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Exploring The Smart Retail Scenario for Traditional Retailers: Case Studies from a Developing Country

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***Abstract*—Traditional retail must maintain its dominance in developing countries by adopting a smart retail strategy that has been proven to enhance the performance of large retailers in developed countries. However, traditional retail's limited resources make smart retail adoption difficult. This study aims to explore the transformation of traditional retail into smart retail and identify the influential factors toward smart retail technology (SRT) adoption. Task-Technology Fit (TTF) is used as a theoretical basis for a successful smart retail adoption framework based on how well the SRT fits the abilities of the individual performing the task. The findings from in-depth-semi-structured interviews indicate that smart retail is feasible for traditional retail since SRT has been adopted in the form of mobile apps and digital payment. However, to transform into smart retail, traditional retailers must consider prior technology adoption experience, users' skill level, operational requirements, and external variables when determining alternative SRT options, which are then selected based on expected features and benefits. Traditional retailers must identify the risks and user acceptance of the adopted SRT during the implementation stage. The problems encountered during the implementation stage can be analyzed to develop SRT adoption strategies that are suited to the needs and capabilities of technology users in traditional retail. The framework proposed can serve as a reference for traditional retailers when making investment decisions and determining how far along they are in the process of transforming into smart retailers, as well as for developing strategies to enhance retail performance.**

***Index Terms*—Developing country, future scenarios, smart retail, task-technology fit (TTF), traditional retail.**

***Managerial Relevance Statement*—Along with the increased benefits due to the advancement of digital technology, smart retail becomes the future trend in the retail industry. Without exception, traditional retailers are facing challenges concerning smart retail adoption due to the limited capacity and capability of traditional retailers. Therefore, this study provides insight that can serve as a theoretical basis for transforming traditional retail into smart retail amid the scarcity of literature on the adoption of smart retail in traditional retail in developing countries. The in-depth qualitative research allows a comprehensive understanding of the status and future scenarios of the traditional retailers transforming toward smart retailing which serves as a guide for traditional retailers in making investment decisions on smart retail technology (SRT) that can fit the needs and capabilities of technology users. The proposed framework will also be useful for assessing whether traditional retailer strategies are "smart" enough to be improved. Technology providers can provide support to enhance traditional retail competitiveness by developing SRT according to the preference generated from this study. While the government can provide traditional retailers with assistance, they require to overcome external factors, implementation challenges, and concerned risks that arise during the transformation to smart retail.**

I. Introduction

THE internet and digital communication technology have made retailing a dynamic sector. Since the Covid-19 pandemic, many traditional retailers have been forced to close their physical stores and focus on technology-based alternatives including online ordering and fulfillment, click and collect, and robot-assisted operations [1], [2]. The popularity of online retail has increased competitive pressures on traditional retailers [3], coupled with online retailers developing smart retail by constructing physical stores equipped with digital technology to improve customer shopping experience while enhancing retail performance [4]. Customers can now purchase anytime, wherever, and however they want, something that traditional brick and mortar retail establishments could not deliver [5]. In addition to eliminating management problems, smart retail can improve income and decrease expenses by offloading labor to customers (e.g., self-scan) or automating processes (e.g., digital shelves) [6].

Smart retail requires major financial investment with significant risks [7], hence it always begins with online retail and capable modern retailers in developed countries. However, the concepts and assumptions effectively used in developed

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countries cannot necessarily be applied in developing countries [8] without adapting them to traditional retailers' demands and capacities as well as technology users' competence. This will be a challenge for traditional retailers in developing countries who have limited financial sources and mostly use simple technologies like calculators or none.

Traditional retail has great potential compared with other types of retail, including being able to absorb a larger workforce and contribute the most to the Gross Domestic Product (GDP) since it remains the primary shopping choice for most people in developing countries, allowing it to grow and dominate the retail industry in developing countries [9], [10]. Therefore, traditional retailers need to consider smart retail strategies to supplement the traditional ones and maintain their dominance in the developing nation's retail business.

However, there has been a lack of research on how to transform traditional retail in developing countries into smart retail. Pantano et al. [11] offer a model of transforming traditional retail into smart retail, but in the context of traditional retail, it is defined as face-to-face interaction between consumers and retailers when shopping at a physical point of sale. Traditional retail in developing countries has broader characteristics, such as small, family-owned retail [12] with informal store management, and the use of simple technologies such as calculators. Furthermore, previous research on traditional retail in developing countries concentrated more on developing strategies, such as identifying strategies to survive in the competitive world of retail [13], [14] and developing competitive strategies with modern retail franchises [15], [16]. Very little research has been conducted on technology adoption in traditional retail, with most studies focusing on the factors, challenges, and strategies for the adoption of technologies such as e-commerce [17]–[19], digital payment [20], [21], mobile payment [22], [23], and self-scanning technology [24]. While it is crucial to develop a smart retail adoption model for traditional retail that has limited resources so that it may successfully adopt technology that fits the context and local challenges of developing countries.

The basic theory that has been frequently used in SRT adoption research can only predict adoption intention or behavior, such as the use of the Theory of Planned Behavior (TPB) to predict Indian grocery retailer intention toward SRT adoption [25] or the Hedonic Motivation System Adoption Model (HMSAM), which is used to assess retail employee adoption intention [26]. Only the Task-Technology Fit (TTF) model can be used to evaluate the performance of systems that have implemented information technology. Due to the difficulty of measuring the performance of systems that adopt technology, the TTF model serves as a substitute for measuring the successful adoption of the technology based on how well the technology fits the abilities of the individual performing the task [27]. Therefore, this study will use the TTF model as a theoretical foundation for developing successful smart retail adoption in enhancing the performance of traditional retail.

Based on the preceding explanation, this study will attempt to examine the adoption of smart retail in traditional retail by addressing two specific research questions:

1. How are traditional retailers transitioning to smart retailers based on their needs and capabilities?
2. What are the determinants for a successful transition (transformation) from traditional to smart retailers?

Addressing these questions is crucial for both theory and practice development. The findings will contribute to the academic debate by highlighting the challenges and opportunities in the process of adopting smart retail and giving insight into the feasibility of smart retail in traditional retail. This enables traditional retail to benefit from improvements in the use of retail technology in the form of smart retail technology (SRT), which will fundamentally expand their point-of-sale. Traditional point-of-sale terminals will continue to dominate, while smart retail will emerge to supplement traditional terminals in certain segments. The findings of this study are likely applicable to other emerging nations, particularly those that share Indonesia's social, political, technical, and cultural characteristics. There are currently no studies on the adoption of smart retail among traditional Indonesian retailers or other countries with similar conditions.

Traditional retailers in Indonesia served as case studies, given that Indonesia is a developing country aiming to include smart retail into the smart city concept for the new state capital to be built in East Kalimantan. Traditional grocery retail was chosen because it accounts for the majority of traditional retailers in developing nations [20]. Furthermore, focusing on one type of traditional retail allows for a complete and extensive examination of the interactions among contextual factors and their influence on smart retail adoption by traditional retailers within the industry.

This paper is organized as follows. Section 2 reviews the academic literature regarding the adoption of smart retail as a strategic option for improving traditional retail competitiveness. The theoretical lens underlying this research is then introduced, along with a basic framework for the empirical research. Section 3 explains the research design and data collection before the findings detailing the understanding of smart retail, SRT adoption status, SRT adoption barriers, and drivers of smart retail adoption are presented in Section 4. Afterward, Section 5 discusses the study and research prepositions. Finally, Section 6 concludes with remarks and implications.

