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Diminishing Profitability? Technology Adoption Capability and Its Impact on Firm Performance: The Case Study of Distribution Firms in Indonesia

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ABSTRACT

Motivated by the trend of decreasing profitability among Indonesian firms, this paper investigates the impact of key variables related to technology adoption capability and strategy execution–including technology assessment, incentive structures and control mechanisms, as well as information flow and decision-making authority–on the performance of firms within Indonesia's fast-moving consumer goods distribution sector. The empirical strategy employs a unique approach for data gathering by utilizing a micro-survey of 393 fast-moving consumer good distributor firms in Indonesia to analyze this relationship. This study enriches the continuing discussion of the service and cost trade-off in supply chain management. It proposes an alternative perspective where the roles of technology adoption capability and strategy execution are considered. The key findings suggest that firms can improve both service and cost simultaneously by maintaining a high level of technology adoption capability and ensuring robust strategy execution. Finally, this study may contribute to the ongoing scholarly debate on the impact of technology adoption on firm performance and enable practitioners to take appropriate action when strategizing technology adoption to improve performance.

Keywords: *distribution, logistics management, operations strategy, performance, strategy execution, technology adoption capability*

1. INTRODUCTION

During the past decade, prior to the Covid-19 pandemic, Indonesia has demonstrated a very healthy economic growth. Between 2012-2019, Indonesia's annual GDP grew on average 5.2% (GDP growth (annual %) - Indonesia 2023), significantly higher than the world GDP growth of 3% (GDP growth (annual %) 2023). Indonesia's research and development expenditure also grew 3.5 times between 2013 to 2019 and 2020 (0.08% of GDP in 2013 to 0.27%, and 0.28% in 2019 and 2020). As an indicator of technology growth use, Indonesia internet users grew 23% year-on-year during the same period (Indonesia: Research and Development Expenditure, 2020).

The impressive economic performance arguably has helped the growth of firms and industries in the country. A strong majority of 195 local and multinational public listed firms in Indonesia that represent over 90% of market capitalization in the Jakarta Stock Exchange enjoyed healthy sales growth in the past 6 years during the period of 2012 to 2019. However, despite a rise in technology and positive sales growth, many firms experienced a decline in profitability as seen in **Figure 1** below.

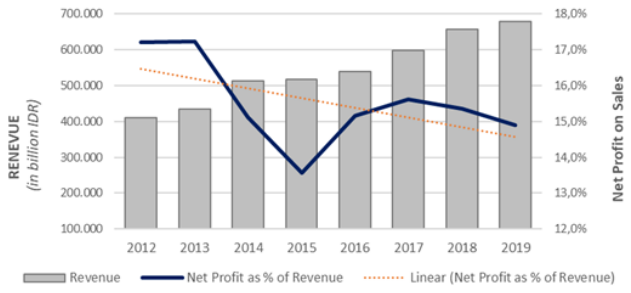

Figure 1 Financial performance analysis pre covid-19 pandemic period
(source: Individual Company Annual Reports, 2012-2019)

Public listed companies in Jakarta Stock Exchange indicate average growth in sales and profitability during 2012-2019. N = 195 companies (across industry sectors of Consumer Goods, Trade, Service & Investment; Finance; Agriculture; Basic Industry & Chemical; Infrastructure, Utilities & Transportation; Property, Real Estate & Building Constructions, and others).

When the ultimate goal of business firms is to enhance their performance (Barney, 1991; Schendel and Hofer, 1978), these phenomena of diminishing profitability in a growing business would need to be addressed. Various studies have been conducted to explain similar phenomena of this diminishing profitability in a growing economy. These studies suggest various reasons for this phenomenon from commoditization (Coe, 2021), environmental and policy changes (Zhou and Park, 2020), including pandemics (Boronos *et al.*, 2020; Xu and Abbasov, 2021).

Specifically, within logistics and supply chain management (SCM) research, the trade-off between service and cost in improving a firm's performance has been an ongoing topic (Christopher, 2016). A phenomenon indicating a tug between service and cost are observed in Indonesian firms (Simangunsong and Subagyo, 2021) with an increase in cost-to-serve in the fast-moving consumer goods industry (Tanudiharjo *et al.*, 2021). Firms must constantly seek opportunities and change, whether it be through strategic, organizational or technology innovative initiatives (Helfat *et al.*, 2009). Adoption of technology has been sought as a promising solution to this classic challenge of service vs cost trade-off. In SCM, the adoption of information technology is acknowledged in facilitating information flow, foster alignment, and collaboration (Moi and Cabiddu, 2021). Blockchain may facilitate improved supply chain collaboration and integration with applications enhancing information flow, automation, and traceability (Wang *et al.*, 2021). Sharma and Khanna (2020) ascertain that *"the adoption of new technology in the outbound supply chain system is crucial to the survival of firms and their channel partners, despite the high initial investment"*. Numerous studies have found that technology and the capability of technology adoption have a positive effect on a firm's performance (e.g., Bharadwaj, 2000; Falentina *et al.*, 2019; Rai *et al.*, 2006). The adoption of Internet of Things (IoT) in SCM coupled with existing technological capability further facilitate integration and knowledge management along the supply chain, thus improving performance (de Vass *et al.*, 2021). Bharadwaj (2000) found that *"firms possessing superior technological capability demonstrated higher performance compared to their counterparts"*. A survey by the Ministry of Trade and Industry Singapore (Q1 2019) also indicate that the adoption of digital technologies (e.g., internet and computer usage, e-commerce, Internet of Things and Artificial Intelligence) is correlated with improved performance among Singapore firms (Tan and Chian, 2019).

