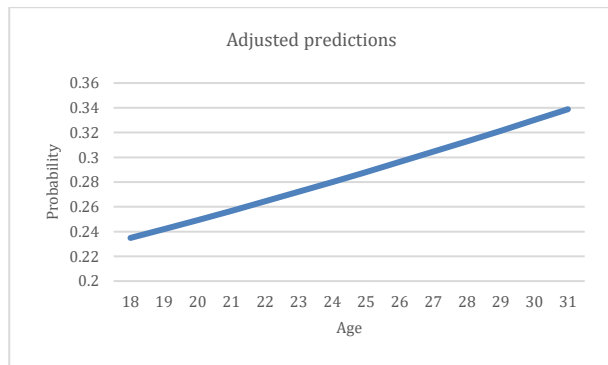


Fig. 1: Probabilities of using the mobile payment to purchase coffee based on students' age

Table 3 shows the impact of personal monthly income level on the probabilities of using the mobile payment to purchase coffee holding other variables

at their mean values. Consequently, students who have an income level of 500-1000 SAR have a 19% higher probability of using mobile payment compared to students whose income level is 0-500 SAR. Also, students whose personal monthly income level is over 1000 have a 12% higher probability of using mobile payment compared to students whose income level is only 0-500 SAR.

Table 3: Average marginal effects

Income	dy/dx	Std. Err.	z	P>z
0-500 SAR	Reference	-	-	-
501-1000 SAR	0.199	0.048	4.14	0.000
Over 1000 SAR	0.120	0.061	1.96	0.049

Table 4 shows probabilities of making payment through mobile to purchase coffee based on students' safety concerns. The results for students who feel it is unsafe or extremely unsafe were insignificant. Thus, we predict that students who feel it is unsafe will not make payment through mobiles. Conversely, the probabilities for students who either feel it is very safe or safe to make payment through mobile devices are 33.3% and 36.9%, respectively.

Table 4: Predictions of using mobile payment based on students' safety concerns

	Margin	Std. Err.	z	P>z	[95% Conf. Interval]
Very safe	0.332	0.039	8.49	0.000	0.256 0.409
Safe	0.369	0.036	10.06	0.000	0.297 0.441
Neutral	0.199	0.027	7.20	0.000	0.145 0.254
Unsafe	0.067	0.047	1.41	0.157	-0.026 0.161
Extremely unsafe	0.028	0.028	1.01	0.313	-0.026 0.083

The model goodness of fit results is shown in Tables 5 and 6. Table 5 shows that the overall rate of correct classification of our model is 73.65%. In addition, the results of Pearson χ^2 Goodness of fit test shows that our model reasonably fits well (Mehmetoglu and Jakobsen, 2016):

Table 5: Model's goodness of fit

	True		
Classified	D	~D	Total
+	25	16	41
-	96	288	384
Total	121	304	425
Classified+if predicted $\Pr(D) \geq 0.5$			
True D defined as using mobile payment $\neq 0$			
Sensitivity	$\Pr(+ D)$		20.66%
Specificity	$\Pr(- \sim D)$		94.74%
Positive predictive value	$\Pr(D +)$		60.98%
Negative predictive value	$\Pr(\sim D -)$		75.00%
False+rate for true ~D	$\Pr(+ \sim D)$		5.26%
False-rate for true D	$\Pr(- D)$		79.34%
False+rate for classified+	$\Pr(\sim D +)$		39.02%
False-rate for classified-	$\Pr(D -)$		25.00%
Correctly classified			73.65%

Table 6: Pearson χ^2 goodness of fit test

Number of observations	425
Number of covariate patterns	362
Pearson $\chi^2(349)$	366.25
Prob > χ^2	0.2522
Pearson $\chi^2(349)$	366.25

Moreover, from Table 7, the results of the link test for model specification show that the hat value is significant, indicating that our model is a good

model, and the hat square is not significant, indicating that our model is correctly specified (Mehmetoglu and Jakobsen, 2016).

Table 7: Link test

Using mobile payment	Coef.	Std. Err.	z	P>z
_hat	1.040	0.326	3.19	0.001
_hatsq	0.023	0.162	0.14	0.887
_cons	0.005	0.177	0.03	0.976

4. Conclusion

This study examined the determinants of mobile payment to purchase coffee among female students at King Faisal University in Saudi Arabia using the logistic regression method. The findings reveal that single women are more likely to use mobile devices to purchase coffee compared to married women. The probability of using mobile payment increases with the increase in students' age. However, the price was found to be an insignificant factor affecting students' adaptation to mobile payment. On the other hand, students who have personal income in the range of 501-100 and over 1000 Saudi riyals (SAR) have higher probabilities of buying coffee using their mobile devices compared to students whose income is in the range of 0-500 SAR. Furthermore, the paper predicts that students who believe that mobile payment is unsafe are unlikely to use mobile payment. Conversely, the probabilities to use the mobile payment for students who think it is safe or

very safe are 37% and 33%, respectively. Therefore, increasing awareness of the safety aspects of mobile payments may improve the use of the technology for the purchase of coffee at the KFU. The findings of this research have practical implications for businesses that operate mobile payment services. Increasing the adoption of mobile payment services can increase their market share and revenue. Emphasizing the benefits of mobile payments as a hassle-free and easy way for doing a transaction may relieve negative perceptions and reduce uncertainties associated with mobile payments. As a recommendation to this study, further research using multi-perspective and multi-level research is required to understand the complex phenomenon of mobile payment services in the food and agricultural sector. Focusing on the behavioral beliefs, social influence, and personality traits may help better understand mobile payment service users and help build long-lasting relationships with customers.

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Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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