II. Theoretical Background and Literature Review

A. *Smart Retail Adoption*

Technology innovation plays a prominent role in FMCG retailing by providing various types and scopes of services provided from each retail format. Its role keeps getting more complex because it transforms retailers' physical and virtual service delivery to customers [28]. This marks the significant evolution of retail formats. As evidenced by the earliest retail technology innovation in the form of a cash register to control cash and reduce theft risks [29] pushed the transition from small, family-owned general stores (traditional retailers) to larger general stores and department stores. Likewise, Amazon

e-commerce recently revolutionized physical stores by opening smart retail equipped with digital information and communication technology (ICT) known as smart technologies such as artificial intelligence (AI), smart shelves, RFID, and iBeacon to improve customer experience and the speed of product acquisition. These technologies are then referred to as smart retail technology (SRT) [30], [31].

Smart retail research tends to focus on large retailers in developed nations with strong investment capabilities since adopting smart retail requires large capital with significant risk [7]. Large capital requirements, primarily for the adoption of connected smart technology to build a retail system that can enhance the consumer experience across multiple touchpoints and optimize performance across these touchpoints [32]. The smart retail adoption model is a rare area of research, with only Pantano et al. [11] providing a model of transforming traditional retail into smart retail through the SRT adoption stages to increase access, connectivity, information sharing, and collaboration (partnership) among all retail technology users. However, this research is still conceptual and has not been supported by empirical data to validate and verify the constructed adoption model. This indicates the difficulty of developing an adoption model for smart retail, given that this format and concept are relatively new to the retail industry. Furthermore, Pantano et al. [11] understand traditional retail as limited to face-to-face interaction between consumers and retailers while shopping at the physical point of sale, whereas traditional retail in developing countries has broader characteristics such as small, family-owned retail [12] with informal store management and using simple technology such as calculators.

Modeling SRT adoption as an integral component of smart retail is an easier way to construct a smart retail adoption model. This was done by Bhattacharya [33] who attempted to model the four phases of RFID adoption in the retail sector using the theoretical framework of Rogers' Diffusion of Innovation (DOI) theory [34]. However, the model is constructed in the context of post-adoption smart retail, not for the transformation of traditional retail into smart retail (pre-adoption smart retail). The adoption of SRT does not automatically transform retail into smart retail. Therefore, further research is required to determine whether adopting SRT may improve sales and purchasing activities so that they become more efficient and effective [35]. Although the transformation of traditional retail to smart retail has been discussed by Pantano et al. [11], methods for employing smart retail to better accommodate local contexts and challenges, particularly in developing countries, have not been discussed.

Large capital requirements are a barrier to the adoption of smart retail in traditional retail in developing countries, which have limited financial and human resource capabilities [20], so no one has discussed the adoption of smart retail in traditional retail in developing countries. Discussions on SRT adoption in developed country literature are explored in developing country literature in a broader context about the adoption of industry 4.0 technologies in the retail business. The research on the application of these technologies to increase the competitiveness of traditional retail in developing countries is still limited to determining the driving factors, challenges, and requirements for e-commerce technology adoption [18], consumer acceptance of new technologies [17], omnichannel transformation [36], and the benefits of technology adoption such as shopping portals [37], digital payments [20], and e-commerce [19], [38]. Furthermore, traditional retailers in emerging countries use only inventory management/accounting software, mobile applications, portable devices (billing POS) [23], e-commerce [18], [19], [23], [39], digital payment [20], [21], and mobile payment [22]. However, it is unclear if these technologies belong in the SRT category or how their use might promote the transition to smart retail. This means that no study has been undertaken on modeling smart retail adoption, particularly the shift from traditional retail to smart retail. Indeed, the development of a smart retail adoption model is critical for determining the best SRT for traditional retail when constrained by financial capabilities, human resources, and demands for successful adoption.

B. Theoretical Lens

Numerous theoretical models have been utilized to investigate SRT adoption in offline retail in developing countries. Most of these models focus on key antecedents to predict adoption intention or behavior. Models that follow this scheme include the Theory of Planned Behavior (TPB) [25] to predict retailer intention/behavior towards the adoption of SRTs used in traditional Indian grocery retail [23], the Technology-Organization-Environment (TOE) [40] to determine the challenges of digital payment adoption from the perspectives of retailers, consumers, and suppliers of traditional Indian retail [20], the Hedonic Motivation System Adoption Model (HMSAM) [26] to measure retail employee adoption intention/behavior [41], and the Technology Readiness Index (TRI) to measure consumers' readiness to adopt self-scanning technology [24].

Even though these models offer insightful information about the successful diffusion and acceptance of SRT, they lack the metrics measuring the performance impact of SRT adoption and often neglect the capability constraints of adopters, which are often encountered by traditional retailers in developing countries. The performance impact of systems that adopt information technologies such as SRT is often difficult to measure directly, so the Task-Technology Fit (TTF) model proposes an evaluation of technology users on the degree of fit between functions or features of the technology and the task requirements of their use, as a surrogate measure for successful adoption of the technology [42]. Adoption of technology does not ensure that it will be used as intended; instead, adoption and assimilation of that technology are determined by its perceived utility [43]. Therefore, the TTF model provides our study with a theoretical basis to predict the success of smart retail adoption in enhancing the performance of traditional retailers in developing countries. This perspective is operationalized by examining the extent to which the operational requirements of traditional retailers (i.e., task characteristics) and the SRT

characteristics that they understand, fit each other, that then motivate traditional retailers to adopt SRT. Furthermore, the TTF model has never been used in the context of SRT adoption in developing nations, particularly in the traditional retail setting. The TTF model's validity has been demonstrated repeatedly in the context of multimedia-based information system for shop floor workers [44], the adoption of e-commerce [45], mobile banking [46], [47], contactless delivery services during the COVID-19 pandemic [48], and more recently technology in shopping activities under social distancing [49].

TTF is defined as the extent to which a technology (broadly defined to include information technologies and other manual technologies or techniques to assist in task accomplishment) aids an individual in carrying out his or her responsibilities [42]. The TTF model is presented as a function of task characteristics (TAC), technology characteristics (TEC), and individual characteristics (IC). Individual potential users will be more motivated to adopt information technology if it matches the task environment (TTF) better [42], [50], [51]. Users' expectations increase as a consequence of the improvements that come with new technology adoption. But still, expectations can only be met when technology is integrated into the organization, as each individual has a various perspective on the technology utilized and how it should be used [52]. Therefore, TTF could be increased by improving technology to better meet task requirements, redesigning, or reengineering tasks to better utilize existing technology features. It could be improved by training users to maximize the technology's capabilities.

In the context of smart retail adoption in traditional retail of developing countries, TTF refers to the ability of SRT to improve consumer shopping experience while enhancing traditional retail operational efficiency (smart retail fit – SRF). The conformity of smart retail in traditional retail is influenced by the characteristics of the SRT used to fulfill tasks in traditional retail or re-engineer existing tasks to optimize the SRT used by considering variables affecting SRT users.

Technologies are viewed as an instrument to perform tasks [42]. In the context of smart retail adoption in traditional retail, technology characteristics refer to SRT (digital technology) provided to assist users in their tasks. The characteristics are determined by the best SRT to satisfy their needs with a limited effort that includes reengineering existing human, financial, and technological capabilities. Moreover, the risks of the selected SRT must be considered, especially those associated with a technology life cycle (out-of-date) and out-of-use [11].

Individuals' actions in transforming inputs into outputs are defined as tasks [42]. Task characteristics include those that may encourage a user to rely more on specific aspects of information technology. SRT design and decisions are influenced by information concerning SRT-enabled business processes and value chain activities [53], as well as the expected benefits of SRT adoption regarded to be better than a preceding idea [54].

