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The mediation effect of inventory management practices on operational performance in public university

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***Abstract*---**Purchasing and inventory managements are essential in both public and private organizations, especially in public higher education institutions and universities since they can they affect achievement of the country mission and fully respond to needs of the people. The objectives of this research are to study the effects of purchasing strategies (PUF) and inventory management practices (INV) on operational performance (OPE), as well as the mediation effect of INV on the effect of PUF on OPE. The study used quantitative method. The sample was 293 staff involved in purchasing and inventory managements in the public university in Thailand, arisen from convenience sampling. The instruments used in the research were questionnaires. The statistics used for data analysis were frequency, percentage, mean, standard deviation, confirmative factor analysis and structural equation modeling. The findings revealed that PUF and INV had a direct positive effect on OPE and INV mediated the effect of PUF on OPE. For practical recommendation, such findings can be a guideline for public higher education institutions to improve their logistics management, especially in purchasing and inventory managements. Public university executives should adopt purchasing strategies as suggested in the study to support inventory planning, control and distribution as well as operational performance. Moreover, they should assess institution's operational performance based on cost, quality and time management, caused by effective purchasing and inventory practices. For theoretical recommendation, academicians and interested persons can bring the research results to conduct further research on environmental purchasing since it positively affects to organizational performance, plus e-procurement should be study because business transaction via internet is essential

in logistics and supply chain management currently in the new economy era.

***Keywords*---**purchasing, inventory management, operational performance, higher education.

Introduction

Quality management system is used in both the public and private sectors to improve and develop work processes continuously and sustainably. It also increase the country's competitiveness whereby the development of the quality of public administration is an important goal of the development of the government worldwide that want government agencies to upgrade their quality working and meet international standards (Bashan & Kordova, 2021). The administration of higher education institutions of the public sector is different from general organizational administration by performing official duties with efficiency. It will focus on the achievement of the mission of the state and fully respond to the needs of the people. The quality operation must result from the readiness of the organization in terms of personnel, budget, resources and management. These four factors are constantly linked (Skarpeta et al., 2020). That is, organizational management to achieve goals must be consistent and coordinate work throughout the supply chain. Emphasis is placed on management processes that allow activities to be interrelated and interconnected within the organization. Various resources are used together to increase the efficiency of work and increase organizational effectiveness resources in government agencies. It consists of many things, including supplies, which are materials, equipment, land and buildings. Purchasing and inventory managements are therefore important mechanisms for supervision in each higher education institution. Government agencies will spend a lot of their budget on procurement through the inventory management component. If the parcel acquisition is in accordance with the plan, numbering and quality that is suitable for the mission of that agency, it will make the budget spending the most worthwhile, including flexible and efficient organization management. As a result, it will help save the country's expenditure budget (Pyun and Gamassou, 2018).

However, purchasing and inventory managements are a risky task for errors because they are a work related to the rules and regulations that are updated all the time. In addition, they have a multi-step process. Purchasing and inventory officers and those involved need to be proficient in the work process and must perform their duties properly in strict accordance with the regulations. Furthermore, government agencies still lack technology to be applied in the management of supplies due to the high investment budget required. From the assessment of government procurement standards, it reflects the process of working in the procurement field that is redundant in many steps. This results in a lack of flexibility in the operating process and does not meet the same standards although each organization uses the same rules (Houé & Duchamp, 2021; Bancroft & Li, 2021).

Based on the issues mentioned above, this study aims to investigate the effects of purchasing strategies (PUF) and inventory management practices (INV) on operational performance (OPE) to find the guidelines for developing university operational performance. The university staff can adopt research findings to help reduce operational risks, achieve the objectives, generate value and supply punctually. Hence, it is beneficial to the university as well as the use of the country's budget economically and worthwhile, which is considered to help the country to solve economic problems in another way.

Literature review

Purchasing strategies

Purchasing is the operation according to the processes for acquiring necessary materials, parcels and products with the accurate quantity, good quality, reasonable price and right place. It is one of logistics activities apart from forecasting, warehousing, manufacturing, packaging, transporting, distributing and providing services (Houé & Duchamp, 2021). Kiser (1976) work offers six PUF such as negotiation, developing and maintaining good relations with suppliers, sourcing, developing suppliers, protecting the cost structure of company and minimizing cost. Later, Thrulogachantar & Zailani (2011) clustered PUF in 4 areas negotiation, relationship, cost and resource management. As a result, purchasing strategies in the study comprise effective negotiation, collaborative interaction, budget management and supply base management.

