



# The Mediating Effect of Enterprise Resource Planning (ERP) Between Production Cost and Improving Performance of Yemen Pharmaceutical Companies

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**Abstract:** this study aims to investigate the mediating effect of enterprise resource planning between production cost and improving performance of Yemen pharmaceutical companies as well as the impact of production cost on performance and ERP. The cross-sectional method is used by this study. For measuring the impact of ERP on improving the performance, structural questionnaire is used and distributed to 258 employees within the industry. The result shows a significant and positive mediating impact of ERP on production cost and improving the performance of the Yemen pharmaceutical companies. Also confirmed a significant impact of production costs that the variable cost, marginal cost, and total cost on the pharmaceutical companies' performance in Yemen as well as ERP.

**Keywords –** *enterprise resource planning, production cost, performance, Pharmaceutical industry, Yemen*

## INTRODUCTION

The data framework incorporation that bolsters the administration of assets and keeps up procedures of a business in an association is alluded as Enterprise Resource Planning Systems (ERPs). This framework has advantage of connecting all specialty units together and has a few modules. This framework has the component of customization as ERPs can be redone as per the business and is a complex in nature. So, Enterprise Resource Planning Systems (ERPs) are “configurable information systems packages that integrate information and information-based processes within and across functional areas in an organization” (Armand and Roger, 2017). The purpose of the paper will be to review the present research enclosing the advantages of implementing ERP systems and to investigate this relationship using a particular case study based on stabilization and successful ERP implementation (Shaul & Tauber, 2013).

Pharmaceutical industry in Yemen is considered as one of the promising sectors within the country, as the demand for the Pharmaceutical products increased rapidly over the last decade. These consequences drive the Pharmaceutical industry to be more aware for new entrants, those have higher capital market; will be able to gain the benefits of the latest technologies such as ERP (Al-Worafi, 2014). In addition, with these new entrants to the sector, the competition level will be stronger than past. The new condition of the Pharmaceutical industry varies from five years ago, several encouragement have affected the business environment, government

encourage new entrants to this sector by providing an tax exemption for ten years, which it's not allowed for the old players within the industry (Alshakka et al., 2014). As well as, several Pharmaceutical products patents become available, which encourage many investors to manufacture it locally. Despite the highest competition within the industry, several pharmaceutical companies lack the adoption of ERP system (Wahyuni, 2016).

## LITRATURE REVIEW

Agency cost theory supports that production cost effects the final performance of the organization (Jensen, 1976). Agency theory was originally developed by Jensen and Meckling proposed in 1976. This theory was later developed into the contract cost theory (contracting cost theory). Contract cost theory assumes. An enterprise consists of a series of contracts, including the contractual relationship between the provider of capital (shareholders and creditors, etc.) and the operator of capital (management authority), enterprise and lender, enterprise and customer, enterprise and employee (Versluis and Polak, 2019). The agency theory also holds that the agent has more information than the client, and this asymmetry of information will adversely affect the client to effectively monitor whether the agent is properly serving the client's interests. It also assumes that both the principal and the agent are rational, and they will use the process of signing an agency contract to maximize their respective wealth. The agent will take advantage of every possible opportunity to increase his wealth for the motive of self- interest. Among them, some actions may harm the interests of the owner. For example, build a luxury office for yourself, purchase a luxury car, and go to famous tourist areas for business trips that have little to do with business operations, and so on. In the contractual relationship between the principal (owner) and the agent, no party can increase their wealth at the expense of the wealth of others, that is, to reach the state of "Pareto optimization" (Tsai and Liao, 2017).

Institutional theory asserts that the development of formal structures in firms can significantly be influenced by the institutional environment (Scott, 2008). For example, Ugrin (2009) incorporates institutional theory into ERP systems adoption in his study. Ugrin mentions that institutional theory suggests that a firm deals with uncertainty, look beyond traditional cost benefit analyses and look also to institutional factors to legitimize their decisions. Ugrin examines the role of institutional factors in addition to traditional decision variables in experienced managers' decisions whether or not to adopt ERP systems. Transaction cost economics is an important concept of institutional theory and several studies pay attention to this concept. For example, Poston and Grabski (2001) use this theory to develop hypothesis regarding the examination of how ERP systems affect firm's transaction costs. According to them, "transaction cost economics posits that a firm is an economic entity created in an effort to economize on market transaction costs, for example searching and communicating market information, negotiating a deal, and preventing or dealing with contract default" (p. 278). Transaction costs are usually high when, for example, a firm has to deal with firm-specific assets and a long-term contract is necessary to prevent the opportunistic behavior of the other party (Williamson, 1981). Furthermore, Hyvönen (2003) mention that findings of previous studies indicate that ERP systems are effective with regard to transaction processing and thus lead to a reduction of the transaction costs of operations.

Bravo, Quintana, and Albuerne (2017) state that to produce products or services it is necessary to acquire and make available to the productive process three elements that are linked to transform a product available for sale. To facilitate the administrative control and the accounting management of the items that make up the cost of an item, the elements of the cost of production have been grouped as follows: Maziotis, Saal, Thanassoulis, and Molinos-Senante (2015) is the necessary materials for the preparation of an article and are perfectly measurable and loadable to the identified production. They are clearly identified with a finished article which take the name of direct materials, because their cost is determined without difficulty and applied to the total cost of the article, which are a direct part of the cost of production, since the indirect materials are assigned to indirect manufacturing costs.