Individual characteristics (training, computer experience, motivation) may influence how readily and effectively a person uses technology [42]. In the smart retail scenario, individual characteristics are influenced by basic, technical, and technological knowledge, as well as current innovation adoption status. Knowledge of innovation is intended to help with the development of a persuasive attitude, decision-making activities, and innovation execution [53]. Individuals also see innovation as comparatively difficult to understand and apply as a result of its consequences and challenges [54]. Furthermore, users' readiness and capabilities represent users' technological restrictions, which could affect SRT implementation [55].

III. Methodology

A. Research Design

Based on our understanding of the TTF theory, we built our initial framework as a lens through which we qualitatively studied smart retail adoption within traditional retailers in developing countries. The initial framework was developed using the TTF approach by considering the variables of smart retail adoption and used to guide the development of the research procedure. To extract appropriate data to highlight the connected constructs, the initial framework directs the research questions and establishes the scope of the study. The initial framework was also used to analyze and evaluate the data, as well as to comprehend topics from the perspectives of the participants. This initial framework as shown in Fig. 1 featured smart retail fit as the representation of TTF in a smart retail adoption context influenced by TEC, TAC, and IC. Operational activities (labeled B in Fig. 1) and the expected benefit of SRT (labeled G) are considered to construct TAC while the choice of technology (labeled F) and concerning risks (labeled H) constructs TEC. Moreover, IC is influenced by users' capabilities (labeled A), users' readiness (labeled E), knowledge about smart retail and SRT (labeled C), and SRT adoption status and challenges (labeled D). These labels (A to H) correspond to the questions in the interview guideline in Appendix A.

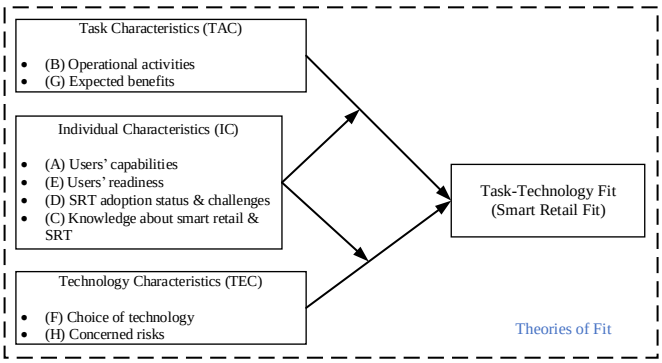

Fig. 1. The initial framework to guide the research.

Qualitative research with a case study design was applied to this study because it explores deeper for gaining new insight into a phenomenon that is not fully explored [56] due to the absence of research discussing smart retail adoption in traditional retail of developing countries. The objective was to understand the perception of smart retail among traditional

retailers, SRT adoption status, barriers, and motivating factors for traditional retailers to adopt smart retail. Purposive sampling, a type of non-probability sampling, was used [57].

The study took place in Samarinda which has been programmed to become a smart city in the last three years [58]. Traditional retailers discussed in this study are merchants selling convenience store items (FMCG) in self-owned stores or rented spaces near their target market, commonly referred to as kiosks or stalls (*warung* in the Indonesian language) [59]. The traditional aspect is reflected in the disorganized management of the business, no documentation of profits and inventory in stores, and the use of traditional technology such as calculators or simply not utilizing technology at all whiles having adopted more advanced technology.

Traditional retail can be classified into four categories according to the scale of the business and the items of services offered. The first category includes small kiosks serving made-to-order kids' food and drinks and earning between 1 and 6 million rupiahs each month. The second category consists of stalls in the residential area selling various daily necessities and having a gross monthly income of between 7 and 25 million rupiah. The third category consists of roadside stalls, which provide the same commodities as the residential stalls as well as additional services, such as tire pumps and fuel stations. This type of stall has a monthly gross income of between 30 and 75 million rupiah. The last category consists of wholesale stalls, which are frequently located near a traditional market and sell items at varied prices depending on whether they are purchased at retail or in bulk. The monthly gross revenue for wholesale stalls is between 180 million and 1.2 billion rupiah. Wholesale stalls have the highest financial power among the four categories of traditional retailers, which is the primary necessity for transforming them into smart retail. Wholesale stalls are thus chosen as the cases in our study due to the highest probability of transforming into smart retail.

B. Data Collection

Prior to the main interview, we pilot-tested all interview guidelines with one stall owner from the first category (smallest stalls), five stall owners from the second category (residential stalls), two stall owners from the third category (roadside stalls), and one stall owner from the fourth category (wholesale stalls). Our objective was to ensure the relevance of the questions and the sensitivity of the language and terminologies used. On the basis of their input, several questions were reworded, and clarifications were added where appropriate.

The data in this study were obtained through in-depth semi-structured interviews with 10 wholesale stall owners, conducted between March and November 2021. Each interview lasted between 1 and 1.5 h. Observation and walkthroughs during a visit to the participants' wholesale stall supported the interview data, which were documented as field notes. According to World Bank, wholesale stalls are categorized as micro-enterprises with up to 10 employees [60]. The main source of information was obtained from wholesale stall owners chosen for their deep understanding of the requirements and capabilities of technology users in their stall, and their willingness to participate in this study. Wholesale stalls have a simple operational structure consisting of the owner and several employees, allowing the owner to perform multiple roles as manager, cashier, and customer service representative as needed. Such a flat organizational structure enhances the flexibility of the decision-making process [61], allowing wholesale stall owners to have complete control over technology adoption decisions due to their full understanding of retail operations. Table 1 shows the details of the participants. The guiding questions involve inquiry about the wholesale stalls' profile and their operational activities, their knowledge about smart retail, the SRT adoption status and challenges, the technology user's readiness and capabilities, the technological innovation requirement, and the expected benefits and concerning risks from the technological innovation.

TABLE I
LIST OF PARTICIPANTS

Participant	Experience (years)	Number of employees	Estimated gross revenue (millions of rupiahs/month)
1	14	7	250 to 300
2	5	3	300
3	21	8	250 to 300
4	20	4	250 to 300
5	5	3	250
6	20	4	200 to 250
7	18	5	300
8	7	3	250
9	12	4	250 to 300
10	4	2	200 to 250

C. Data Analysis

The interviews were conducted in Indonesian with the participants' confidentiality guaranteed. They were audio-recorded, transcribed, and then translated into English. The approach of Gioia et al. [56] was used to identify primary codes, secondary codes, and themes. In the initial phase of data analysis, we conducted open coding of the results of interviews with eight participants, in which the transcripts were examined to find the relevant code categories [62], [63]. The data were analyzed using NVivo 12 by inserting open codes on the interview transcripts to separate the data and determine concepts connected to the raw data extracted from the interview transcripts [64].

In the second stage of data analysis, these open codes are clustered into more abstract codes, which Corbin and Strauss [65] refer to as axial codes, but which we refer to as primary codes. When new insights emerged from this iterative process, further interviews were performed, resulting in a broader understanding of the concepts. After the initial round of coding, two further interviews were done to strengthen and validate our initial findings. After the second round of interviews, they were deemed to have reached the saturation point and no new insights arose from the data [66]. This also represents a

validation of the results of the coding analysis, as the findings of the additional interviews did not generate any new codes and were consistent with the previously identified codes. Therefore, the entire sample size consisted of 10 interviews with wholesale stall owners. Following Eisenhardt et al. [67], we refer to the existing literature to continue refining theoretical insights derived inductively from coding findings. We examined the coding data to uncover discrepancies in findings until an acceptable degree of dependability was obtained [68], [69].

