

Examining the Mediating Role of Strategic Integration of Purchasing and Advance Purchasing Practices in the Relationship between Purchasing Operational Performance and IT Investment in Purchasing

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Abstract--- The main purpose of the current study is to investigate the mediating role of strategic integration of purchasing, and advance purchasing practices in the relationship between purchasing operational performance and IT investment in purchasing. In this research, some other practices have been considered including involvement of suppliers, evaluation and assessment of suppliers and integration of logistics. Strategic integration of purchasing is referred as the degree to which the strategic relevance of purchasing function is recognized by a company. This has been regarded as an important antecedent of supply management practices and advanced purchasing. In the relation of performance, supply and purchasing practices and IT investments, one of the important factors is strategic integration of purchasing. The study has used survey-based method and data is collected by the aid of questionnaire. The collected data is analyzed with the SEM-PLS. The findings of the study have shown agreement with the proposed results. In author knowledge it is among the pioneering studies on the issues related to strategic integration of purchasing, advance purchasing practices, purchasing operational performance and IT investment in purchasing. This study will provide guidelines to policymakers, researchers and corporate personnel in understanding the relationship between strategic integration of purchasing, advance purchasing practices, purchasing operational performance and IT investment in purchasing.

Keywords--- IT, Investment, Purchasing Performance

1. Introduction

Over the last few years, the influence of IT (Information Technology) on the performance of businesses has been of great interest for the researchers. In the early 1980s, the empirical studies

conducted lead to the emergence of interest in the internet technology. However, the earlier studies were not able to find a positive association between the investments made in IT and rate of productivity in several industries. This lack of positive association is referred as Solow Productivity Paradox. In recent researches, the inability to find a positive association among the variables is attributed to the unavailability of suitable databases. This resulted in the disappearance of the paradox [1]. When some other performance measures are taken into account, variations occur in the empirical findings. This has been shown by this literature [2]. Different indicators of Information Technology are considered, or the comparison is made among different companies, this leads to variations of findings. It is important to analyze that whether the effects are direct or universal or not because of the variations in the research findings. It is considerable to evaluate the circumstances that can describe the benefits because of investments in Information Technology [3]. The way in which the process takes place is important as well along with the existence of a positive impact.

Most of the research studies have found the association between performance and investments in IT at business, industry or economic level. Very few studies have worked at basic level. A number of investments have functional aspect and can give different impacts in different areas of a business. By analyzing, the way in which different IT investments give benefit will give knowledge about the use of Information Technology by a company for achieving competitive advantage. This has been considered by a number of research studies from the aspect of operations and production [42]. Some have considered this from sales and marketing perspective

(Laurent); others have considered this from the aspect of supply chain management, logistics and purchasing [22]. The contributions of these research studies lead to the finding that IT investments can result in benefits at the basic functional level. From this perspective, it is crucial to identify and analyze the variable that takes part in this mechanism. In the previous studies, a global perspective has been adopted and it is important to have a positive impact by the IT investment and analyze the mechanism of this impact.

In this research paper, the relation between performance and investments in IT will be analyzed with reference to the purchasing function. The purpose of this research is to evaluate the extent with which the two factors/variables (implemented supply and purchasing practices and the level of strategic integration of purchasing) play the role of mediator in the relationship. One of the key aspects to be considered in this research is the process through which IT investments result in benefits for the businesses at functional level. However, there are some other aspects taken into account by this research as well. The role of purchasing has been shifted from an administrative function to strategic in a number of organizations [6]. The purchasing function can lead to the achievement of competitive advantage as a number of companies have started focusing on the internal capabilities resulting in high dependence on the suppliers. Moreover, it is important to know the activities and practices that result in the achievement of set objectives and improved performance. One of the instruments is the adoption of Information Technology, which is considerable to study.