However, some studies have also found no improvement or no significant correlation (e.g., Chandler and Hanks, 1994; Gagnon and Dragon, 2002), and some studies have found a negative correlation between technology and productivity, flexibility, or performance (e.g., Acemoglu *et al.*, 2014; Jawabreh *et al.*, 2012). In view of the mixed findings of empirical studies above, the impact of technology towards a firm's performance is considered inconclusive (Arifin *et al.*, 2016; Henderson and Venkatraman, 1989).

Arguably, there are many factors that may influence the relationship between technology and performance. One of these factors is how technology is adopted into the organization (Gagnon and Dragon, 2002). Wu and Liu (2010) in their study emphasize that *"the business value of technology is more dependent on the capability of a firm in developing, deploying, and exploiting technology related resources than the resource itself"*.

Previous research has found that technology adoption capability positively influences strategy execution, and in turn positively impacts firm performance. However, data from the companies in Indonesia above portray a different relationship between investment in technology and profitability. With the on-going scholarly debate on the impact of technology adoption toward firm performance as mentioned above, this research attempts to better understand this diminishing profitability phenomenon in Indonesia by investigating selected variables of technology adoption capability and strategy execution and its influence on financial and non-financial performance. The purpose of the study is to explore the role of technology adoption capabilities in determining firm performance through an empirical study on technology adoption capability and its influence towards firm performance. This study may contribute to the ongoing scholarly debate of technology adoption and enable practitioners to take appropriate action when strategizing technology adoption to improve firm performance.

2. THEORETICAL BACKGROUND AND HYPOTHESES DEVELOPMENT

A firm's performance is an indicator of a firm's level of accomplishment in fulfilling its objectives. Firm performance is measured by financial performance (FP) and non-financial performance (NFP) (Venkatraman and Ramanujam, 1986). FP is typically measured with indicators such as earnings per share (EPS), sales growth, or profitability (Venkatraman and Ramanujam, 1986), return on assets (Adame-Sánchez *et al.*, 2016; Soto-Acosta *et al.*, 2015), and labor productivity such as sales per employees (Adame-Sánchez *et al.*, 2016). Typical metrics of NFP include market share growth (Abdullah and

Yaakub, 2014; Yuan, 2016), competitive position (Abdullah and Yaakub, 2014), product technology and innovation, product or service quality, marketing, trade effectiveness (Venkatraman and Ramanujam, 1986), efficiency and effectiveness (Yuan, 2016). Numerous studies have investigated the relationship between supply chain management (SCM) effectiveness and indicators of market-oriented and financial performance (e.g., Beheshti *et al.*, 2014; Shi and Yu, 2013). Specifically, in the logistics and distribution industry, NFP can also be assessed through service quality to the customers, such as measuring order fulfillment (Soto-Acosta *et al.*, 2015) and order lead time (Lenny Koh *et al.*, 2007).

A firm's process in adopting and implementing new technology is influenced by numerous factors, many of which have been identified and explored (e.g., Soto-Acosta *et al.*, 2015; Tornatzky and Fleischer, 1990). For this study, factors of technology adoption capability relevant to the FMCG distribution network are derived from the technology-organization-environment (TOE) (Tornatzky and Fleischer, 1990) and organizational-task-environment (OTE) (Dess and Beard, 1984). The factors to be explored in this research are limited to technology assessment (TA) and resources and routines utilization (RR) under the construct of technology adoption capability, and incentive and control (IC) and information flow and decision rights (IDR) under the construct of strategy execution.

2.1 Technology Assessment (TA), Resources, and Routines Utilization (RR)

Research by Katsikeas *et al.* (2004) found that *"there is a strong relationship between firms and their performance in terms of reliability, competitive pricing, service support, and technological capability"*. Whereas a firm's technology adoption capabilities (TAC) refer to the ability of an organization to assess, acquire, and adopt a technology in their quest to improve firm performance. This ability may relate to internal and external factors, e.g., TA and RR (Dess and Beard, 1984) and regulations and legal constrictions (Arifin *et al.*, 2016).

The variables of technology adoption capability analyzed in this study are TA and RR. TA is an assessment of short and long-term outcomes of a technology application which may provide information for policy makers (Banta, 2009). TA is a crucial factor when defining the suitability of current or new technology to be used within an organization in its quest to achieve better performance (Sait *et al.*, 2017). Subjects of TA include the technology itself, adoption and diffusion of technology, technology transfer, acceptance of new technology, etc. RR pertains to the utilization of people, knowledge, and material resources and the norms, rules, procedures, and technologies through which organizations operate (McCarthy, 2003). Rules and routines in organizations may contribute to firm performance (Ringov, 2017). In general, RR is believed to positively affect firm performance. However, depending on the environment, resources and routines may also negatively affect organization performance, as found in research on English local government authorities (Walker and Brewer, 2009).

Based on the literature above and as technology adoption capability, reflected by TA and RR, influences firm performance, this leads to the proposition of the following hypotheses:

H1a: *Technology assessment (TA) positively influences a firm's non-financial performance (NFP).*
H1b: *Technology assessment (TA) positively influences a firm's financial performance (FP).*
H2a: *Resources and routines utilization (RR) positively influences a firm's non-financial performance (NFP).*
H2b: *Resources and routines utilization (RR) positively influences a firm's financial performance (FP).*

2.2 Incentives and Control (IC), Information Flow, and Decision Rights (IDR)

Strategy execution (SE), often also referred to as strategy implementation, is defined by Li *et al.* (2008) as "*the actualization of strategic plans - a dynamic, complex, and iterative process affected by interrelated internal and external factors, comprising of a series of managerial decisions by managers and activities by employees, to realize strategic plans in order to achieve strategic objectives"*. Strategy execution at the firm level is subject to the elements of firm governance, e.g., incentive, control, and decision rights (Huse, 2003). Thompson *et al.* (2018) identifies 10 basic managerial bases to ensure successful strategy execution, including reward and incentive system, policies and procedures, and information and operating systems, control, and leadership. Safdari *et al.* (2014) compiled several factors recognized in influencing strategy execution from numerous studies, e.g., principles and rules, control system, authority and decision-making rights, control monitoring, distribution and sharing of information, and information exchange. For the purpose of this study, the factors explored of strategy execution in an FMCG distribution network are incentives and control (IC) and information flow and decision rights (IDR).

