Integrated Payment Gateway Adoption by Women-Owned Micro, Small and Medium Enterprises (MSMEs) in Apparel Retail Sector: Scale Development and Validation

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Abstract. The digital economy offers a remarkable new opportunity for Malaysia to become a high-income nation when the digital payment landscape is expanding, and the e-commerce market is experiencing growth. It is supported by the advancement of payment gateway (PG) technology that revolutionized the digital payment solution which started with website integration, progressed to social media, and evolved to just one payment link for entrepreneurs to receive online customer payments. Micro, small and medium enterprises (MSMEs) have shown an increasing interest in adopting PG system for their business, but the involvement in women-owned MSMEs in this digital payment context is still low in Malaysia. Hence, this study aims to develop an instrument that evaluates the items in the factors that influence the adoption of Integrated PG by woman-owned MSMEs in Malaysia's apparel retail sector and to empirically validate a measurement instrument relating to it. The instrument was developed and validated based on a comprehensive multi-step approach. The questionnaire was pre-tested with the involvement of three experts in the apparel retail sector and three academicians. A pilot study was carried out on 108 woman-owned MSMEs in the apparel retail sector. Reliability was tested, and the result suggested an excellent internal consistency of the items. Confirmatory Factor Analysis was applied to assess the scale for validity, which indicated an acceptable model fit for the final scale. All 61 items showed good reliability and validity in examining the factors that influence the intention to adopt integrated PG service in the organizational setting of the apparel sector.

Keywords: Payment Gateway, Scale Development and Validation, Women Entrepreneur.

1 Introduction

Malaysia has embarked on digitalization since 1996 with the introduction of the Multimedia Super Corridor (MSC) as the first step to strategically position itself as a

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competitive force in the digital era. Following that, the need to migrate to payment technology was addressed by Dr Zeti Akhtar Aziz, the Governor of the Central Bank of Malaysia, at the Payment Systems Forum and Exhibition 2005, Kuala Lumpur on 28th November 2005. Thenceforth, the government has promoted innumerable programs, policies, and methods to stimulate digital and technological transformation in Malaysia.

To maximise the benefits and minimise the risks of the burgeoning digital economy, the Malaysian government needs to increase access to low-cost, reliable, and high-speed internet and encourage entrepreneurship, particularly among SMEs and women-owned businesses [1]. Recently, Malaysia has introduced MyDigital, a five-year national project representing the government's ambition to transform Malaysia into a high-income country, a digitally driven and regional leader in the digital economy. One of the main concentrations stated in the MyDigital blueprint is on MSMEs. A total of RM70 million funds were allocated for eligible MSMEs to utilise e-commerce platforms.

The government also offered a Digitalisation Grant Scheme as an every-year initiative. This year 2023, Maxis Bhd. was appointed as the certified digitalisation partner to support MSMEs in keeping their business connected online all the time. A reliable fibre internet with zero downtime is highly important especially when a business is using an integrated payment gateway (PG) to receive online payment from customers. PG plays the role of a connector between the seller's online shop and the financial institution. Its presence in each online transaction is required for the transaction to occur safely. Third-party PG service providers such as iPay88, PayPal, eGHL Razer Merchant Services and Billplz help to integrate PG into retailers` websites or apps to receive online payments from customers. It involves a wide choice of payment methods such as e-wallet, FPX internet online banking, credit cards and debit cards. As the market for online payment processing expands, retailers offer more payment features and alternatives, which drive expansion in various directions. Therefore, the role of PG is crucial in the developing digital economy.

The adoption of digital payment technology is more popular among large firms, and SMEs are particularly underrepresented in Malaysia's digital economy [2]. Of those SMEs who have not yet gone online, 43 per cent of them perceived that there is no business necessity to digitize [3]. Around 70 per cent of SMEs still accept payments through cash and 90 per cent still accept payments through a separate online banking transaction, instead of through an integrated PG [4]. The Economic Census Report showed that from a total of 920,624 establishments operated in 2015, only 61.5 per cent of establishments used the Internet in their business, 74.8 per cent of them used fixed broadband and the rest only depended on poor connection [5]. Women-owned establishments are found to have less access to Internet connection. Only 41 per cent have access to the Internet compared to 62 per cent for all businesses [1]. They need help to use technology more effectively because adapting swiftly and effectively to its technological growth will benefit the women-led MSMEs and assist in reducing available threats in the market [**Error! Reference source not found.**]. In Malaysia, MSMEs make up 97.4 per cent or 1,173,601 establishments. Women-owned MSMEs only accounted for 186,930 establishments [6]. Despite numerous strategic initiatives for the

development of women entrepreneurs, they continue to be underrepresented in this country [7].