The role of purchasing practices as a mediating factor has been used by some researchers in the association between performance and IT investments [37]. These researchers have focused only on the practices that develop a collaborative structure of association with the suppliers [33]. However, there is no evidence of this. The focus of this research paper is on the operational performance and IT investments with reference to the purchasing function. A functional aspect has been considered in this research study [5]. proposed four competitive priorities including quality, cost, flexibility and dependability. This research study measures the performance for the outcomes within each of these proposed priorities. A competitive dimension in the purchasing function is presented by these competitive priorities. In the next section of this research, literature review has been studied and hypotheses have been developed. The research methodology has been discussed in section 3

and section 4 represents the results of the study. In section 5, research summary along with its implications and limitations has been given.

2. Literature Review and Hypotheses Development: IT Investment and Performance

Over the last two decades, the effect of IT investments on the productivity level of a business was considered important to be analyzed. A number of research studies worked on this research objective. Several researches were conducted from theoretical perspective using statistical models and empirical aspect [37]. In order to analyze the consequences of implementing Information Technology systems, greater challenges have emerged in using suitable models, approaches and instruments for measurement. However, it was found in the empirical studies of 1980s that there is no impact of IT on the profitability or productivity of a business. This led to the development of concept called Productivity Paradox. Recent research studies have found that the previous findings of influence of IT on performance were because of haste [45]. It is still under question that in which way this issue can be resolved by using the most suitable research method or approach. In some recent researches, it has been suggested that companies can achieve different benefits through investments in Information Technology. It has been identified in literature that not all the investments in Information Technology result in positive influence on the performance of businesses. It is based on several other factors and the fact the companies differ from each other in circumstances.

For justifying a positive influence of Information Technology on organization, Dewett and Jones [8] have given five arguments, which include Information Technology. These are as below:

1. Information Technology enables a relation among the employees working in different divisions and function
2. Information Technology helps in storing information, coding and communicating it. In this way, it contributes in preserving and protecting the important information of the organization.
3. Through Information Technology, the external environment can be analyzed quickly and projects can be resolved in an effective manner.
4. Efficiency is improved through Information Technology by storage of information and effective communication.

5. Innovation is promoted through Information Technology for managing knowledge and information effectively. Further, it helps in generating new ideas.

The quality is improved through use of IT. These studies reflect that the operational performance is positively influenced through investments in Information Technology. This impact is much evident as compared with the overall performance measures including market share or financial profitability [24]. According to Liu et al., [24] most of the research studies are based on the analysis of benefits such as EDI (Electronic Data Interchange) with reference to the purchasing aspect.

Case study evidence has been provided by González-Benito, [12]. regarding the benefits of automatic processing of purchasing orders. There are several investment opportunities and EDI is one of them. An integrative aspect was adopted by Hilletoft and Hilmola, [18], which gave empirical evidence about the organizations with high rate of investments in Information Technology in the purchasing processes. It has been revealed that such companies experience high operational performance in purchasing area. Therefore, lower cost, better time management and resolution of conflicts can be resulted through information efficiencies [36, 7]. The integration of different organizational activities and suppliers is supported through information synergies, which are involved in designing, engineering or production. The following research hypotheses have been developed based on the literature findings.

H1: The IT investments in the purchasing function is in significant impact on the operational purchasing performance.

2.1 The role of Purchasing Practices as Mediator

It has been revealed through recent research studies that greater benefits are being generated by companies through IT investments. However, there are differences in the results. Moreover, it can be seen that the influence of IT on productivity and performance may not be universal and direct. It is the capability of a company to ripe the benefits through IT by making changes in internal systems and routines. The recent literature focus has shifted to studying the way in which benefits can be obtained through IT investments rather than the benefits exist or not [44]. It is the use of technology, which determines success rather than the adoption of IT. It is concluded by the literature conducted by Azhdari [1] that IT investments create a major influence on

returns. According to Liu, et al, [24] the relation between performance and IT investments is based on the business processes of a company. The way in which a company operates determines the relation between performance and IT investments. There exist contingent factors as indicated by [29]. The role of mediator in the relation of IT strategies and Business was studied by [11, 16].