Incentives are widely accepted to have a positive influence on performance (Cheung *et al.*, 2009). Incentives and control are important tools in evaluating and monitoring change, which contribute to a firm's performance (Tudor, 2021). IDR pertains to the flow of information across organizational boundaries and decision-making in strategy execution (Neilson *et al.*, 2008). Good information flow is one of the factors acknowledged in managing and improving performance (Do and Mai, 2020) and the delegation of decision rights are key drivers of performance (Herz *et al.*, 2016).

In accordance with previous research mentioned above where IC and IDR are suggested to positively influence firm performance, the following hypotheses are proposed:

H3a: *Incentives and control (IC) positively influence a firm's non-financial performance (NFP).*
H3b: *Incentives and control (IC) positively influence a firm's financial performance (FP).*
H4a: *Information flow and decision rights (IDR) positively influence a firm's non-financial performance (NFP).*
H4b: *Information flow and decision rights (IDR) positively influence a firm's financial performance (FP).*

2.3 Influence of Technology Assessment (TA), Resources and Routines Utilization (RR) on Incentives and Control (IC), Information Flow and Decision Rights (IDR)

Henderson and Venkatraman (1999) establish a relationship between TAC and SE. In their Strategic Alignment Model (Henderson and Venkatraman, 1999), the Competitive Potential perspective is concerned with the potential of IT capabilities in affecting business strategy and the corresponding decisions and processes.

Technology adoption capability is reflected by TA and RR. Underscoring that SE is influenced by TAC, where SE is reflected by IC and IDR, the following hypotheses are proposed below:

H5a: *Technology assessment (TA) positively influences incentive and control (IC).*
H5b: *Technology assessment (TA) positively influences information flow and decision rights (IDR).*
H6: *Resources and routines utilization (RR) positively influences information flow and decision rights (IDR).*

3. RESEARCH METHODOLOGY

3.1 Data Collection

Considering the sample size of 536 independent distributors at the time when the field survey was conducted in April 2020 and access to them, we used a census data collection method. Survey questions were designed and phrased based on prior studies. A pre-test and a focus group discussion with logistic and supply chain management practitioners were conducted to ensure that the questions were well understood and not ambiguous. The survey was made available in two languages, English and Indonesian, to further ensure that the questions were well understood.

The online questionnaire (via a Google-form platform) was sent to 536 distributors nation-wide comprising of five sales regions and further cascaded to 46 sales areas. The respective area sales managers then contacted owners or operation managers of independent distributors in their respective areas to complete the questionnaire. Secondary data was obtained directly from the principal company and the individual distribution firms. The secondary data of FP_1 and FP_2 was gathered from the Q1, 2020 report, and the financial growth was calculated based on the sales progression between Q1, 2019 to Q1, 2020 covering one full year period.

The questionnaire was uploaded and distributed to all respondents during a three-week period (April to mid-May 2020). During this time, Indonesia and countries all over the world were dealing with the Covid-19 pandemic and Indonesia had just detected its first cases. It was imperative to eliminate bias as a result of the recent developments pertaining to the Covid-19 pandemic, hence in the questionnaire respondents were reminded to respond based on the situation and period prior to the pandemic (January 2019 - March 2020).

3.2 Unit of Analysis and Target Population

The unit of analysis was conducted at the firm level, the level of independent distributor firms. Independent distributors are defined here as firms that neither have an ownership nor managerial affiliation with the principal company. These distributors operate independently from the principal company and have total independence in determining their policies, business strategies, resources, and resource planning. The ideal distributors selected for this research are distributors that exclusively supply and distribute products of the principal company. However, some of these independent distributors may possibly be part of a larger group of distributors which work with other companies.

The survey was sent to independent distributors of a multi-national company, the largest fast-moving consumer goods in Indonesia with a population (dry product distributor) of 541 active distributors (data as of April 2020) which reaches throughout the 34 provinces in Indonesia. These independent distributors are mostly owned by individuals or a group of entrepreneurs and are engaged with the principal company through a commercial arrangement specifying type of store and sales area coverage. These distributors serve general trade (i.e., small stores) or specialized stores, e.g., traditional beauty products stores, secondary dealers, or local modern trades. The distributors selected for this research have an average asset of 3.4 billion IDR (or approximately 240 thousand USD), an average annual revenue of 67 billion IDR (4.7 million USD), serve on average 628 stores or outlets, and employ an average of 23 fulltime employees per distributor. Distribution technology in this study refers to the proprietary distribution technology applications developed and distributed by the principal company to all its independent distributors. These technology applications have been adopted and implemented across its 541 independent distributors surveyed in this study. These technology applications connect each of these distributors digitally with up to several hundred thousand of their customers for ordering, order processing, order fulfillment, invoicing, and digital payment. Customers (stores and retailers) digitally place their orders to their suppliers, i.e., independent distributors, through an in-house developed application on their mobile communication devices. Through machine learning and artificial intelligence, the system generates order fulfillment plans and suggests the most optimum piece picking, dispatch planning and routes. Strategic alliances are formed with a share riding platform where two-wheel drivers can digitally receive delivery orders within their proximity or service area. Upon completing the dispatchment of goods, a goods received acknowledgment can be logged onto the customers' and couriers' devices to automatically generate invoices. The process is completed when the system acknowledges if an electronic payment has been made. Predetermined products stock level at the distributor's end is set in the system and regularly refreshed based on actual sales. When the actual stock of a product reaches a minimum level, the system will automatically generate stock replenishing orders to the principal company. System maintenance, system upgrades and user training are provided, and its related costs are borne by the principal company.