The swift progress of the apparel retail sector has upgraded retailers' business models by digitalising the apparel business. During the Covid-19 pandemic, fashionable apparel is one of the most sustainable, most popular, and burgeon industries that operates online. It is believed that the pattern will continue although customers are no longer affected by the pandemic. The apparel market is projected to experience a surge in revenue growth of $5.23 billion in 2023. The market is predicted to expand by 5.79 per cent every year (2023-2027). It is forecasted to expand by 3.2 per cent in volume in 2024 [8]. Despite the changes in consumer purchasing patterns and the availability of multiple online channels selling apparel, not all apparel retailers actively engage in online businesses [9]. Woman-owned MSMEs in the apparel retail sector in Malaysia can leverage PG as a game-changer to facilitate their business as MyDigital Blueprint also focuses on the retail sector as crucial as the other three sectors; agriculture, construction and manufacturing. In addition, the presence of other technologies such as 3D designs, digital printings, radio-frequency identification (RFID), automated manufacturing and augmented reality (AR) has made PG indispensable and inevitable.

Past studies have covered technology adoption research like e-commerce, e-payment, mobile payment and security of online payment. However, there is a very limited study focusing on PG that has contributed to an empirically validated measurement instrument. Thus, the goal of this study is to create a measurement instrument and empirically evaluate the scale for assessing the adoption intention of integrated PG technology by women-owned MSMEs, particularly in the apparel retail sector, an ever-growing sector in Malaysia.

2 Theoretical Background

2.1 Technology Adoption

There are several technology adoption theories. Among the prominent theories that guide technology adoption studies include Theory of Reasoned Action (TRA), Technology Acceptance Model (TAM), Technology-Organization-Environment (TOE) framework, Diffusion of Innovation theory (DOI) and Unified Theory of Acceptance and Use of Technology (UTAUT). While there are strong pieces of evidence of the applicability of these theories to the adoption of technology, not all theories can be applied to suit the current study. The TOE framework has been frequently mentioned concerning the technological adoption area of study such as e-commerce, B2B e-commerce, e-marketplace, Information and Communications Technology (ICT), digital payment, mobile payment, Artificial Intelligence (AI) and big data analytics. TOE framework is more suited to the context of an enterprise in terms of understanding the adoption of technological innovation [10] driven by technological factors, organisational factors, and environmental factors. Thus, the framework applied will be more adaptable, with an insight into the technology itself, involving the exact characteristics

of an enterprise from the overall environmental perspective to better forecast the intention to adopt integrated PG by woman-owned apparel MSMEs.

3 Research Methodology

3.1 Scale Development and Validation

The purpose of this research is to create and test a measurement instrument to scrutinize the adoption intention of PG among woman-owned MSMEs in the apparel retail sector. Scale development and validation is a process of creating a reliable and valid measure of a construct to assess an attribute of interest. [11] described a series of processes for the development and validation of the scale include gathering the items` initial list based on a survey of literature, appraisal by a professional group, content validity assessment, questionnaire and pilot study`s draft preparation, data collection via survey, and assessment of the instrument's reliability and validity. The scale was developed in phases, beginning with identification of constructs based on literature review (LR), moving to item generation, pre-testing, pilot testing, data screening and analysis and, assessing reliability and validity.

3.2 Identification of Constructs

Construct identification was accomplished based on LR. This study considered three independent constructs. Due to the uniqueness of PG adoption among apparel woman-owned MSMEs, new variables have been proposed and a sum of eleven variables along with one intervention factor and a dependent variable were determined. Although the constructs are based on the TOE framework and Theory of Reasoned Action (TRA), some of the variables differ from prior studies on technology adoption and are tailored to the needs of Malaysian apparel woman-owned MSMEs. Based on past studies involving various technological adoptions, the following variables for each of the three contexts were determined.