By developing collaborative relation with the suppliers, the impact of IT investments on some indicators of performance in the purchasing area can be operated. Empirical evidence was provided by Sundar et al, [40] in which the internal and external collaboration act as mediator. However, this role was considered from the aspect of supply chain management. Most of the research studies reveal that the benefit of IT in the functional area of purchasing is depending on the use of IT for managing different organizational processes. Some purchasing practices are required to be implemented and linked with the implementation of Information Technology [26]. It has been proposed in this research study that the ability of purchasing function to utilize the IT systems and manage supply chain activities determines the influence of IT investments on performance.

Increased collaborative relation with the suppliers is one of the latest practices that have been considered by recent research studies in the supply management. Baumberger et al, [3] has incorporated the supplier evaluation and development while in some studies, supplier involvement in the designing and development of product has been used. Some scholars incorporate suppliers' integration and logistics. These factors have been incorporated to some or large extent in supply chain management [20]. Moreover, lean supply and constructive JIT purchasing elements are included as well. In order to promote business in terms of performance and improve purchasing performance, it is important to adopt these practices as a useful instrument.

Through use of Information Technology, the mentioned practices can be adopted in an effective manner. IT helps to implement these advanced practices in a more efficient and effective manner. It is required to maintain the interfaces of customers and suppliers as well as registers for supplier evaluation [13]. Information storage and teamwork practices are required in the designing and development of new products. Interchange of data with the suppliers and use of suitable software is involved in the integration of logistics [27]. Through increased sharing of information, relationships can be built through trust. The implementation of latest

purchasing practices is required for creating an influence on performance through IT investment. Based on the literature, the following research hypothesis has been developed:

H2: Implementation of Advanced Purchasing Practices mediate the relation between Operational Performance and IT Investment

2.2 The Role of Strategic Integration of Purchasing as a Mediator

The strategic relevance of purchasing function is not recognized by every company in a similar way. The constructs such as strategic purchasing and purchasing integration measure the ability of a company to recognize the strategic relevance of purchasing function [30]. Different activities reveal the integration through actions. For instance, it is revealed when the purchasing managers participate in the strategic planning of business, formulating a business strategy, setting objectives, etc. Moreover, the realities such as possession of good knowledge by the purchasing team and professionals also portray the organizational ability.

Significant efforts are required for the implementation of practices related to advance purchasing in an organization. It has been concluded by a number of researchers that the process of implementation has a strong antecedent, which is the strategic integration of purchasing. Strategic integration of purchasing refers to the degree with which the company is willing to provide resources for the development in this function [4]. The strategic integration of purchasing can be improved through efficiencies and synergies of information. Information synergies and efficiencies support the vertical communication mechanism in an organization, which result in better understanding of the business strategy. It can be concluded through the observations that latest purchasing practices can result in some of the effect of IT investment because of high strategic integration in purchasing function. This is improved through investments in IT. The following research hypothesis has been developed based on the theoretical framework created by Prajogo et al, [33].

H3: The degree of strategic integration of purchasing act as a mediator in the relation of IT Investment and Implementation of Advanced Purchasing Practices

A graphical representation of the proposed hypotheses has been represented in Figure 1. The relation between is intervened by advanced

purchasing practices as well as strategic integration of purchasing. Both of these should be taken into consideration for understanding the association between performance of business in the purchasing function and IT Investments. A positive association between purchasing performance and IT investment is suggested by first hypothesis. In Figure 1, this association has been shown by an arrow starting from IT investment and ending at purchasing performance through any other variable, the relation among these two can be indirect.

This research study focuses on the consequences and benefits of Information Technology. Therefore, IT investment has been used as an independent variable. Most of the previous studies have incorporated IT investment as a dependent variable [38]. The causal relation can exist in opposite direction as well. A greater influence of purchasing function in top management can be created by higher strategic integration. This can result in improved changes for getting resources of the organization. Greater strategic integrating can be considered because of IT investments in the purchasing function. IT investment is greatly relevant for the efficient working of purchasing function and development. However, these alternatives need to be considered as well.