Variances in scope and factors affecting an expansive distribution chain are limited by focusing on the distribution chain within one organization. Hence,

variances, e.g., distribution technology used and business processes, which may influence the study more if performed on multiple individual organizations, are kept to a minimum. The research population are operation managers, business owners or representatives of business owners and other senior management of independent distributors.

3.3 Research Model and Measurement

Based on the research objectives and theoretical arguments above, the model of this research is illustrated in **Figure 2** of the hypothetical model below. It comprises six variables and twenty-one indicators.

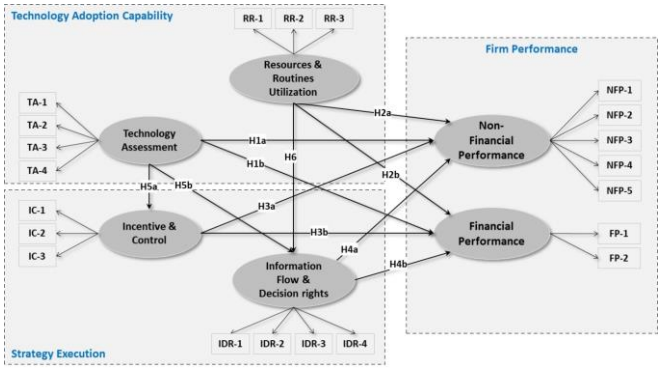

Figure 2 Constructs, variables, and indicators

Due to the limited studies on technology adoption capability and strategy execution in the context of an FMCG network, it is not always possible to directly use instruments available from previous studies. The principal variable measures are based on existing instruments from various previous research, and some were modified to fit the context of this research.

TA in this study is measured by four indicators based on previous research. Respondents were requested to express their perception towards four distribution technology characteristics: compatibility of the technology (item based on Jeon *et al.*, 2006 and McCarthy, 2003), technical feasibility of technology (item based on Arifin *et al.*, 2016), complexity of technology (item based on Jeon *et al.*, 2006) and ease of technology (item based on Jeon *et al.*, 2006 and Nugroho *et al.*, 2022).

The indicators for RR measure the perception towards the technology adoption related capability of the workforce: workforce number in TA (item based on Arifin *et al.*, 2016 and Jeon *et al.*, 2006) and number of technology gatekeepers (item based on Fichter and Beucker, 2012). In addition, the respondents are asked about the availability of training (item based on Soto-Acosta *et al.*, 2015).

IC is measured by three indicators regarding monitoring, control, and incentive for strategy execution. The indicators, i.e., comprehensive rules (item based on Grover, 1993), coordination and control (item based on Grover, 1993) and production and quality management system (item based on Sánchez-Rodríguez and Martínez-Lorente, 2004) measure the respondent's perception of the monitoring and control system.

Three indicators used for the IDR variable are related to the flow of information in strategy execution: coordination between different functions, collaboration with customers (items based on Nugroho *et al.*, 2022), and information exchange system reliability (item based on Vanpoucke *et al.*, 2009). The fourth indicator measures decision-making in strategy execution: locus of decision-making (item based on Neilson *et al.*, 2008).

Firm performance is measured by financial performance, FP, and non-financial performance, NFP (Venkatraman and Ramanujam, 1986; Lebas and Euske, 2007). The unit analysis of this research is independent privately owned distributors. They do not produce products. Product cost and their operations management, including their stock holding level, is predetermined by the contractual agreement with their principal company and managed through a Vendor Managed Inventory (VMI) system. Hence, indicators used for measuring financial performance in this research are proxy indicators. The indicators adapted are sales per full-time employee (item based on Adame-Sánchez *et al.*, 2016) and return on assets (item based on Soto-Acosta *et al.*, 2015, and Chen *et al.*, 2021). These indicators measure quantitative data and are not used in the questionnaire. The secondary data of the respondents are obtained from their principal company. For each item there are 5 response options to choose from, each option indicating a range of quantitative values.

Indicators used for measuring non-financial performance in this research consist of qualitative items. The indicators are order fulfillment (item based on Soto-Acosta *et al.*, 2015), order cycle time (item based on Patel and Jayaram, 2014), market share (item based on Nugroho *et al.*, 2022 and Yuan, 2016), customer satisfaction (item based on Abdullah and Yaakub, 2014 and Nugroho *et al.*, 2022), and active store percentage (item based on a metric used by the principal company).

The questionnaire, as mentioned in **Table 1**, was designed based on various literature sources. To ensure that the validity of the questions is statistically acceptable, this questionnaire was pre-tested through 31 logistics and distribution practitioners which differ from the targeted respondents of the actual survey.

4. RESULTS AND ANALYSIS

504 responses were received from a total of 536 active distributors surveyed. The total of valid distributor responses post data cleansing is 393, which account for 72.7% of the total population. The profile of respondents from the distributors are categorized based on the demographics of age group, gender, and formal education. In addition, the respondents are also categorized based on their position in the organization. The majority of the respondents hold managerial positions (62.8%). 25.2% are the owners of the distributor companies and 12% are personnel related to distribution and logistics. In terms of gender, there is a significant difference between male respondents (84%) to female respondents (16%). Respondents mostly fall within the age groups between 30-39 and 40-49 years old, at 39.9% and 35.1% respectively. The majority of respondents possess an undergraduate diploma and higher (53.5.1%).