The intercoder reliability [70] and intercoder agreement [71] were maximized by two of our researchers who separately coded the data to evaluate redundancy, uncover inconsistencies, examine the reliability of the coding, and identify new insights. Based on Robinson's [72] measure of agreement, the intercoder agreement level was at least 95% of the statement that could be encoded in the sample text. To ensure reliability, we continued our discussions until the 95.5% intercoder agreement was reached. Our data analysis resulted in four main emerging themes (shown in Appendix B): the smart retail understanding, SRT adoption status, SRT adoption barriers, and smart retail adoption drivers.

IV. Findings

In this part of the article, we present the findings identified during the study. From the coding and thematic analysis, we structure the content based on the four emerging themes.

A. Smart Retail Perceptivity in The Context of The Wholesale Stall

It is necessary to grasp the wholesale stall owners' knowledge and understanding of smart retail before analyzing the appropriate form of smart retail adoption for traditional retail. The news on smart retail in Indonesia was limited and focused on the government's effort in urging modern retailers to adopt it as a new marketing strategy. Therefore, most participants are unfamiliar with this term (Participants 1, 2, 3, 4, 5, 7, and 9). The rest of the participants admitted having heard this term and understood it to refer to a physical store whose services and facilities are geared towards satisfying buyer desires, as stated by Participant 1, "*maybe smart stores are capable of fulfilling buyers' wishes*". Participant 10 implied the same thing by emphasizing online selling features, "*I think it is a store that sells online with the mobile application*". Participant 7 added the role of technology to this point of view by stating, "*if the wholesale stall uses the latest technology to meet buyers*' *wishes, then it can be called smart".*

Exploring further on this topic, we provided an example of smart retail and SRT such as JD.ID X Mart in Jakarta uses facial recognition, a QR Code scanner, and a mobile application. We also mentioned smart shelves and interactive displays as one of the SRTs used in smart retail. Afterward, participants added the usage of the latest technology to assist store operations as restated by Participant 7, "*I think smart retail is the way a store enhances their activities, including selling online, with newest technology assistance*". This is further supported by Participant 6's statement, "*as far as I know, it is a store adopting today's technologies that also sells online*". Participant 10 mentioned mobile applications as the most well-known example of today's technological advances.

Finding 1: *Smart retail for the wholesale stall is understood as the application of one or more of the latest technologies to provide services tailored to the needs of buyers*.

B. Smart Retail Technology Adoption Status

Our interviews revealed that most participants have not adopted technology that is more advanced than calculators and modern technology, with Participant 4 having never received offers of new technology and the other five participants were not interested since they consider it unnecessary, as stated by Participant 6, *"… I'm not interested in using it because I find it difficult to understand new technology. Besides, I don't feel like I need that kind of technology yet"*.

The participants believed that calculators and modern technologies, such as POS Systems, printers, and barcode scanners, were sufficient for documenting small-quantity transactions and storing information on the sales of the unit and wholesale goods, as stated by Participant 3, "*I used a computer and a barcode scanner to record the number and prices of items in the stall*". Participant 6 argued in favor of this claim by employing existing technology to compute monthly profits, "F*or the last 5 years, I have been using a laptop for recording the incoming and outgoing goods, so I know the income and the expenses every month, including earnings….*". Moreover, Participant 8 added, *"…. I use the printer to print payment receipts and purchase invoices…* ".

Four participants have adopted mobile-based technologies that are more advanced than existing technologies, including mobile applications and digital payments. In the literature on smart retail in developed countries, these mobile-based technologies are classified as SRT [73], [74]. The application of mobile-based technology in wholesale stalls has adapted to the extent that the mobile application is limited to ordering supply goods to distributors and receiving buyer orders, as Participant 1 explained, *"I used EMOS PRO to order goods from PT. Enseval … There was also an application offer from PT. Sampoerna (AyoSRC), similar to EMOS PRO, where I can place an order to Sampoerna distributor in Samarinda, and buyers can order to me through that application…"*.

However, there was a mobile-based technology that was discontinued since the SRT provider settings were not compatible with the settings at wholesale stalls, as explained by Participant 2, *"I used to join AyoSRC, but then I quit because we were being controlled especially in the display of merchandise…"*. A similar response was aired by Participant 1 who discontinued using the digital payment for a different reason, *"… I use QR code for digital payment from Maybank. For a year no one has been using it. Some buyers prefer to transfer rather than using that"*.

Finding 2: *SRT has been adopted in the form of a distributor-provided mobile application that is confined to ordering items from distributors.*

C. Smart Retail Technology Adoption Barriers

Participants are unfamiliar with the term SRT, but they may have used SRT-related technologies such as mobile applications and digital payments. To understand the potential of smart retail adoption in traditional retail, this study has investigated the barriers that participants have encountered when adopting technology, including traditional technology (calculator), modern technology (POS System, barcode scanner, and printer), and SRT (mobile-based technologies).

The first barrier relates to the unreadiness of technology users in wholesale stalls, as demonstrated by their inability to perceive and understand technological innovation and buyers' disinterest in utilizing SRT. Technology users in wholesale stalls, consisting of wholesale stall owners, employees, and buyers, have generally low technology skills and knowledge, as Participant 6 explained, *"I am quite interested, but my ability is lacking to understand and operate it… my employees are not educated, thus no one can operate it"*. This is supported by Participant 3, *"probably most of them are not ready… our society is not ready for such concept (smart retail). Most of our buyers are not tech-literate, so it is hard to learn new technology"*. Buyers' unreadiness can also be seen in buyers' reluctance to adopt new technology classified as SRT, as experienced by Participant 1, who had to cease installing digital payment from MayBank after a year because buyers prefer cash transactions over digital payment.

The second barrier relates to the problems that arise during the implementation of SRT-classified technologies, particularly mobile applications. The SRT adoption did not solve the frequently emerging problems in wholesale stalls. Our interviews revealed that one of the unresolved problems is a failure to monitor the supply of items, which results in frequent stockouts. Out-of-stock or shortage of goods was discovered only after buyers complained about being unable to find certain items on the stall shelves, as stated by Participant 6, *"the stock often runs out before our orders from the distributor arrived. We did not count the number of items because it is very time-consuming. That is why we often know the goods are out of stock because buyers are looking for them"*.

The lack of communication between distributors and retail owners regarding the availability of goods further contributes to the problem, causing *"… sometimes the number of items we receive is less than the amount we order…"* (Participant 2) or even *"… they substitute it with other goods"* (Participant 5). Participants 4 and 9 said the courier distributors sometimes steal the goods to be resold, resulting in a discrepancy in stocks. This will lead to losses for wholesale stalls.

Another unsolved problem is wholesale stalls' limited space and resources, which prevent them from meeting the wishes and expectations of buyers who demand modern retail-style self-service facilities. The arrangement of goods becomes disorderly and untidy due to limited space to exhibit all merchandise. As a result, buyers must ask employees for assistance. Participant 1 stated that this will hinder the flow of service. It is more efficient for the seller (owner and employees) if the buyers submit their shopping list and wait for it to be prepared. Therefore, wholesale stall owners long for technological advancements that will satisfy the desire of buyers and sellers as stated by Participant 8, *"it would be good if there is a technology to help to arrange the goods to be more orderly, making it more comfortable for both buyers and sellers"*.

Participants believed that these problems originated from inadequate inventory management at wholesale stalls, thus it was expected that there would be technology capable of addressing them, as emphasized by Participant 5, *"I think the activities of organizing incoming and outcoming goods are important for us because we often find out that an item is out of stock when a buyer is looking for it, thus missing out on an opportunity to make a profit from it"*.

The third barrier was explored from the problems that arose during the implementation of SRT prevented its continued use, such as Participant 2's decision to stop utilizing mobile applications due to the excessive restrictions imposed by SRT providers, *"I used to join AyoSRC, but then I quit because we were being controlled especially in the display of merchandises…. AyoSRC envisions the wholesale stall display as a minimarket with no items mounted or hung. This is tough to accomplish because sachets will not be noticed unless they are hung"*.