Technological Construct

The authors proposed three factors under technological context which are the factors of relative advantage, compatibility and security. Relative advantage and attitude path are also supported [12]. Compatibility is critical in the adoption of technology since it has been proven to be statistically significant in explaining behavioural intentions to utilize fitness wearable technology (FWT) [13]. Security is a major concern for many organisations and cannot be overlooked especially when it comes to online payment [14].

Organisational Construct

For the organisational context, the authors proposed three variables. Awareness has a significant impact on attitude and adoption. Awareness as a significant factor in the

adoption of technologies has been mentioned extensively [15]. Digital payment literacy is a new relevant factor that has been considered and is relevant to apparel MSMEs` intention to adopt integrated PG technology. [16] revealed that behavioural intention is significantly and positively influenced by the technological knowledge of the retail businesses` owners or managers. Financial resource has been cited as another significant factor that influences the organisation's decision to adopt technologies. Behavioural inclination to utilise new technology rises in direct proportion to financial capacity [17].

Environmental Construct

For the context of environment, the authors proposed three variables. Trust in service providers is another new relevant factor that has been introduced based on the past literature. [18] highlighted that trust has a significant impact on attitude. Competitive pressure has been often mentioned as a significant factor in the studies of technological adoption. Adoption is due to the existence of competitive pressure [19]. Government support has also been cited frequently in past technology adoption studies. In the absence of government support, people's perceptions and attitudes about new things or services may change [20].

Attitude and Intention

A previous study discovered that attitude is the most powerful predictor of technological intention. [21] suggested that attitude acts as a mediator between the indirect constructs and the people`s intention to utilise renewable energy. This study postulates that attitude mediates the connection between TOE constructs and intention to adopt integrated PG technology. It is hypothesised that woman-owned MSMEs` attitudes influence the intention to adopt integrated PG. Several studies have found a link between behavioural intention and actual behaviour or adoption. Theory of Reasoned Action (TRA) believes that the most reliable indicator of behaviour is behavioural intention which is determined by attitude [22].

3.3 Generation of Items

The items are adapted from previous research using validated instruments. Table 1 to Table 4 details the number of items and sources. Items have been adopted from the sources listed in the table below. All items have been contextualised and appropriately adapted to suit the study.

Table 1. No. of items and sources for technological context.

Factor Name	No. of Items	Sources

Relative Advantage	7	[23], [**Error! Reference source not found.**]
Compatibility	7	[23]
Security	7	[24]

Table 2. No. of items and sources for organisational context.

Factor Name	No. of Items	Sources
Awareness	7	[25], [26]
Digital Payment Literacy	7	[27]
Financial Resource	6	[28], [29]

Table 3. No. of items and sources for environmental context.

Factor Name	No. of Items	Sources
Trust in Service Provider	7	[30], [31]
Competitive Pressure	7	[32], [16]
Government Support	7	[33], [34]

Table 4. No. of items and sources for attitude and intention.

Factor Name	No. of Items	Sources
Attitude	7	[35], [16]
Intention	6	[36], [32]

3.4 Pre-Testing

Pre-testing employs a limited number of respondents to assess the question comprehension and suitability. This part of the study may reduce bias and help to correct any flaws before presenting the instrument orally or via a questionnaire to respondents [37]. Researcher should ask a group of experts to comment on the appropriateness of the questions during pre-testing. As well as allowing suggestions to be made on the structure of the questionnaire, this will help establish content validity and enable to making of necessary amendments before pilot testing. Usually, a small number of respondents are selected for the pre-test. This activity is carried out with the involvement of related Subject Matter Experts through online questionnaire evaluation. The items were discussed and validated by three academicians from public university and three industrial experts from apparel MSMEs. The opinions and ideas from both viewpoints, MSMEs and academia, were carefully considered. Comments related to jargon language and ambiguity are considered. Two items were deleted due to confusion and duplication.

3.5 Pilot Testing

An online pilot test was conducted involving 108 apparel business owners purposively chosen by considering certain important criteria: Owner of women owned MSMEs registered with Suruhanjaya Syarikat Malaysia (SSM) operated in Klang Valley, Malaysia and selling the finish products of cloths, hijab, footwear, leatherwear and accessories.

3.6 Data Screening and Data Analysis

A total of 108 responses were received. All respondents completed their questionnaire with no missing values as all items were set as compulsory to answer. The data distribution as depicted in Table 5 to Table 9 shows that most of them are selling clothes/hijab (90.74%), majority of them have between one to less than five years of operation experience in Malaysia (47.22%), mostly hire around one to four full-time employees (92.59%), majority of them earn sales turnover per year of less than RM300,000 (91.67%), and most of the respondents have an average transaction of fewer than 100 transactions per day (85.19%).