Respondents were asked to indicate a degree of agreement with the statements presented. While a five-point Likert scale was used ranging from qualitative responses "1 = strongly disagree" to "5 = strongly agree" for the majority

of the questions, secondary data of FP_1 and FP_2 were processed as normal distribution measuring median and standard deviation (std. dev).

4.1 Measurement Model

Confirmatory Factor Analysis (CFA) was conducted to test the measurement model fit. Hair *et al.* (2014) and Hu and Bentler (1999) prescribe the following model fit requirements: a significant *p*-value, GFI greater than 0.8, CFI at least 0.9, RMSEA and RMR less than 0.07. The fit indices resulting in compliance with these requirements are indicated in **Table 1** below. Also displayed are the acceptable estimates of each indicator used to measure the variables.

Table 1 Variable measurements

Fit Indices *p*-value = 0.000 ; GFI = 0.90 ; CFI = 0.97; RMSEA = 0.065; RMR = 0.040			
Technology Assessment	**Estimate**	**Standard error**	***t*-value**
1. In my opinion, the distribution technology is highly compatible with our business (TA_1)	0.57	0.037	0.77
2. In my opinion, the distribution technology is highly feasible (TA_2)	0.42	0.036	0.58
3. In my opinion, the distribution technology is not complex at all (TA_3)	0.64	0.040	0.81
4. In my opinion, the distribution technology is not difficult (TA_4)	0.63	0.039	0.81
Resources and Routines Utilization	**Estimate**	**Standard error**	***t*-value**
1. There is an ample number of employees using the distribution technology in my company (RR_1)	0.61	0.038	0.81
2. There is an ample number of employees in my company who make decisions for distribution technology issues (RR_2)	0.61	0.039	0.78
3. Employees in our company receive sufficient training on the distribution technology (RR_3)	0.58	0.043	0.67
Incentive and Control	**Estimate**	**Standard error**	***t*-value**
1. In my opinion, the rules and work procedure system in my company is very comprehensive (IC_1)	0.46	0.03	0.77
2. In my opinion, the performance monitoring and supervision system in my company is very effective (IC_2)	0.54	0.031	0.89
3. In my opinion, the work-quality monitoring system in my company is very good (IC_3)	0.54	0.031	0.88
Information Flow and Decision Rights	**Estimate**	**Standard error**	***t*-value**
1. In my opinion, coordination between departments at my company is very good (IDR_1)	0.33	0.03	0.55
2. In my opinion, coordination between my company and my customers (store/outlet) is very good (IDR_2)	0.31	0.03	0.52
3. In my opinion, the information received via the distribution technology is very reliable (IDR_3)	0.53	0.033	0.79
4. In my opinion, the decision-making pertaining to the use of a distribution technology is very clear (IDR_4)	0.48	0.032	0.75
Financial Performance (Data in this section is secondary data collected from principal company record)	**Estimate**	**Standard error**	***t*-value**
1. What is the ratio of your last year's sales divided by total number of employees? (FP_1)	0.56	0.06	0.49
2. What is the ratio of your last year's sales over the value of your company's assets? (FP_2)	0.84	0.06	0.71
Non-Financial Performance	**Estimate**	**Standard error**	***t*-value**
1. In my opinion, the service level (order fulfillment) to our customers has improved after the implementation of the distribution technology (NFP_1)	0.52	0.038	0.69
2. In my opinion, the order turn-around time to our customers has improved after the implementation of the distribution technology (NFP_2)	0.52	0.037	0.70
3. In my opinion, our average market share has grown after the implementation of the distribution technology (NFP_3)	0.66	0.04	0.84
4. In my opinion, our customers (store/outlet) are satisfied with the implementation of the distribution technology (NFP_4)	0.66	0.04	0.78
5. In my opinion, the number of customers (store/outlet) that place an order at least once a month (active store) has grown after the implementation of the distribution technology (NFP_5)	0.65	0.04	0.78

4.2 Construct Validity and Reliability

The measurement properties of our scales were assessed via confirmatory factor (CFA) and validity and reliability analyses. **Table 2** below shows the factor loading of each variable ranging between 0.49 and 0.84. Factor loading of FP_1 (0.49) is rounded up to 0.5, thus all factor loading values meet the requirements. Cronbach's Alpha (CA), Composite Reliability (CR), and Average Variance Extracted (AVE), displayed in **Table 3**, were also examined for each of the six variables to test the reliability and validity of the measurement model on the total sample (Hair *et al.*, 2014). Acceptable consistency is achieved if $0.6 < CR < 0.8$, and good if $CR > 0.8$ (Hair *et al.*, 2014).

Except for FP with a CA value of 0.512, all other measures exhibit strong reliability with CA ranging from 0.789 to 0.886. CR values range from 0.534 to 0.887, while

the AVE values range from 0.372 to 0.720. With respect to CA and CR, higher than 0.9 is regarded as excellent, higher than 0.8 is fine, higher than 0.7 is adequate, higher than 0.6 is doubtful, and lower than 0.5 is substandard (Hair et. al., 2014).