Finding 3: *The challenges encountered when adopting SRT include insufficient technology user skill and knowledge, buyers' disinterest in SRT, substantial unsolved problems despite SRT implementation, and problems that developed during SRT implementation.*

D. Drivers of Smart Retail Adoption Intention

The application of technology by wholesale store owners indicates the potential application of SRT in traditional retail since technology is an important aspect of smart retail. However, it is necessary to investigate in greater detail the factors that can motivate traditional retailers to implement SRT as a first step toward smart retail adoption. Based on participants' managerial experience and the use of SRT, we divided the factors that will encourage participants to adopt smart retail into four categories: anticipated benefits from the adoption of smart retail, SRT testing opportunities to anticipate risks, acceptance of technology users in traditional retail, and external factors.

The first category is the expected benefits of adopting smart retail as expressed by Participant 2, *"as long as there are benefits, I believe there is no harm in implementing new technologies or concepts…"*. Moreover, Participants 3 and 7, who are currently not interested in implementing SRT, acknowledged that if there is a clear cost-benefit calculation, they will consider adopting smart retail as stated by Participant 3, *"as a businessman, I want definite calculation related to profit and loss …. The most important thing is the cost of implementing new technology or new concepts such as smart retail should not exceed the cost of purchasing merchandise"*.

Participants also wished for benefits from resolving the inventory management problems outlined in section 4.3. The next benefit that participants expected was inspired by the low

capability of technology users, as the adopted SRT must be usable by users with poor skill and knowledge as explained by Participant 1, *"…. if there is a technology that does not require certain knowledge and skills, even accessible to the uneducated, then I will use it"*. Participant 2 suggested the voice recognition feature to suit these capabilities, while Participant 5 suggested the remote-controlled ability.

The second category is the opportunity to test SRT before adoption to detect and mitigate potential risks that could result in business losses as stated by Participant 3, *"I'm scared I would make a mistake when using the technology, and it may cost me money…",* and added by Participant 6, *"… for me, at least the new concept or technology can be tested first so the risks are calculated"*.

The third category concerns technology users' acceptance since they have seen the perceived benefits of SRT adoption, which motivates them to continue utilizing mobile applications as explained by Participant 1, *"if we run out of stock, we can directly order from the distributors with the same price without waiting for the salesman. Furthermore, unlike ordering through a salesman, we can see the availability of goods in the distributors"*. The acceptance of technology users in wholesale stalls can also be observed in their willingness to learn new concepts or technologies as stated by Participant 6, *"if there is a technology that is accessible for someone like me, I might be willing to try…. I think my employees will be eager to learn if someone can teach them"*.

The fourth category is related to external influences such as competitors' influence, technology trends, and government policy. Participants may be influenced to use the same technology as competitors who have implemented it as mentioned by Participant 4, *"because I have seen how the technology is used, regardless of its success"*. The fear of being left behind due to the inability to keep up with the current technology becomes their motivation in adopting it as expressed by Participant 1, *"well, if everyone has already used it, then we have no choice but to follow…"*. The following external factor is government pressure to implement smart retail, especially if it is mandatory. However, if it is proved to be detrimental to the participants, then the new technology or concept will only be used as a formality as stated by Participant 8, *"… I will follow government policies as long it does not hurt the business. Even though it is detrimental, I will pretend to follow. We do not want to be regarded as criminal"*.

Finding 4: *Wholesale stall owners are eager to adopt smart retail for a variety of considerations, which can be grouped into four categories.*

V. Discussion

We have developed a strategy to assist traditional retailers in adopting smart retail in a way that benefits them. In this part, we begin by defining the proper concept of smart retail for traditional retailers in a developing country, then proceed to map the variables required for transforming traditional retail into smart retail in the context of TTF. Finally, we develop a future traditional retail scenario in the framework of smart retailing.

A. Defining Smart Retail Concept for Traditional Retailers in a Developing Country

The owners of the wholesale store, who serves as a traditional retailer in this study, defines smart retail as a retailer that makes use of one or more of the latest technologies for providing services following buyer preferences, including the availability of online sales. From this perspective, it is possible to criticize three things.

First, by "latest technology," traditional retailers mean the newest technology that is different from what they have been using up until now (calculator, POS System, printer, and barcode scanner). Mobile-based technologies, such as mobile applications and QR-code-based digital payments, are the newest technologies they are beginning to employ today. In addition to the fact that mobile phones have been widely adopted in developing nations, traditional retailers continue to use this technology as an alternative method for ordering the supply of products from distributors.

Most smart retail in developed countries involves the use of a set of interactive and interconnected technologies, such as RFID and mobile apps for smart shelves [75] and RFID, Big Data Analytics (BAD), sensors, mobile apps, and camera vision for Amazon Go [76]. However, some SRTs are used independently without attaching to other smart technologies, including RFID [77], digital receipts, mobile checkout, mobile coupons, and loyalty programs [31]. In developed nations, mobile-based technologies are commonly used to construct smart retail [73], [74], so it can be said that traditional retail has adopted SRT. However, the implementation of SRT does not automatically transform traditional retail into smart retail; it must be determined whether the implementation of SRT can simultaneously improve organizational processes and selling activities [35]. For this reason, it is necessary to study further performance changes due to the adoption of SRT.

Second, traditional retailers understand smart retail as providing services based on the buyer's preferences. It prioritizes traditional retailers' interests in improving retail performance, particularly those connected to inventory management, which will ultimately improve consumer service. This priority emerges because traditional retailers rarely analyze the availability of items and their retail profits regularly, thus traditional retail management requires a lot of refinancing to be able to deliver the best service to its buyers.

This understanding of smart retail differs slightly from that of earlier research, which focused on enhancing the shopping experience of consumers while also attempting to enhance retail performance [35]. In this case, the use of smart technologies will change retail into experience-based retail, which will have unique advantages for its retail operations [5]. Customers who shop at smart retail will enjoy a revitalizing shopping experience [78].

Thirdly, the COVID-19 epidemic and the shift in customer preferences that led to more individuals choosing to make

purchases online prompted the rise of internet shopping to accelerate each year [2]. Online sales are now the newest sales channel option that offline stores and traditional retailers must consider when increasing their retail revenue. The adoption of SRT enables customers to purchase products online after trying them out and waiting less time for delivery than from traditional retailers [78]. Although online sales will enhance the shopping experience for smart retail's intended goals, further research is required to evaluate how they will affect the effectiveness and efficiency of operational and sales activities to determine whether retail has transformed into smart retail.

Traditional retail has limited resources, so the concept of smart retail must be simplified into a retail format that implements one or more categories of SRT with the primary objective of enhancing the performance of traditional retail, thereby enhancing the service provided to the customer. The type of SRT that traditional retailers can employ is limited to inventory management, which is currently a priority for their operational requirements. Moreover, the recommended SRTs can be learned and utilized by users who lack technological expertise. However, additional evaluations are required to determine whether the adoption of SRT has resulted in a transformation to smart retail, as measured by changes in the efficiency and effectiveness of organizational processes and selling activities.