Inventory management practices

Inventory refers to materials and parcels organizations store for selling or using in manufacturing process. In all businesses, inventory is considered as business asset (Arnold & Chapman, 2004). Inventory management is responsibilities in planning, controlling and distributing inventory from raw materials until final products (Bancroft & Li, 2021). Thus, the study depicts inventory management practices in three dimensions: inventory planning, inventory control and inventory distribution.

Operational performance

OPE refers to the quality, cost, productivity, and delivery outcomes of an organization and, or the ability of an organization to reduce costs or expenses in managing operations according to the time of the order cycle, improve the efficiency of raw material utilization, and meet customer delivery requirements. Assessment of OPE is very important to manufacturers because it will lead to the effectiveness of producing high quality products. This results in greater customer satisfaction and increased revenues and profits (Abdallah et al., 2016). OPE indicators, moreover, are indirectly measured by the turnover rate or the rate of absenteeism which is an effect of the efficiency of human resource management (Wisedsin et al., 2020). According to a review of previous studies mentioned, the OPE dimensions of a business organization that are important issues are operation costs, operation quality and cost time.

Hypothesis development

Purchasing strategies are considered as a tactical task in the university or firm. The purchasing practices as negotiating with supplier to procure quality material at reasonable price, dealer assessment and management lead to reducing the material cost plus enhancing quality of input (Ambekar et al., 2021; Hallikas et al., 2021; Van Zoest et al., 2019). This, in sequence, increases benefits for a company or university. The study, therefore, hypothesizes that:

H1: Purchasing strategies have a positive effect on operational performance.

Purchasing is an essential task of inventory management. The inventory management function is dependent on purchasing. Effective purchasing strategies help in improving inventory management practices in terms of planning in numbers of inventory staff, meeting and training program (Yassine, 2022). Moreover, purchasing strategies support inventory control and distribution (Santos et al., 2021; Negi & Kharde, 2021). Hence, the study hypothesizes that:

H2: Purchasing strategies have a positive effect on inventory management practices.

Inventory and warehousing managements denote greater product availability in numerous sections, which can possibly raise supply chain performance (Aunyawong et al., 2021). The effect of great unintentional operational performance caused by product demand instability can be important and even consume safety inventories (Santos et al, 2020). Past studies investigate the effect of inventory management on the firm performance. The lack of appropriate inventory management policies obstructs the profitability (Orobia et al., 2020). Consequently, the following hypothesis is proposed:

H3: Inventory management practices have a positive effect on operational performance.
H4: Inventory management practices mediate the effect of purchasing strategies on operational performance.

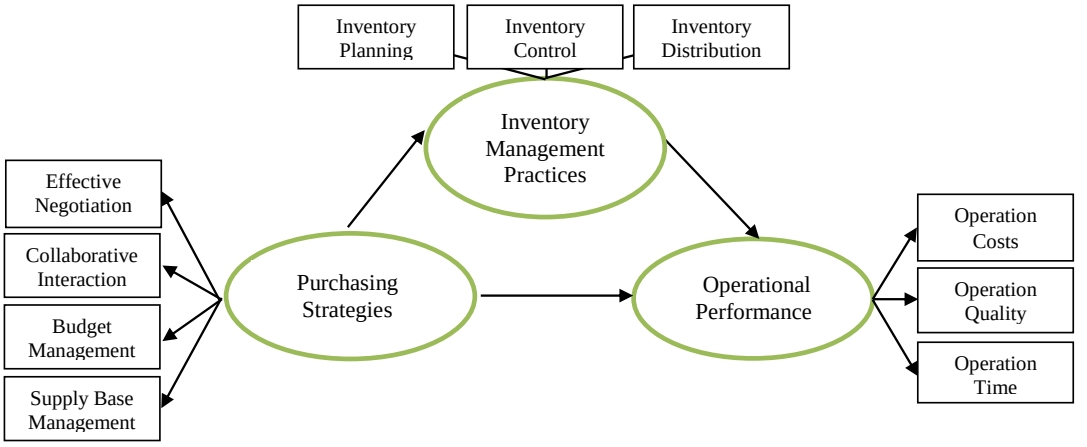

Figure 1: Research Conceptual Framework

Research Methodology

This research was quantitative research. The population in this section included staff involved in purchasing and inventory managements in Ramkhamhaeng University, Thailand. The respondents of 293 answered the questionnaire. The sample size was adequate based on the minimum of 20 times greater than the numbers of observed variable in the research model, as suggested by Hair et al. (2010). The sampling was done by convenience sampling. The personal information of respondent was shown in Table 1.