Table 2 Factor loadings

Variable	Factor loadings	Error
Technology Assessment		
TA_1	0.77	0.41
TA_2	0.58	0.66
TA_3	0.81	0.35
TA_4	0.81	0.35
Resources and Routines Utilization		
RR_1	0.81	0.34
RR_2	0.78	0.39
RR_3	0.67	0.55
Incentives and Control		
IC_1	0.77	0.41
IC_2	0.89	0.21
IC_3	0.88	0.23
Information Flow and Decision Rights		
IDR_1	0.55	0.70
IDR_2	0.52	0.73
IDR_3	0.79	0.37
IDR_4	0.75	0.44
Financial Performance		
FP_1	0.49	0.76
FP_2	0.71	0.50
Financial Performance		
NFP_1	0.69	0.53
NFP_2	0.70	0.51
NFP_3	0.84	0.30
NFP_4	0.84	0.29
NFP_5	0.78	0.39

The CR indices above for all variables are greater than 0.70 and the AVE are greater than 0.50 (Bagozzi and Yi, 1988), except for FP (CR & CA < 0.7 and AVE< 0.5). The exception for FP may be due to the derivation from secondary data converted to Likert scale. The minimum recommended Average Variance Extracted (AVE) is 0.5, but the value of 0.4 is still acceptable. Therefore, the variables fulfill the threshold value and were considered to have met the standard recommended for validity and reliability.

Table 3 Reliability and validity of the constructs

Variable		Items	CA	CR	AVE
TA	Technology Assessment	4	0.829	0.834	0.560
RR	Resource and Routine Utilization	3	0.789	0.799	0.571
IC	Incentive & Control	3	0.793	0.795	0.561
IDR	Information Flow & Decision Rights	4	0.882	0.885	0.720
FP	Financial Performance	2	0.512	0.534	0.372
NFP	Non-Financial Performance	5	0.886	0.887	0.612

The variables correlation matrix in **Table 4** below indicates significant correlation between variables TA, RR, IC, and IDR with NFP (*p*-value below 0.01). TA, RR, and IDR is found to have no correlation with FP, while IC is found to have a negative correlation (-0.187) with FP. TA, RR, IC dan IDR are positively correlated with *p*-value < 0.01. There are no results with a Pearson correlation above 0.80, thus the strength of all correlations between variables are similar.

4.3 Structural Relationships

Structural Equation Modeling (SEM) (Hair *et al.*, 2014) was employed to simultaneously examine the relationship dependencies between variables. The Linear Structural Relations (Lisrel) from Statistical Software Package (Lisrel version 8.8) in combination with SPSS (Statistical Product for Service Solution) version 26 was used to analyze data. The collected data was analyzed using SEM to confirm causal modeling (path analysis) between variables.

Table 4 Correlation table

	TA	RR	IC	IDR	FP	NFP
TA	**1.00**	0.740**	0.359**	0.645**	-0.034	0.632**
RR	0.740**	**1.00**	0.488**	0.759**	-0.009	0,749**
IC	0.359**	0.488**	**1.00**	0.761**	-0.187**	0.378**
IDR	0.645**	0.759**	0.761**	**1.00**	-0.007	0.628**
FP	-0.034	-0.009	-0.187**	-0.007	**1.00**	-0.067
NFP	0.632**	0.749**	0.378**	0.628**	-0.067	**1.00**

**Correlation is significant at the 0.01 level (2-tailed)

To determine the model fit, fit indices used include expected significant p-values; absolute-fit measures as indicated by Goodness-Fit Index (GFI), Standard Root Mean Square (SRMS), Reflective Fit Index (RFI), and Root Mean Square Error of Approximation (RMSEA). To determine the incremental-fit measures, we analyzed Non-Normed Fit Index (NNFI), Incremental Fit Index (IFI) and Comparative Fit Index (CFI). Finally, to determine Parsimonious-Fit Measures, we used Norm Chi-Square (Normed $\chi 2/df$) (Hair *et al.*, 2014).

The estimated results in **Table 5**, have a model fitness that fulfill the requirements with NNFI (≥0.90) = 0.96, CFI (≥0.90) = 0.97, RFI=0.94, IFI (≥0.90) = 0.97, SRMR (≤0.05) = 0.090, GFI (≥0.90) = 0.90, and Norm χ^2 (≤ 2) = 0.00. The index Standardized Root Mean Square Residual (SRMR) indicates the average of standardized residuals between the observed and the hypothesized covariance matrices (Chen, 2007). SRMR result of 0.090 is higher than the requirement of a good fit (≤ 0.05). However, an SRMR value lower than 0.10 indicates an acceptable fit and a value lower than 0.05 indicates a good fit (Kline, 2015).

Table 5 Hypothesis test results

Fit Indices CMIN/DF =2.68 ; p-value = 0.000 ; GFI = 0.90 ; NNFI = 0.96 ; CFI = 0.97; RFI = 0.94 ; IFI = 0.97 ; RMSEA =0.065; SRMR = 0.090 ; Norm χ^2 (≤ 2) = 0.00						
Research Hypothesis		***t*-value[1)]**		**Coefficient**	**Significance**	**Conclusion**
H1a:	Technology Assessment -> Non-Financial Performance	2.38	***	0.20	Positive; significant	Supported
H1b:	Technology Assessment -> Financial Performance	-1.13		-0.19	Negative; not significant	Not Supported
H2a:	Resources and Routines Utilization -> Non-Financial Performance	3.44	***	0.27	Positive; significant	Supported
H2b:	Resources and Routines Utilization -> Financial Performance	-0.48		-0.06	Negative; not significant	Not Supported
H3a:	Incentive and Control -> Non-Financial Performance	-1.24		-0.06	Negative; not significant	Not Supported
H3b:	Incentive and Control -> Financial Performance	-0.88		-0.07	Negative; not significant	Not Supported
H4a:	Information Flow and Decision Rights -> Non-Financial Performance	4.07	***	0.37	Positive; significant	Supported
H4b:	Information Flow and Decision Rights -> Financial Performance	1.21		0.21	Positive; not significant	Not Supported
H5a:	Technology Assessment -> Incentive and Control	5.48	***	0.31	Positive; significant	Supported
H5b:	Technology Assessment -> Information Flow and Decision Rights	5.58	***	0.48	Positive; significant	Supported
H6:	Resources and Routines Utilization - Information Flow and Decision Rights	4.07	***	0.33	Positive; significant	Supported