3. Methodology

The current study is carried out to explore the nexus among the IT investment in the purchasing function, strategic integration of purchasing, advance purchasing practices and purchase operation performance. The current study has employed the quantitative approach. The quantitative approach used the surveys-based methodology the reason why the quantitative research design has been framing for this study, is that it helps a researcher in thoroughly examining the large sample of respondents and then generalizing their responses. Meanwhile it also helps a researcher in obtaining the summarized behavior of respondents participating in the study. This study which has employed the quantitative method has adapted a questionnaire to quantify the responses and opinion regarding issues raised in this study.

The IT investment in the purchasing function scale is adopted from the study of [21] of strategic integration of purchasing [23]. of advance purchasing practices González-Benito [12], and of purchase operation performance. The use of questionnaire also helps a researcher in understanding the relationship between set of dependent, independent and intervening variables [41, 39]. The questionnaire was designed

according to the objectives, problem and hypotheses of the study to determine the relative importance of factors that may control the employees' performance in the manufacturing organizations of Indonesia. The data collected through the surveys were loaded into the Microsoft Excel, the IBM SPSS, and Smart-PLS. The seven-point Likert scale is used to operationalize the variables and their sub constructs.

4. Analysis and Discussion

Partial Least Square is a second order Structural Equation Modeling technique [15]. It is consistent to the structural-equation models with a set of latent constructs and cause-and-effect associations. In addition, the PLS is an ideal technique for predicting and developing the statistical model.

The present study applied this technique, as: 1) In case of complex models, PLS path model is easy to

use as well as preferable for applying to the real-world cases. Present study aims to assess the relation among dependent and independent variables. Moreover, it also explores any moderating effects prevailing in the study; 2) PLS-path modeling is applicable on non-normal and normal set of data [25]. Since most of the researches in the area of social sciences involve non-normal data; 3) PLS path modeling examines not only the relation among the constructs but also the relation among the indicators, as well as the latent constructs of these indicators i.e. it simultaneously examines the structural and the measurement model, making it a robust statistical technique [9, 43]. Therefore, PLS path modeling is employed, in order to examine the proposed relations, i.e. the reliability and validity of the constructs. The measurement model of the current study is shown in the figure 1.