Table 1: Personal Information of Respondents

Demographic information	Numbers (n.)	Percentage (%)
1. Academic supplies	108	36.86
2. Finance and accounting scholar	65	22.18
3. Educational scholar	31	10.58
4. General administration officers	54	18.43
5. Other officers	35	11.95
Total	293	100.00

A questionnaire was an instrument used as research instrument to collect data. The instrument accuracy was checked for validity and reliability. The validity consisted of content validity using IOC >0.5 and construct validity using confirmatory factor analysis (CFA), while the reliability was checked for Cronbachs' alpha coefficient >0.8 (Cronbach, 1990). The five-point Likert scale questionnaire comprised the items related on research variables and based on the concepts of past studies as discussed in literature review. For quantitative data interpretation, the criteria were recommended by Best and Kahn (2006).

For data analysis, first, the level of variables in the research were analyzed using descriptive statistics, including mean, standard deviation (S.D.), Skewness (Sk),

and Kurtosis (Ku). The skewness between -3 and +3 and kurtosis between -10 to +10 indicating a normal distribution when using SEM (Kline, 2 0 1 1) were considered. Second, discriminant validity was tested based on Maximum Shared Variance (MSV) < Average Variance Extracted (AVE) and Average Squared Shared Variance (ASV) < AVE; Also, the latent variable's AVE should be greater than the squared correlation between the latent variable and all other variables. In addition, the convergent validity was tested taking into account that the composite reliability value must be greater than 0.7 and AVE > 0.5 (Fornell & Larcker, 1981). Third, CFA was used to check the construct validity of the questionnaire. Forth, path analysis was used to examine the research hypotheses. Fifth, model fit indicators and the criteria of C.R. or t-value >1.96 were based on hypothesis s proposition by Diamantopoulos and Siguaw (2000).

Research results

The descriptive statistical results showed that the manifest variables averaged between 3.25 – 4.11, which was at a high level and had a standard deviation between .52 and .69. The variable with the highest mean was tourist satisfaction, while the variable with the lowest mean was infrastructure, as shown in Table 2.

Table 1: Descriptive Statistics

Variable	Min	Max	Mean	S.D.	Sk	Ku	Remarks
Operational performance	-	-	4.14	0.03	-	-	High
				0.50	-	1.2	High
	1.0				0.7	06	
OPE1: Operation costs	0	5.00	3.86		15		
				0.55	-	1.1	High
	1.0				0.7	78	
OPE2: Operation quality	0	5.00	4.20		52		
				0.56	-	1.2	High
	1.0				0.3	70	
OPE3: Operation time	0	5.00	4.37		26		
Purchasing strategies	-	-	4.08	0.03	-	-	High
				0.66	-	2.3	High
	1.0				1.2	51	
PUR1: Effective negotiation	0	5.00	4.24		83		
				0.61	-	1.6	High
PUR2: Collaborative	1.0				0.9	14	
interaction	0	5.00	3.87		35		
				0.64	-	1.4	High
	1.0				0.7	30	
PUR3: Budget management	0	5.00	3.86		38		
				0.58	-	1.2	High
PUR4: Supply base	1.0				1.4	52	
management	0	5.00	4.36		52		
Inventory management				0.06	-	-	High
practices	-	-	3.76				
INV1: Inventory planning	1.0			0.52	-	1.7	High
	0	5.00	3.84		0.9	63	

Variable	Min	Max	Mean	S.D.	Sk	Ku	Remarks
INV2: Inventory control	1.00	5.00	3.71	0.62	-0.822	1.146	High
INV3: Inventory distribution	1.00	5.00	3.74	0.50	-0.473	1.034	High

The results of measurement model found that the highest factor loading was operation quality and the lowest factor loading was inventory distribution. The standard errors ranged from 0.046-0.058 and t-values ranged from 11.203-19.686, as shown in Figure 3 and Table 2. Moreover, the test results on composite reliability, convergent validity and discriminant validity depicted that all factors, comprising operational performance, purchasing strategies and inventory management practices, were meet the acceptable criteria, as shown in Table 3.