Table 5. Distribution of woman-owned MSMEs by main types of apparel retail business.

Type of Products	# of Woman-owned MSMEs	% of Woman-owned MSMEs
Cloths/Hijab	98	90.74
Footwear	4	3.70
Leatherwear	1	0.93
Jewellery	5	4.63
Grand Total	108	100.00

Table 6. Distribution of woman-owned MSMEs by operation period.

Operation Period	# of Woman-owned MSMEs	% of Woman-owned MSMEs
Less than 1 year	6	5.56
1 year to less than 5 years	51	47.22
5 years to less than 10 years	33	30.56
10 years or above	18	16.67
Grand Total	108	100.00

Table 7. Distribution of woman-owned MSMEs by number of employee hired.

Number of Employees	# of Woman-owned MSMEs	% of Woman-owned MSMEs
1 – 4 full-time employees	100	92.59
5 - 29 full-time employees	8	7.41
Grand Total	108	100.00

Table 8. Distribution of woman-owned MSMEs by sales turnover per year.

Sales Turnover (RM)	# of Woman-owned MSMEs	% of Woman-owned MSMEs

Less than 300,000	99	91.67
300,000 to less than 3 million	9	8.33
Grand Total	108	100.00

Table 9. Distribution of woman-owned MSMEs by average transaction per day.

Average Transaction	# of Woman-owned MSMEs	% of Woman-owned MSMEs
Less than 100 per day	92	85.19
100 – 500 per day	15	13.89
More than 500 per day	1	0.93
Grand Total	108	100.00

3.7 Assessing Reliability and Validity

The scale was measured for reliability and validity using the Structural Equation Modeling (SEM) of Partial Least Squares (PLS) method with the latest version of SmartPLS software to gain relevant results. The results are deliberated in the section below.

4 Result

The first step is to determine how much of each indicator's variation is explained by its construct. Indicator loadings greater than 0.708 are suggested since they imply that the construct explains more than 50 per cent of the variation in the indicator, resulting in adequate indicator reliability. Meanwhile, for item loading, the scale had all items exceeding the 0.708 criteria as depicted in Table 10.

Composite Reliability rho_c (CR) and Cronbach's α-value were employed in the second step to measure internal consistency reliability. The degree to which indicators measuring the same construct relate to one another is referred to as internal consistency reliability. Composite reliability should be higher than 0.70 [38]. In this study, as depicted in Table 10, all reliability values were more than 0.7 and passed the threshold level.

The third step is to evaluate each construct's convergent validity. The average variance extracted (AVE) indicators for each construct are used to assess a construct's convergent validity. An AVE value of 0.50 or greater suggests that the construct explains more than half of the variation of its indicators on average. An AVE smaller than 0.50, on the other hand, implies that more variation persists in the error of the items than in the variance explained by the construct [39]. As mentioned in Table 10, all AVEs were higher than 0.50 threshold.

The fourth step is to evaluate discriminant validity. This metric assesses the degree to which a construct is empirically unique from other constructs in the structural model. The HTMT threshold should be less than 0.9 [39**Error! Reference source not found.**]. The results are depicted in Table 11. During the process, twelve items need to be deleted.

Table 10. Outer loadings, Cronbach`s alpha, composite reliability and AVE.

Construct	Item Code	Outer Loadings	Cronbach`s Alpha (α)	CR (rho_c)	AVE
Relative Advantage	REL02	0.938	0.971	0.978	0.919
	REL04	0.955			
	REL05	0.978			
	REL06	0.964			
Compatibility	COM02	0.955	0.969	0.976	0.89
	COM03	0.962			
	COM04	0.972			
	COM05	0.879			
	COM06	0.946			
Security	SEC01	0.887	0.95	0.962	0.835
	SEC02	0.924			
	SEC03	0.949			
	SEC04	0.919			
	SEC05	0.887			
Awareness	AWA01	0.905	0.956	0.964	0.792
	AWA02	0.904			
	AWA03	0.871			
	AWA04	0.848			
	AWA05	0.859			
	AWA06	0.902			
	AWA07	0.937			
Digital Payment Literacy	DPL01	0.886	0.901	0.93	0.77
	DPL03	0.818			
	DPL04	0.894			
	DPL05	0.908			
Financial Resource	FIN01	0.776	0.902	0.924	0.672
	FIN02	0.864			
	FIN03	0.92			
	FIN04	0.802			
	FIN05	0.72			
	FIN06	0.82			
Trust in Service Provider	TR01	0.8	0.954	0.962	0.785
	TR02	0.898			
	TR03	0.921			
	TR04	0.875			
	TR05	0.89			
	TR06	0.919			
	TR07	0.893			
Competitive Pressure	CP01	0.866	0.898	0.924	0.71
	CP02	0.849			
	CP05	0.801			