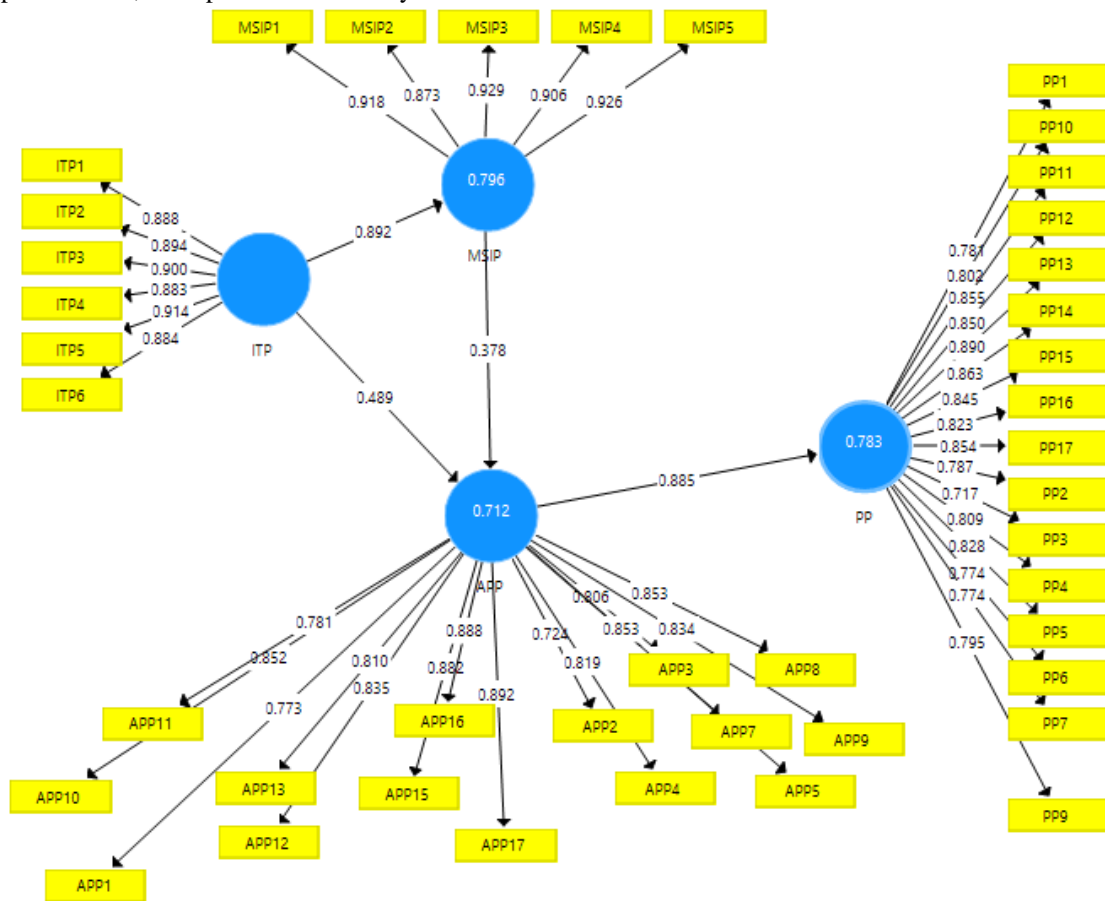


Figure 1. Measurement Model

The loading values of the variables are shown in the table 1. The results indicate that the items whose loading are below than 0.7 are deleted.

Table 1. Outer Loading

	APP	ITP	MSIP	PP
APP1	0.773			
APP10	0.852			
APP11	0.781			
APP12	0.835			
APP13	0.810			
APP15	0.882			
APP16	0.888			
APP17	0.892			
APP2	0.724			
APP3	0.806			
APP4	0.819			
APP5	0.746			
APP7	0.853			
APP8	0.853			
APP9	0.834			
ITP1		0.888		
ITP2		0.894		
ITP3		0.900		
ITP4		0.883		
ITP5		0.914		
ITP6		0.884		
MSIP1			0.918	
MSIP2			0.873	
MSIP3			0.929	
MSIP4			0.906	
MSIP5			0.926	
PP1				0.781
PP10				0.802
PP11				0.855
PP12				0.850
PP13				0.890
PP14				0.863
PP15				0.845
PP16				0.823
PP17				0.854
PP2				0.787
PP3				0.717
PP4				0.809
PP5				0.828

PP6				0.774
PP7				0.774
PP9				0.795

According to Henseler, and Sarstedt, [17] under PLS, internal consistency can be appropriately assessed through composite reliability, and is named as Cronbach alpha. In view of Nunnally and the value of composite reliability must be higher than 0.7. The composite reliability for each variable is presented in the Table 2, which are ranging from 0.844 – 0.985. The composite reliability values are higher than 0.70, thus are in line with the threshold level. According to

Ramayah et al. [34] convergent validity is the degree to which a variable is measured through various items. The convergent validity of a study is checked through average variance extracted (AVE). For each variable, the value of AVE must not be less than 0.5. Therefore, the value of AVE for present study is attempted to improve, by omitting items having less than 0.5 loadings.