B. Mapping Task-Technology Fit to Traditional Retail Transformation Towards Smart Retail

Our findings (Section III.A. and III.B.) indicate the transformation that wholesale stalls have experienced thus far. The technology that is still used by traditional retailers began with the use of calculators, which were later upgraded to POS Systems, printers, and barcode scanners. Only about 25% of participants have used mobile-based technologies that are categorized as SRT, such as mobile applications and digital payments based on QR codes. Although the installation of digital payments has been stopped, mobile applications are still utilized for obtaining goods from distributors and accepting buyers' requests. These mobile apps have been equipped with barcode scanners and mobile cashier features that allow wholesale stalls to replace the usage of POS Systems, printers, and barcode scanners they have used with the equivalent of technologies that have been utilized by modern retailers in developing nations. This illustrates the transformation from traditional retail through physical stores utilizing modern technology to the present state of retail using mobile-based technology.

This transformation process is consistent with the future shopping scenarios in the smart retailing perspective presented by Pantano et al. [11], although the wholesale stalls have not yet reached the e-tailing and smart retail phases as outlined in the model. Moreover, wholesale stalls went through a physical store phase with modern technologies rather than an interactive technology phase. Therefore, to describe the transformation that traditional retail developing countries have gone through, Pantano et al.'s [11] framework was then revised by placing the physical store phase with modern technologies after the traditional retailing phase, which was then followed by the mobile retailing phase and the e-tailing phase. The phase of mobile retailing is characterized by the implementation of mobile-based technologies at wholesale stalls, such as apps for ordering goods with distributors, taking orders from customers, and processing payments digitally. The e-tailing phase is separated from the mobile retailing phase since the usage of mobile applications has not yet offered e-commerce sales channels to wholesale stalls. The e-tailing and smart retail phases come after the mobile retailing phase in the next phase, which wholesale stalls have not yet experienced. Each transformation phase involves four SRT adoption stages: search, select, implement, and adopt. The outcomes of the Pantano et al.'s [11] scenario modification, which describe the transition of traditional retail in developing countries to smart retail can be proposed as shown in Fig. 2.

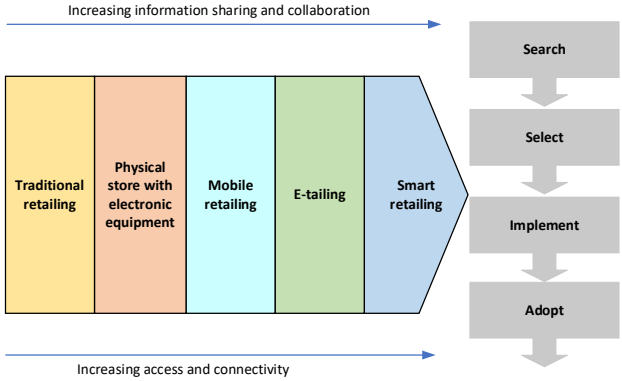

Fig. 2. Transformation of traditional retail in a developing country toward smart retail.

Our findings (in Section III.B., III.C., and III.D.) were then mapped into the TTF components before mapping their influence on the SRT adoption stages in the framework depicted in Fig. 2. Individual characteristics (IC) include the status of SRT adoption, user acceptability, external factors, and level of user skills, as these factors influence the ability of technology users in traditional retail to use technology. This is consistent with the definition of individual characteristics referring to the technology-related behavior of individuals or organizations [79] that can influence the ease and efficiency with which technology users utilize technology [42]. The adoption status of SRT and the level of user skills, in addition to shaping the technology user experience with the required technology and technology infrastructure [3], also describe the availability of technological resources in the form of appropriate technological infrastructure and skilled individuals, which is an important organizational factor for technology adoption [80]. Previous technological experience influences user attitudes toward technology-based services [81]. This attitude is a desire to accept and be enthusiastic about new technologies, which reflects the high-tech availability of individuals [79] as perceived by participants. External factors such as competitor pressure, government policies, and technological trends were

never classified as ICs, but Triandis [82] stated that external factors such as the lack of facilitating conditions could prevent individuals from taking the intended action. Therefore, external factors were incorporated into the IC, as the findings showed that they influenced the adoption decisions of SRT by traditional retailers.

The task characteristic (TAC) components include technological requirements that can facilitate inventory management needs and implementation problems, as this is the primary task wholesale stall owners expect to perform with the aid of technology. If technology can support one or more ways to meet task requirements, then technology can provide a process view, explicitly showing how individuals solve tasks or learn concepts [83]. This will be visible as the technology is implemented to determine its compatibility with the task to be solved. The technology adoption theory suggests that the better technology fits the task environment (TTF), the more motivated potential users are to implement it [42], [51].

SRT preferences, expected benefits, and concerned risks are part of the technological characteristics (TEC) component because they represent the desired features and benefits of the to-be-implemented technology, as well as the risks that may arise from its implementation. In addition to computer systems (hardware, software, and data), SRT features that can support a task's requirements also include user support services such as training, trialability, and observability [42]. Tornatzky & Klein [84] identified relative advantage, trialability, and observability as technological characteristics that can influence technology adoption. Furthermore, relative advantage can be viewed as the functional benefits generated by a good fit between organizational tasks and technology [85].

Search is the initial stage of SRT adoption related to identifying retailers' adaptability to changes caused by the implementation of technology [86] and obtaining relevant information about existing technology that can meet the retailers' requirements [11]. This stage is primarily determined by the current status of SRT adoption, which influences the experience of technology adoption, external variables, and the requirement to fulfill operational tasks with the use of technology. Pantano et al. (2018) discussed opportunities for developing new technology innovations to obtain SRT that best fit the requirements of retailers. However, traditional retailers are unable to develop new technology and can only utilize the technology available in developing countries. Therefore, participants' prior experiences with SRT implementation will influence their decision regarding which SRT to implement next. This is in accordance with what Dholakia & Uusitalo [3] asserted that past experiences are major predictor of future behavior, which in this study will impact the identification of SRT that can suit their requirements [87]. Therefore, we suggest that:

Proposition 1 (P1): Prior SRT adoption status that impacts the experience of traditional retailers influences their expectations and alternatives to SRT.

External variables, such as the adoption of the most recent retail technology trends by their competitors and the encouragement of SRT implementation by government legislation, can also increase wholesale stall owners' general awareness, acceptability, and readiness to adopt technology [88]. In contrast to the findings of a previous study by Brown & Russel [89], which suggested that competitors who have adopted SRT exert competitive pressure on retailers, this study found that traditional retailers were monitoring early adopters to determine if they could gain an advantage, which became a benchmark for traditional traders to consider adopting SRT to obtain similar advantages. This competitive force and resource compatibility have proven to encourage traditional retailers to adopt e-commerce [17]. Other external factors, such as government responsibility in technology development, can affect the implementation decision of new technology [18], but in the context of this research, they more accurately affect the stage of search than implementation. This is because alternative technologies that can be used by traditional retail are determined by the government's access to the entry of new technologies, whereas in the case of the adoption of e-commerce in Yaseen [18] research, the biggest challenge is not infrastructure, but continuous changing government rules, taxes, and customs policies. In this regard, we therefore suggest:

Proposition 2 (P2): External variables, such as competitor influence, government pressure, and technological trends, can influence the choice of alternative SRT that traditional retailers want to adopt.

Our findings indicate that traditional retailers will consider technologies that can handle inventory management and can be utilized by technology users in wholesale stores with limited technological proficiency. This is consistent with Zhao & Bacao's [48] research, which implies that technology features that can specifically satisfy the needs of users can increase customer usage intentions. Lack of technological knowledge and skills can have a negative impact on the desire to adopt SRT, as is the case with Jordanian retailers who lack initiative in the adoption of e-commerce due to inadequate knowledge about e-commerce [18]. The compatibility of SRT with user capabilities makes the technology simpler to use and encourages its adoption [90]. Based on this, we suggest that:

Proposition 3 (P3): The technological skill level of users in traditional retail influences the choice of SRT alternatives adopted by traditional retailers.