Notes: *** p<0.001; * p<0.05 [1)] *t*-value 1.96: significant
Chi-Square=0.00, df=175, p-value=0.0000, RMSEA=0.065

The test results support hypothesis 1a (TA positively influences NFP). The path had a *t*-value of 2.38 and coefficient of 0.20 (p-value < 0.001) exhibiting a significant positive relationship. Hypothesis 1b (TA positively influences FP) is not supported. The path had a *t*-value of -1.13 and coefficient of -0.19 with its t-value falling below the threshold of 1.96, thus it is rendered not significant.

Hypothesis 2a (RR positively influences NFP) is supported by this study with a *t*-value of 3.44 and coefficient of 0.27 (p<0.001) exhibiting a significant positive relationship. Hypothesis 2b (RR positively influences FP) is not supported by this study with a *t*-value of -0.48 and coefficient of -0.06 exhibiting an insignificant negative relationship.

Neither hypothesis 3a (IC positively influences NFP) and hypothesis 3b (IC positively influences FP) are supported by this study. The path of Hypothesis 3a had a *t*-value of -1.24 and coefficient of -0.06. Similarly, the path of Hypothesis 3b had a *t*-value of -0.88 and coefficient of -0.07. As both t-values fall below the threshold of 1.96, these hypotheses are not supported and indicate an insignificant negative relationship.

Hypothesis 4a (IDR positively influences NFP) is supported by this research while Hypothesis 4b (IDR positively influences FP) is not supported. The path of Hypothesis 4a had a *t*-value of 4.07 and coefficient of 0.37 (p<0.001) indicating a significant positive relationship. The path of Hypothesis 4b had a *t*-value of 1.21 and coefficient of 0.21, indicating an insignificant positive relationship.

Both hypothesis 5a (TA positively influences IC) and 5b (TA positively influences IDR) are supported by this research with a t-value of 5.48 and coefficient of 0.31 (p<0.001), and t-value of 5.58 and coefficient of 0.48 (p<0.001) respectively. Hypothesis 6 (RR positively influences IDR) is supported by this study with a t-value of 4.07 and coefficient of 0.33 (p<0.001) exhibiting a significant positive relationship.

To summarize, of the 11 hypotheses, 6 hypotheses are supported: TA -> NFP, RR -> NFP, IDR -> NFP, TA -> IC, TA -> IDR, RR -> IDR. The model tested passes the Good of Fit Test with all GFI, NNFI, CFI, RFI, and IFI above 0.90.

5. DISCUSSION

This research aimed to investigate the impact of technology adoption capabilities on firm performance in relation to an observed phenomenon of diminishing profitability and the cost-service trade-off tug of war. It analyses relationships between TA, RR, under the construct of technology adoption capability, and IC and IDR, under the construct of strategy execution, with NFP and FP within the FMCG distribution industry in Indonesia. The results conclude that TA, RR, and IDR have a significant relationship with NFP, while IC does not seem to have a role towards NFP. This implies that these variables of the technology adoption and strategy execution constructs have a direct influence on NFP. These findings are in accordance with previous studies of technology adoption and strategy execution, respectively, towards firm performance. Rai *et al.* (2006) in their research also found that technology, in the context of supply chain integration, has a positive impact on NFP, inter alia, critical elements such as operation excellence, data consistency, information flow, and cross-functional integration. Sait *et al.* (2018) found that *"TA has a positive relationship towards obtaining a competitive advantage, one of the indicators of a firm's NFP"*. Weichbrodt and Grote (2010) found that *"firm performance is positively influenced by RR"*. These findings are also supported in research by Hemmert (2019) where training of employee, one of the items measured under RR, in Korean firms is positively related to organizational and financial performance.

An intriguing observation worth noting is that in the context of this research, TA, RR, IC, and IDR all were found to have insignificant roles towards financial performance, whether positive (IDR) or negative (TA, RR, IC). The insignificant relationship between these four variables and financial performance intuitively reveals that these variables do not sufficiently affect financial performance. This may be what is being represented by the phenomenon of a diminishing profitability observed from the Indonesian companies above and might help explain why despite a rise in technology, R&D, and sales growth, many firms experienced a decline in profitability. They might not have benefited financially, however, are justified in their investment by reaping benefits from the non-financial aspects.

Investments in technology, with proper assessment and execution, would be expected to yield higher financial performance. However, suggestions that investments in technology and firm profitability are uncorrelated, or plausibly even negatively correlated, despite the high investments may be due to firms' failure in building effective technology capability (Bharadwaj, 2000). In addition, the business value of technology is less dependent on the resource itself compared to the dependency on a firm's capability to develop, deploy and exploit technology related resources (Wu and Liu, 2010). As the relationship between technology and performance remain inconclusive, the decision to invest in technology and the realization of benefits (Henderson and Venkatraman, 1989; Wu and Liu, 2010) is a risk for any organization intending to invest or use technology for the implementation of strategies or to realign business processes (Henderson and Venkatraman, 1989).