	CP06	0.861			
	CP07	0.833			
Government	GOV01	0.893	0.964	0.971	0.825
Support	GOV02	0.916			
	GOV03	0.954			
	GOV04	0.917			
	GOV05	0.921			
	GOV06	0.836			
	GOV07	0.917			
Attitude	ATT01	0.926	0.976	0.98	0.875
	ATT02	0.959			
	ATT03	0.907			
	ATT04	0.914			
	ATT05	0.948			
	ATT06	0.962			
	ATT07	0.932			
Intention	INT01	0.799	0.91	0.937	0.788
	INT02	0.912			
	INT03	0.934			
	INT05	0.9			

Table 11. Hetrotrait-Monotrait ratio (HTMT).

	ATT	AWA	COM	CP	DPL	FIN	GOV	INT	REL	SEC	TR
ATT											
AWA	0.793										
COM	0.779	0.799									
CP	0.898	0.775	0.757								
DPL	0.733	0.857	0.895	0.819							
FIN	0.602	0.584	0.668	0.798	0.766						
GOV	0.86	0.756	0.731	0.835	0.715	0.639					
INT	0.722	0.759	0.856	0.717	0.806	0.601	0.653				
REL	0.797	0.803	0.892	0.732	0.829	0.52	0.748	0.884			
SEC	0.653	0.797	0.851	0.632	0.75	0.61	0.667	0.697	0.747		
TR	0.783	0.737	0.71	0.821	0.695	0.694	0.785	0.657	0.671	0.701	