Proposition 4 (P4): The traditional retail operational requirements influence the choice of SRT alternatives adopted by traditional retailers.

The selection stage consists of identifying selection criteria for selecting the best technology to satisfy retailers' needs and capabilities [11]. Several aspects of technology must be examined while making decisions [91]. Wholesale stall owners want an SRT capable of aiding with inventory management and usable by low-tech savvy users. They suggested the use of voice-based technology that can be remotely monitored as features that suit the capabilities of wholesale stall technology users. The expected benefits must also be weighed against the costs to achieve these benefits [92], as wholesale stall owners have limited financial and human resources, which is the primary challenge in selecting the ideal SRT from the available technological options. Toufaily et al. [93] identify the expected benefits as a factor influencing the stage of adoption, but only in combination with other factors. Therefore, the Vatanasakdakul & D'Ambra's [94] opinion is more appropriate to use in this study, as the best strategy to maximize the benefits of technology adoption is to select the technology that best fits their local environment. Considering this fact, we propose that:

Proposition 5 (P5): SRT characteristic preferences influence the selection of the best SRT among all feasible SRT options.

Proposition 6 (P6): The expected benefits of technology users in traditional retail strongly impact the selection of the best technology from all potential SRT alternatives.

Implementation is the phase in which SRT is put into practice by traditional retailers who are the decision-makers in this study. The acceptance of technology users in traditional retail significantly influences the technology implementation process, which determines a person's technological readiness and efficacy [33]. The acceptability of traditional retailers can be evaluated based on the participants' willingness to accept and learn new technologies designed to aid their operational activities. This is in line with Hoske's [95] findings that cultural willingness to move beyond traditional methods must be encouraged to ensure successful implementation. Therefore, we propose that:

Proposition 7 (P7): The acceptability of technology users in traditional retail influences their decision and readiness to use SRT.

The technology that has been identified in the previous stage requires adjustment to fit the needs of all technology users, which may need a reallocation of current organizational resources [11]. Therefore, it is necessary to implement or test the selected technology on the actual traditional retail system to determine the appropriate adjustments. Most of our participants wish to trial the technology to prevent technical failure that might result in financial losses. It is crucial to do a risk assessment to lower the possibility of technological failure, which is the main challenge to SRT implementation [96]. Moreover, traditional retailers in developing nations can be classified as laggards according to the Diffusion of Innovation (DOI) theory, as they are frequently resistant to change, have the lowest risk profile, and will not adopt an innovation until it has been proven effective [34]. Pantano et al. [11] considered concerned risks as factors influencing the stage of adoption, but the risks considered were out-of-date and out-of-use risks that did not appear in this study's findings. Therefore, we propose that:

Proposition 8 (P8): Potential risks that traditional retail technology users are concerned about influence SRT implementation.

Throughout the SRT's implementation phase, operational issues progressively surfaced. This will influence the decision to adopt a sustainable SRT, as many potential RFID adopters have retreated due to implementation difficulties [33]. The problem that is often encountered is the cost of the physical implementation with regards to hardware and software [33], but this problem did not appear in this study because the cost of procuring modern technology such as POS Systems, printers, and barcode scanners is still affordable for traditional retailers, and mobile-based technologies are provided by distributors or technology providers as long as mutually beneficial cooperation exists between traditional retailers and technology providers. The problems encountered by wholesale stall owners in implementing mobile applications and digital payments can serve as an example of the challenges that will be encountered during the actual adoption of SRT. The technological platforms employed, such as digital payments, are not yet mainstream, making wholesale stall technology users hesitant to adopt them. The challenge is to persuade customers to alter their traditional (physical) access to the products and services offered by implementing SRT [35]. Therefore, it is necessary to develop a successful adoption strategy based on an evaluation of actual outcomes during the implementation phase against expectations [34]. We put the last proposition in this regard, noting that:

Proposition 9 (P9): Potential implementation problems have a strong influence on the decision to adopt SRT in traditional retail.

Traditional retailers were still in the preliminary stages of considering SRT. Many traditional retailers regarded SRT as a technology issue rather than a business strategy. From a technological perspective, SRT was viewed as still immature, and many traditional retailers were hesitant to commit to it on a full-scale basis. There are indications that SRT will become more prevalent in the future, as evidenced by the willingness of traditional retailers to study and implement SRT, and the changes that occur over the next few years will provide an exciting new research topic. Fig. 3 illustrates how we formulate the concept of smart retailing by addressing the TTF components with SRT adoption stages in the context of improving the competitiveness of traditional retailers in developing countries.

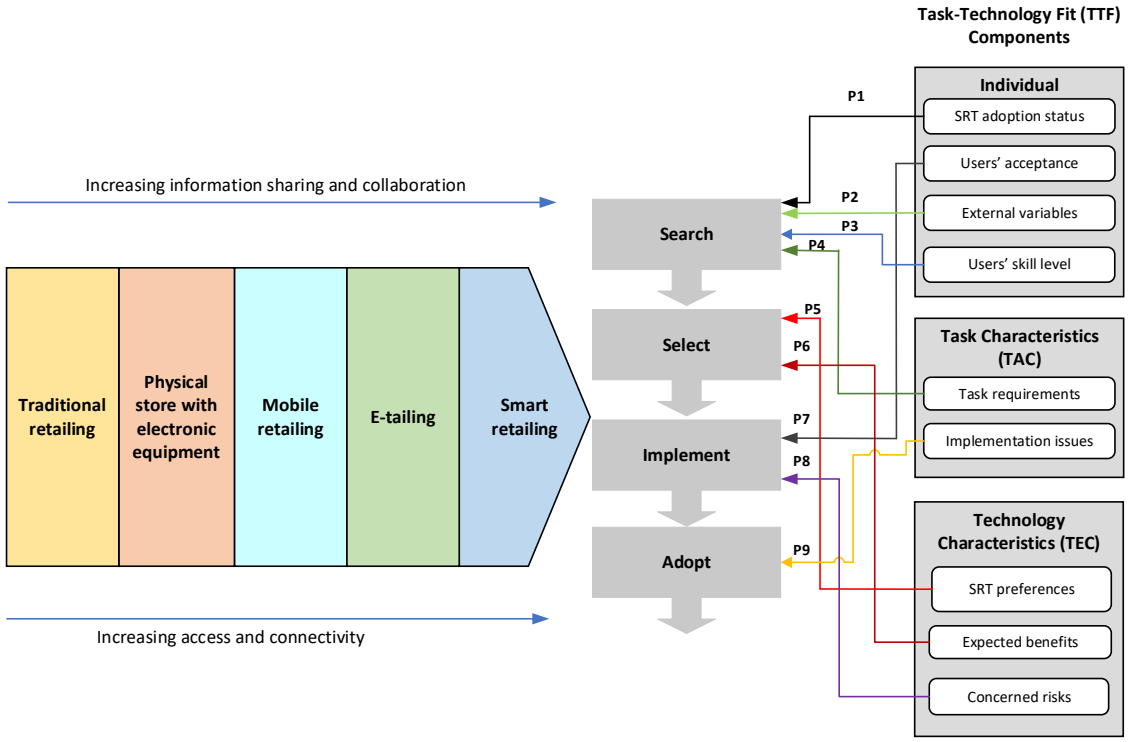

Fig. 3. The future traditional retail scenario in the framework of smart retailing.

VI. Conclusion and Implication

The retail industry in developing countries seems to be transitioning from traditional to smart retail as the internet dan ICT continues to advance. Even though smart retail has been conceptually applied since 2003 at Walmart supermarket, there has been a lack of study on its adoption. This was highlighted in the literature review, which noted the scarcity of research on smart retail adoption in developing countries, particularly for traditional retail, which still dominates their retail industry. More discussion is required on how traditional retailers with resource capacities far below those in developed countries might implement smart retail.