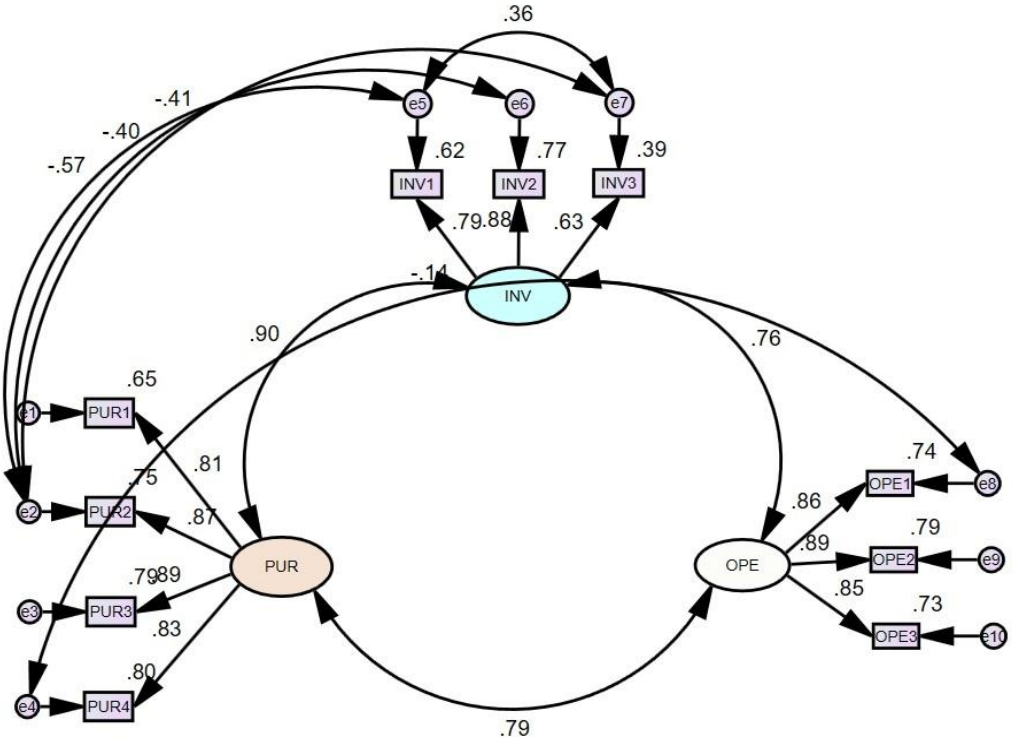

Figure 2: CFA analysis

Table 2: Measurement Model Results

	Operational performance	Purchasing Strategies	Inventory Management	t	S.E.	R^2
OPE1	0.860			19.686	0.047	.739
OPE2	0.891			<- ->	<- ->	.794
OPE3	0.852			19.372	0.046	.726
PUR1		0.808		17.024	0.052	.653
PUR2		0.868		<- ->	<- ->	.754
PUR3		0.886		19.653	0.047	.785
PUR4		0.803		17.572	0.054	801
INV1			0.787	15.290	0.058	.620
INV2			0.876	<- ->	<- ->	.767
INV3			0.628	11.203	0.053	.394

Notes: OPE1: Operation Costs, OPE2: Operation Quality, OPE3: Operation Time, PUR1: Effective Negotiation, PUR2: Collaborative Interaction, PUR3: Budget Management, PUR4: Supply Base Management, INV1: Inventory Planning, INV2; Inventory Control, INV3: Inventory Distribution, <- ->: Constrained Parameter, S.E.: Standard Error

Table 3: Reliability, convergent and discriminant validity

	α	CR	AVE	MSV	ASV	Remarks
Operational performance	0.893	0.855	0.563	0.443	0.421	Acceptable
Purchasing strategies	0.886	0.834	0.584	0.484	0.418	Acceptable
Inventory management	0.872	0.817	0.572	0.469	0.425	Acceptable

Notes: Threshold of reliability: CR>.70; Convergent validity: AVE>.50; Discriminant validity: AVE>MSV, ASV<AVE. CR =composite reliability; AVE = average variance extracted; MSV = maximum shared variance; ASV = average shared variance.

The results indicated that structural equation model had construct validity due to the following indices: Chi-Square = 28.014, df = 27, p-value = .410, χ^2/df = 1.038, GFI = .982, AGFI = .963, TLI = .999, CFI = .999, RMR = .008, RMSEA = .011. In addition, H1-H4 was supported with statistical significance at the 0.001 level, by which purchasing strategies had a positive direct effect on operational performance, with a standard coefficient of .559, and a positive direct effect on inventory management practices, with a standard coefficient of .900. While inventory management practices had a positive direct effect on operational performance, with a standard coefficient of .255, and mediated the effect of purchasing strategies on operational performance, with a standard coefficient of .230. In addition, purchasing strategies explained inventory management practices by 81.0 percent as well as purchasing strategies and inventory management mutually explained operational performance by 63.3 percent, as shown in Table 4 and Figure 3.