Table 2. Reliability

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
APP	0.966	0.967	0.969	0.680
ITP	0.950	0.950	0.960	0.799
MSIP	0.948	0.949	0.960	0.829
PP	0.967	0.968	0.970	0.667

Discriminant validity refers that to which extent distinct concepts are measured or different items of the constructs are differentiated. In addition, it is the level where study variables are different from each other [9]. As recommended by Hair et al. [15] the discriminant validity for present study was tested through two criterions i.e. cross-loadings and Fornell-Larckers' criteria. According to Idris, [19] for each variable, the square root of AVE must be higher than the correlation between the variables. Consequently, for each variable the square root of AVE turned out to be higher than the correlations between set of other

variables. However, the attitude variable is not found to be consistent with the criterion. Five items of the attitude variable were excluded and 68 items having loadings that ranges from 0.581-0.881 were kept in the data set. Afterwards, for each variable, the square root of AVE turned out to be higher as compared to the correlations between the other constructs, thereby confirming the discriminant validity at appropriate level. The square roots of AVE with boldface are presented in the Table3 whereas, correlations of the latent variables are appeared with the lightface.

Table 3. Discriminant Validity

	APP	ITP	MSIP	PP
APP	0.825			
ITP	0.827	0.894		
MSIP	0.815	0.892	0.911	
PP	0.885	0.723	0.730	0.817

In PLS analysis, the next step is to determine the structural model. The present study examined the values of R-square, path-coefficient's significance, the predictive relevance, moderating effect, and the volume of effect. Following the studies [10, 35], the

bootstrapping procedure is employed for assessing the significance of path coefficients, involving 266 cases and 5000 samples. The structural model is shown in the figure 2

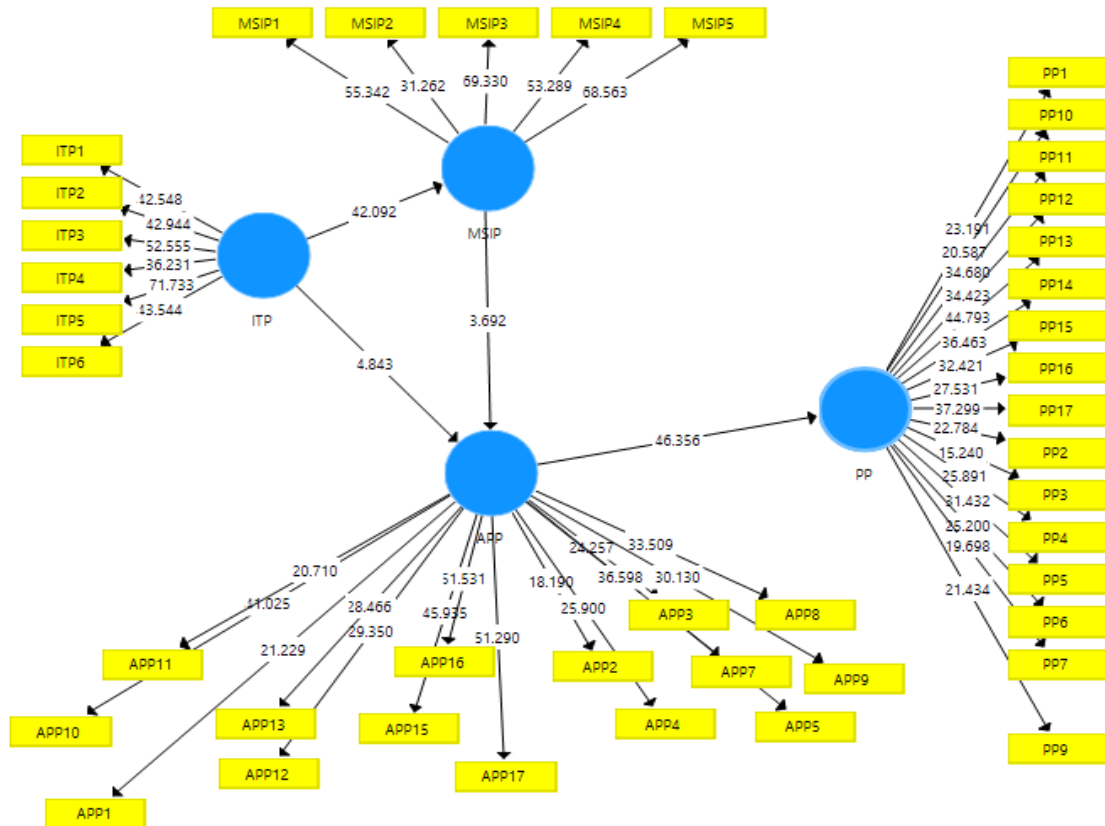


Figure 2. Structural Model

The description of the relationships mapped in the figure 2 are shown in the table 4. The results

highlight that the all the variables are in direct and significant relationship with each other.