This paper sought to determine the extent to which SRT adoption in traditional retail, particularly wholesale stalls, serves as the basis for determining the transformation process that traditional retailers have passed and will pass toward smart retail while still considering the needs and capabilities of traditional retail technology users. The TTF approach utilized to identify the factors that drive the SRT adoption stage provides a theoretical foundation for understanding smart retail adoption adapted to conventional retailers' limited capabilities but capable of delivering performance enhancement to traditional retailers. It is intended that by understanding these factors, traditional retailers will be able to successfully shift into smart retailers, increasing their competitiveness.

The findings indicate that smart retail is feasible for traditional retail because SRT has been adopted in the form of mobile-based technologies such as mobile applications and digital payment. Even though traditional retailers' priority in implementing SRT is retail improvement, the final result is an improvement in customer service, which is the same as the primary objective of adopting smart retail in developed countries. However, the implementation of SRT does not automatically transform traditional retail into smart retail until the impact of SRT implementation on the efficacy and efficiency of operational and sales activities is acknowledged.

Based on the research findings, we adjusted the [11] framework so that traditional retail leverages modern retail technologies before transitioning to mobile retailing and e-tailing, bringing smart retail adoption closer. The stages of adopting SRT in this transformation process were still based on the [11] scenario with mapping the TTF component at the SRT adoption stage. Our findings indicate that SRT adoption status, user skill level, operational requirements, and external variables such as competitive pressure, government pressure, and technological trends must be considered when searching for SRT alternatives that traditional retailers can adopt. It is possible to select the most suitable SRT for traditional retail by considering the SRT's features, and the expected benefits desired by technology users. In addition, they require information on the potential risks that could lead to financial losses, as well as users' acceptance of SRT during the implementation stage. Furthermore, problems that arise during the implementation stage are evaluated in order to formulate an adoption strategy that meets the requirements and capabilities of technology users in traditional retailers in

developing countries.

We present a modified future shopping scenario of the [11] model to better represent the process of transitioning traditional retail into smart retail. We mapped the stages of SRT adoption and TTF in this scenario to develop effective smart retail adoption in traditional retail, which was subsequently described as eight prepositions. In this circumstance, the deployed SRT can have a substantial impact on management and sales activities at the same time, transforming traditional retail into a smart one. This scenario may contribute to a paucity of literature on smart retail adoption in traditional retail in developing countries. We anticipate that smart retail adoption integration methodologies and systems will evolve in the future, with each focusing on delivering solutions to traditional retail in developing countries. This future evolution should be guided by careful evaluation of the implications of the design variables mentioned in this study.

Our framework may serve as a guide for traditional retailers' SRT investment decisions, as it identifies three TTF components that are believed to influence each stage of SRT adoption in traditional retail. This framework can also be used to assess whether traditional retail strategies are "smart enough" so that they can be enhanced accordingly. Moreover, technology providers can use the results of this study to develop SRT according to the preferences of traditional retailers, which are determined based on the requirements and capabilities of traditional retail technology users. Governments of developing countries can also provide the assistance required by traditional retailers to overcome external factors, implementation obstacles, and risks anticipated to arise during the transformation to smart retail. It is expected that assistance from technology providers and the governments will increase the competitiveness of traditional retail, allowing it to remain the most popular shopping destination in the developing world.

Empirical research on the adoption of smart retail has not yet reached maturity, despite significant growth in the past few years. Indeed, the findings of this study can serve as a theoretical foundation for the adoption of smart retail in traditional retail in developing nations. Future research should continue to test the hypothesis formulated in this study from the perspective of other stakeholders, including consumers, the government, and technology providers, to validate the factors proposed to influence each stage of SRT adoption during the transformation of traditional retail into smart retail. The proposed framework must also be quantitatively and empirically evaluated in traditional retail case studies in one or more specific developing countries. For comparative purposes, empirical experiments can also be conducted on various traditional retail subsectors (e.g., fashion, luxury goods, etc.) and formats. Furthermore, the findings of this study apply to other developing nations, especially those with similar cultural, political, technical, legal, and economic conditions as Indonesia. However, since this study was based on cases from a single region in Indonesia, there is a need to further validate the framework's generalizability by undertaking a large survey of traditional retailers from various regions and types.

APPENDIX

APPENDIX A
SEMI-STRUCTURED INTERVIEW GUIDELINES

Research questions (RQs):

1. How are traditional retailers transitioning to smart retailers based on their needs and capabilities?
2. What are the determinants for a successful transition (transformation) from traditional to smart retailers?

Researchers give a brief description of the project.

A. Wholesale stalls' profile
- Could you please briefly describe your experience in building and running your wholesale stall?
- How many people do you hire and what are their duties on your wholesale stall?
- Who are your customers/target market?
- If you don't mind telling us, how much is your stalls' estimated revenue?
- From the revenue, how much are you willing to allocate for new technology implementation?

B. Wholesale stall operational activities
- How do you supply goods to your stall?
- How do you know the number of items available in the stall? Is there a regular schedule for inventory checking?
- How do you promote your stall to gain more customers?
- What services do you provide for buyers?
- What problem do you often encounter when managing the stall and how do you solve that?
- Among all the retail operations, which one do you think requires the most technological assistance?

C. Knowledge about smart retail
- What do you know about smart retail?
- What comes to your mind about smart retail?
- Do you think smart retail can be applied to your stall?

D. SRT adoption status and challenges
- What are the technologies that have been and are still used in your stall?
- Why do you stop using that particular technology?
- What technological innovations were offered to your wholesale stall?
- What are your reasons for accepting or rejecting the offer?
- What benefits do you accrue from the innovations occurring in your stall?
- What makes you interested and driven in implementing technological innovation or new technology such as smart retail?

E. Readiness of technology users
- To what extent are your buyers ready to use the new technology?
- To what extent are your employees prepared to use the new technology/technological innovation?
- How ready are you as a wholesale stall owner to employ new technology/technological innovation?

F. Technological innovation requirement
- What kind of technology do you expect to be employed in your stall?
- What technology criteria are you considering employing in your stall?
- What is the latest technology you have heard of and known that you want to employ in your stall?

G. Expected benefits
- What kind of benefits do you expect to gain from using technological innovation or new technology in your wholesale stall?

H. Concerned risks
- What risks are you worried about from using new technologies or new concepts such as smart retail?

APPENDIX B
CODE CATEGORIES AND THE EMERGING THEMES

Primary codes	Secondary codes	Themes	Research Questions
• A physical store that sells online	Buyers' features	Smart retail understanding	What is the scenario for traditional retailers in the developing world to transform into smart retail that meets their needs and capabilities?
• A physical store that is capable of fulfilling buyers' wish			
• A physical store that adopts today's technology	Technical features		
• Calculator	Prefer existing modern technologies	SRT adoption status	
• POS System with printer and barcode scanner			
• Mobile applications	Adapted SRT		
• Digital payment with QR code			
• Lack of technological knowledge and skill	Unreadiness of users	SRT adoption barriers	What are the requirements for traditional retailers in the developing world to transform into smart retail that meets their needs and capabilities?
• SRT didn't interest buyers			
• SRT did not solve operational problems	Implementation problems		
• Problem with the SRT provider			
• Try it first to assess the risk	Anticipating concerned risks	Smart retail adoption drivers	
• Enhance inventory management	Expected benefits of smart retail adoption		
• SRT suitable for poor technological skill and knowledge user			
• Competitors' influence	External variables		
• Government pressure			
• Technology trends			
• Willingness to learn	User's acceptance of SRT		
• Perceived benefits			

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