Table 4: Structural Model Results

	Standard coefficients	S.E.	t	P	Support
PUF -> OPE	0.559	0.065	13.296	0.000	H1: supported
PUF -> INV	0.900	0.074	14.317	0.000	H2: supported
INV -> OPE	0.255	0.076	11.470	0.000	H3: supported
PUF -> INV -> OPE	0.230	-	-	0.000	H4: supported

Note: Threshold of acceptable hypothesis: P-value > .05, t-value > 1.96

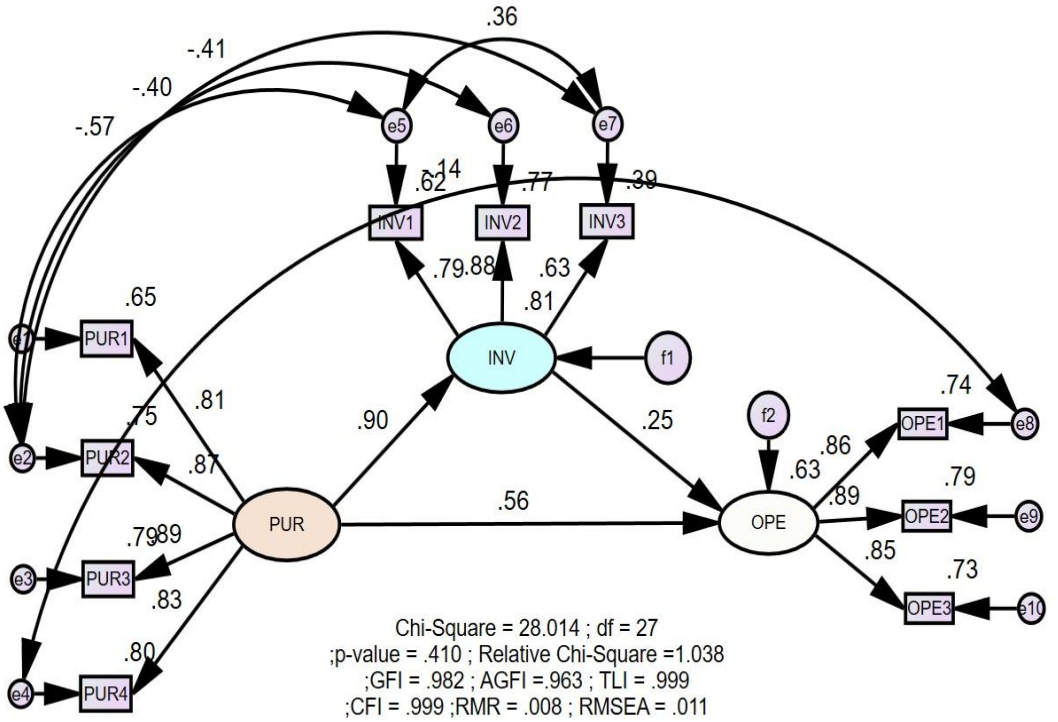

Figure 3: Structural Equation Model

Discussion and Conclusion

The hypotheses are proposed in the literature review part of the study for examining the effects of purchasing strategies and inventory management practices on operational performance, including the mediation effect of inventory management practices. The results have portrayed that first, purchasing strategies have a positive significant effect on operational performance. Purchasing with collaboration among supply chain partners and supplier management (e.g. negotiation, physical supply, cost measurement and relationship) enhances firm operational performance in terms of efficiency and effectiveness. That is, the organization can reduce the operational costs and acquire quality materials or products (Ambekar et al., 2021; Hallikas et al., 2021; Van Zoest et al., 2019). Second, purchasing strategies have a positive significant

effect on inventory management practices. Purchasing is a crucial task of inventory management as the inventory management job depends on purchasing. To improve inventory management practices in terms of inventory planning, inventory and distribution, effective purchasing strategies need to be applied in public higher education institutions (Yassine, 2022; Santos et al., 2021; Negi & Kharde, 2021). Third, inventory management practices have a positive effect on operational performance and mediate the effect of purchasing strategies on inventory management practices. Inventory and warehousing managements denote greater product availability in numerous sections, increase operational performance and prepare well for unstable environment. Appropriate inventory management policies support the effectiveness in operations (Aunyawong et al., 2021; Santos et al, 2020; Orobia et al., 2020).

For practical recommendation, such findings can be a guideline for public higher education institutions to improve their logistics management, especially in purchasing and inventory managements. Public university executives should adopt purchasing strategies as suggested in the study to support inventory planning, control and distribution as well as operational performance. Moreover, they should assess institution's operational performance based on cost, quality and time management, caused by effective purchasing and inventory practices. For theoretical recommendation, academicians and interested persons can bring the research results to conduct further research on environmental purchasing since it positively affects to organizational performance (Pintuma & Aunyawong, 2021), plus e-procurement should be study because business transaction via internet is essential in logistics and supply chain management currently in the new economy era (Nualkaw et al., 2021).

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