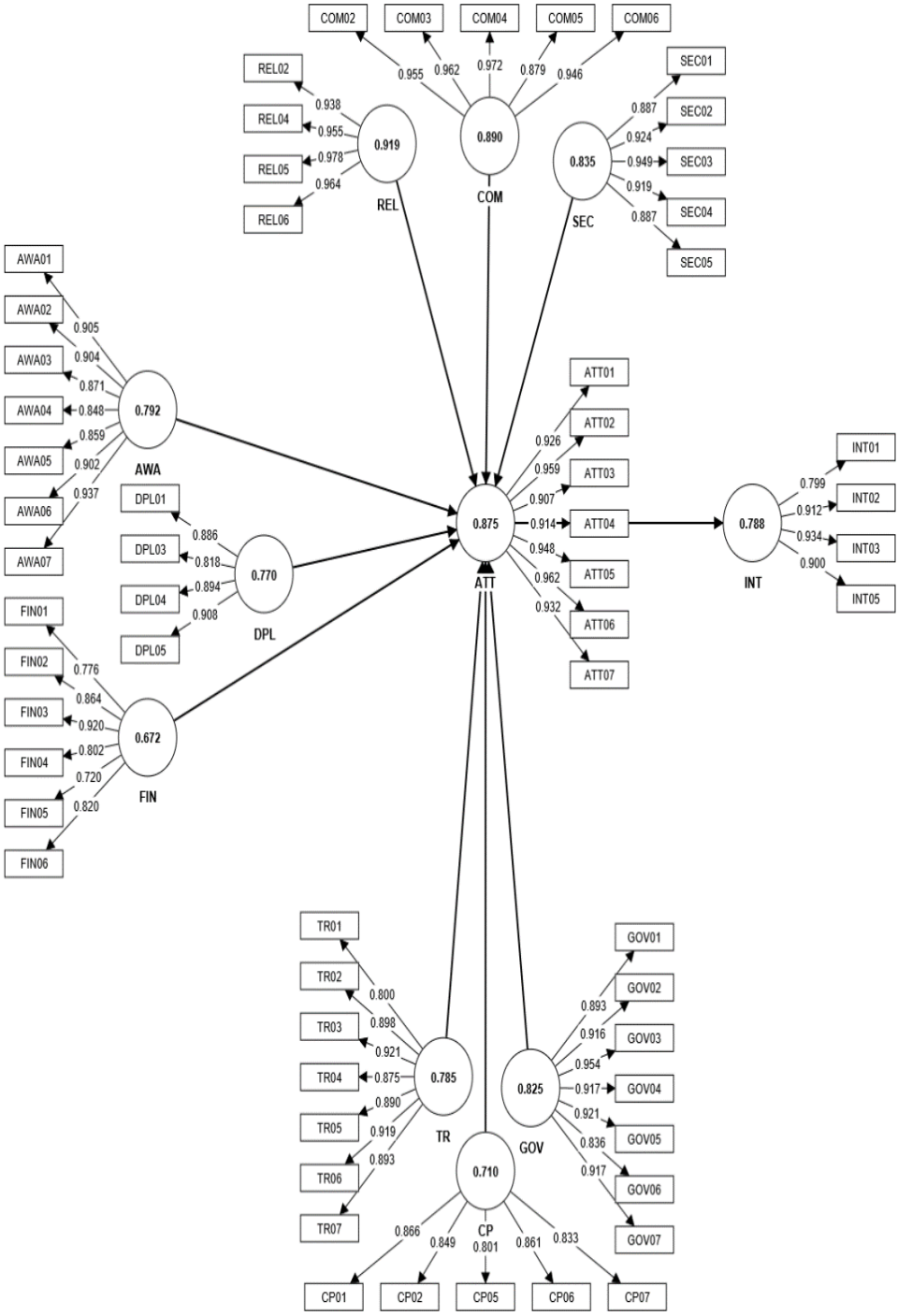

Fig. 1. Graphical output of PLS result.

5 Conclusions and Future Research Directions

The measurement instrument for this study was created in stages, including factor identification, generation of items, pre-testing, pilot testing, and validation of scale. Data were gathered from 108 women respondents who own apparel MSMEs in Klang Valley, Malaysia. The questionnaire was pre-tested online which involved three industrial experts and three academicians. Confirmatory Factor Analysis (CFA) was applied to evaluate the scale`s reliability and validity. The generated scale has a total of sixty-one items with nine independent variables, one mediating variable and one dependent variable. The findings indicate that the instrument is reliable and valid, and it may thus be applied as a tool for future research in the area of women-owned MSME`s digital payment technology adoption in the apparel sector.

The need for such an instrument has become a necessity with the rise of the digital payment era and as enterprises recover from the Covid-19 pandemic which has caused disruptions in global and local apparel industries. This measurement scale can be used by researchers, digital payment system providers and entrepreneurs to study the influencing factors of integrated PG adoption intention in apparel and other related sector. Furthermore, this study has come out with identify new factors that influence the attitude of woman-owned MSMEs toward using PG technology and attitude as a mediator toward the intention to adopt PG in the apparel Sector. The new variables, namely, digital payment literacy as the element of the organisational context, trust in service provider as part of the environmental context, and attitude towards PG adoption intention enable researchers to utilise them in the context of researching the adoption of payment technology in an organisation setting. The study`s findings contributed to a new insight into payment technology adoption.

Certain limitations to this study should be addressed in upcoming research. First, the study only involves woman-owned MSMEs, and further studies are needed to cover the opposite gender of business owners. Second, the concentration is on MSMEs; thus, other types of business settings are excluded. Third, this research focuses on the intention to adopt integrated PG in the retail subsector; hence, the other subsectors such as financial and insurance, education, transportation and logistics, tourism and healthcare need more research. Fourth, product concentration is the integrated PG, a product offered by PG service providers, which involves the integration of PG into MSMEs` websites or apps; thus, future researchers may broaden their scope into other services offered such as the payment links, pages and buttons. Fifth, the scope of the study is regarding the intention to adopt integrated PG offered by third-party PG service provider, so upcoming research may look on another side which is the intention of MSMEs to create their own PG. Sixth, the scale is established and tested in the context of Malaysian firms. Finally, this study is limited to a cross-sectional survey where data is gathered at a particular time point. Longitudinal type of research would allow for a more meticulous study of the measurement scale.

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