Table 4. Direct Relationships

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
APP -> PP	0.885	0.887	0.019	46.356	0.000
ITP -> APP	0.827	0.829	0.033	25.192	0.000
ITP -> MSIP	0.892	0.894	0.021	42.092	0.000
MSIP -> APP	0.378	0.386	0.102	3.692	0.000
MSIP -> PP	0.334	0.343	0.091	3.662	0.000

The indirect relationship in terms of mediation effects are shown in the table 5 below. The results are confirming the proposed hypothesis.

Table 5. Indirect relationships

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
ITP -> MSIP -> APP	0.337	0.346	0.095	3.533	0.000
ITP -> APP -> PP	0.433	0.429	0.091	4.759	0.000
MSIP -> APP -> PP	0.334	0.343	0.091	3.662	0.000
ITP -> MSIP -> APP -> PP	0.298	0.307	0.085	3.501	0.000

While using the PLS-SEM technique, the researchers must employ measures for showing the predictive relevance of the model, in order to assess the quality of the underlying model [14, 31]. The present study adopted the predictive relevance test by Hair et al. [10] through applying blindfolding procedures. This procedure can be particularly employed for determining the goodness-of-fit. According to

Basheer et al. [2] one of the important criteria under PLS-SEM, is determining the variance of the endogenous variable. The value of R^2 shows how much of the variation in dependent variable is explained by the independent variables [15, 32]. The R-square values 0.25, 0.50, and 0.75 are considered as weak, moderate, and substantial variance, respectively.

Table 6. R-Square value

	R Square
APP	0.712
MSIP	0.796
PP	0.783

5. Conclusion

The main purpose of the current study is to investigate the mediating role of strategic integration of purchasing, and advance purchasing practices in the relationship between purchasing operational performance and IT investment in purchasing. It has been argued by [28] that there are two main benefits linked with Information Technology, which result in all the above consequences. These two benefits include information efficiencies and information synergies. Information efficiencies are related to savings in terms of cost and time, while information synergies are related to improved collaboration and integration among people, activities and processes. It is revealed by all the statements that IT investment has immediate result in the operational area of an organization. In this research, some other practices have been considered including involvement of suppliers, evaluation and assessment of suppliers and integration of logistics. Strategic integration of purchasing is referred as the degree to which the strategic relevance of purchasing function is recognized by a company. This has been regarded as an important antecedent of supply management practices and advanced purchasing. In the relation of performance, supply and purchasing practices and IT

investments, one of the important factors is strategic integration of purchasing. The study has used survey-based method and data is collected by the aid of questionnaire. The collected data is analyzed with the SEM-PLS. The findings of the study have shown agreement with the proposed results. In author knowledge it is among the pioneering studies on the issues related to strategic integration of purchasing, advance purchasing practices, purchasing operational performance and IT investment in purchasing. This study will provide guidelines to policymakers, researchers and corporate personnel in understanding the relationship between strategic integration of purchasing, advance purchasing practices, purchasing operational performance and IT investment in purchasing. The results of the study argue that through information efficiencies in terms of cost and time as well as information synergies, an organization is able to lower its cost, improve its quality, dependability, product service and flexibility. The ability of an organization to gather and process historical information related to business processes determines the identification of causes behind several quality issues. The influence of IT investments occurs in the intermediate level of organizations, which involves the variables determining to operational performance of the organization.

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