In addition to the relationship between variables and performance, TA is found to have a positive influence on IC and IDR. RR also positively influences IDR. These correlations between TA, RR, IC, and IDR in general support previous research findings that technology adoption capability positively influences strategy execution, which in turn influences firm performance. Henderson and Venkatraman (1989) establish a relationship between technology adoption capability and strategy execution. In their Strategic Alignment Model (Henderson and Venkatraman, 1999), the Competitive Potential perspective is concerned with the potential of IT capabilities in affecting business strategy and the corresponding decisions and processes. In a case study by Siemieniuch *et al.* (1999) on the relationship between suppliers and customers it was found that improved technology capability significantly improved strategy execution, e.g. the timeliness of information exchange, decision making, efficiency and effectiveness.

5.1 Theoretical and Strategic Management Implications

This research addresses the phenomenon of diminishing profitability in Indonesia with empirical research of select variables derived from the TOE and OTE framework under the construct of technology adoption capability and strategy execution, and their impact on firm performance in the FMCG distribution industry.

Firstly, this study brings a new perspective to the ongoing scholarly debate on whether technology adoption positively, negatively, or insignificantly impacts a firm's performance. Numerous prior research supports behind one of the arguments presented above. As a result of these contradictory findings, the role of technology adoption towards firm performance may be considered inconclusive. Rather than contrasting and confronting the different views above, this study suggests that technology adoption capability alone does not significantly impact firms' financial performance as it requires the successful execution of strategy to generate value from the technology adoption. It is vital to ensure that capabilities needed to support strategy execution are up to level and ready to be deployed (Thompson *et al.*, 2018).

Secondly, by focusing on select variables and segregating firm performance into non-financial and financial performance, this study presents a better understanding of the phenomenon of diminishing profitability above. Our research suggests that although a firm manages and executes the selected variables of technology adoption capability and strategy execution properly, i.e., technology assessment, resources and routines, incentive and control, and information flow and decision rights, it does not guarantee that the firm will achieve higher financial performance. It will, however, improve a firm's non-financial performance. Firms must be able to find a position along the line of the service-versus-cost curve which will yield optimum profit, stronger cash-flow, and a healthier balance sheet, meaning they must determine at what total cost they will benefit most from.

Thirdly, this empirical study samples a wide fast-moving consumer good distribution network of 393 independent distribution firms in Indonesia. Its research methodology and applicability may be useful for research in other countries or regions. Thirdly, this paper complements the existing literature on technology adoption capability and strategy execution. It specifically focuses on how the selected variables play a role in affecting firm performance.

This study also offers management and practitioners insight on technology adoption capability. First, management must comprehend that technology adoption is not a quick fix to improve financial growth. It takes time and effort over a period of time. Before adopting a technology, firms must consider the entire process of technology exploitation, classification, and selection (McCarthy, 2003), which includes processes such as licensing, purchasing, and R&D alliances. A technology's compatibility with a firm's business process, feasibility of the technology, complexity, and ease of use of the technology are critical factors in assessing a technology to be adopted. Furthermore, the utilization of resources and routines for the adoption process of the technology chosen must be considered. This includes the provision of adequate resources and gatekeepers, and training for the technology to be used.

As the variables of this study over the span of one year were found to have an insignificant impact on financial performance but a positive one on non-financial performance, firms may then design their technology business strategies taking this into consideration and allocate the time, strategy and resources to maintain high technology adoption capability and a robust strategy

execution over a longer period of time to ensure that both non-financial and financial targets are satisfied. Managers of firms with limited resources, hence more sensitive towards a stagnant or even possibly a short-term negative financial performance, may plan to downscale the technology adopted and still enforce a robust strategy execution to achieve positive results, albeit at a smaller scale.

Secondly, managers and practitioners in a similar context seeking to achieve higher non-financial performance may take note of the roles of the variables investigated above and their direct impact on non-financial performance. Understanding the roles and importance of these variables is crucial in formulating technology adoption strategies. In conclusion, managers and practitioners must anticipate that while technology adoption might before long impact their non-financial performance, impact to financial performance might take a longer time to materialize.

5.2 Limitations and Direction for Future Research

The limitations of this empirical research may elicit future research in the following aspects. First, the question of what lead to the phenomenon of diminishing profitability in Indonesian firms in the period observed is not fully answered. Arguably, there are many factors that may strengthen or weaken the relationship between technology and performance. However, this study finds that the selected elements of technology adoption capability and strategy do not have a significant impact on financial performance opens the possibilities for investigations into other possible influencing factors, such as, market structure, organizational behavior, demographics, etc. Group analysis of this study indicates that respondents with a higher education (i.e., undergraduate, and graduate diploma) show more significant positive impact of tested variables toward firm's financial performance. Researchers, in general, agree that demographics, such as the education level of the top management of the firm have an impact on a firm's performance. Darmadi (2013) found that *"financial performance is positively impacted by the education level of top management in Indonesia"*, while Wei *et al.* (2005) found that *"education heterogeneity of top management has a negative impact on firm performance in China"*.

Secondly, the empirical elements of this paper are primarily based on the simplified nodes of the supply chain, i.e., the principal company and its distribution network. An expanded supply chain that includes suppliers of suppliers and customers of customers would further reinforce the external validity of empirical research.

Thirdly, data collected in this research extends over a one-year period. Technology is not a short-term investment and may take a long period in its adoption. Some research suggests that a longer period is needed for technology adoption to demonstrate its impact on performance (Venkatesh, 2006). Thus, conducting research over a longer period might yield slightly different results.

Lastly, this research takes place in a single country, Indonesia, which although it is the largest archipelagic state and a culturally diverse country, the environment factors considered in this research are relatively similar to each other. Impacts from other environment factors of the TOE and OTE theoretical models, which may affect the effectiveness of technology adoption, such as market structure, technology infrastructure, and local government regulations, would further advance our understanding on this subject.

DECLARATION OF INTERESTS

On behalf of all authors, the corresponding author states that there is no conflict of interest. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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