Chen, Delmas, and Lieberman (2015) is added to the unit cost with printing, because it is not convenient to establish their total participation due to the minimum importance that has its value within the final cost of the article. Direct labor is necessary for the preparation of an article and whose salaries can be assigned to an identified production unit. The volume that companies pay for labor varies according to the product that is going to be elaborated. Indirect labor is considered the compensation of the workers who contribute to the worker to perform a more efficient and productive task. Indirect manufacturing costs are expenditures with the purpose

of benefiting the set of different articles that are manufactured or the different services provided, because they cannot be charged to a defined production form (Yilmaz, 2017).

The result of all expenses that prevent the product or service from complying with the requirements established by the client; it represents the difference between the real cost and what its reduced cost would be if there were no faults or defects in its production. Some authors distinguish two types of quality costs: 1) Efforts to manufacture a quality product, and 2) Those generated by not doing things correctly are called non-quality costs, he mentions (Hansen, Mowen, & Guan, 2007). The need for management accounting is at the service of the organizational strategy, from planning to evaluation, which requires breaking the paradigms on the role that has played in Colombia, where it states that companies have systems of incomplete costs (de Freitas Grupioni, Santos, Fernandes, Valente, & de Carvalho Pinto, 2018).

According to Halpern, Koren, and Szeidl (2015), evidencing how some voluntary or involuntary activities that occur within the organization generate economic impacts that affect financial results in achieving their strategic objectives, generating "dysfunctions", known as hidden costs which are results of the actions that must be put in place to counteract the aforementioned effects. According to Hirsch (2017), the hidden costs are not hidden by chance, because there is no appropriate tool for measuring them. The concept was developed in 1973 by Savall and Zardet (2015), since then several scholars from different countries have joined the research, which allowed to create the ISEOR (Institute of Socio-Economics of the Companies and the Organizations), in 1975, the same one that has been proposed for a cost to be hidden must fulfill three conditions: continuous control system, name and measure (Islam et al., 2018). The method of hidden performance costs, arise from two ideas: the change strategies, as a need for companies and rely on human potential, the change needs an economic evaluation, then the economic calculation has to be renewed in consequences. This method seeks reconciliation between the economic dimension and the social dimension, Social and Economic Performance, establishes six sensitive points in the performance of an organization, which are: working conditions, work organization, communication, and coordination (Renzetti & Dupont, 2018).

## METHODOLOGY

This research relays on hypotheses testing technique so the quantitative methodology is the best methodology can be used for this type of research. Using the quantitative methodology allows the researcher to analyze the data and figure out whether they achieve the research objectives or not. For the purpose of testing the mediating effect of ERP between production cost and the performance of pharmaceutical companies in Yemen, the questions instrument is used and distributed to a sample of managers at the top and middle levels. The measurements of the study variables are adopted from previous studies, for the ERP measures, ten items are adopted from the study of Park, Suh, and Yang (2007), for the production cost measures, fifteen items are adopted as next the variable cost measurements are adapted from the study of (Wang et al., 2017), the total cost measurements are adapted from the study of (Park et al., 2007), the marginal cost measurements are adapted from the study of (Wang et al., 2017) for the performance measures, six items are adopted from the study of Ismail (2007). The population of the study is represented by the total registered staff by the ministry of health in Yemen that equal to 400 staff work at the top and middle level, as well as operation's supervisors at the operation level. The sample of this study has determined based on Krejcie and Morgan (1970) table, which is 226.

## FINDINGS

Table 1 provides the respondents' profile, most of the respondents are male as (n=165) and female (n=61), for the educational levels, most of the respondents bear bachelor degree as (n=129), diploma (n=56), master (n=28), and PhD (n=13). The respondents age is classified into five categories as from 17-25 years (n=28), from 26-30 years (n=53), from 31-35 years (n=71), from 36-40 years (n=45), and above 40 years (n=29).

**TABLE 1: Respondents profile**

	Frequency	%		Frequency	%
<b>Gender</b>	<b>Education level</b>				
Male	165	73%	Bachelor	129	57%
Female	61	27%	Diploma	56	25%
			Master	28	12%
			PhD	13	6%
<b>Age</b>					
17-25 yrs.	28	12%	31- 35 yrs.	71	31%
26-30 yrs.	53	23%	36- 40 yrs.	45	20%
			> 40 years	29	13%

Table 2 shows the result of the internal consistency, which measures by Cronbach alpha, for the items under ERP factor (0.722) and for items under performance factor (0.784), as all the internal consistency values higher than 0.7, it refers to accepted level of internal consistency (Kline, 2005).

**TABLE 2: Reliability test**

Factors	Items	Cronbach's Alpha
ERP	8	0.722
Performance	6	0.784

Table 3 provides the result of normality test and describes the mean and standard deviation of each factor. For the normality test, Skewness and Kurtosis have values ranged between -3 and +3, which is accepted as suggested by Hair, Sarstedt, Ringle, and Mena (2012). For the mean values, ERP (4.06) and for performance (3.52), these values imply that respondents were agree for the statements reported for each factor.

**TABLE 3: Descriptive Statistics**

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
PF	226	4.0619	.62309	-.240	.162	-.240	.322
ERP	226	3.5207	.65011	.082	.162	.082	.322

ERP; enterprise resources planning; PF; Performance

Table 4 shows the factor loading analysis of the model measurements, as KMO value is higher than 0.5, this indicates to adequate sample for the study. Table 5 shows the rotated factor loading, as suggested by Hair et al. (2012) values over 0.5 loading refers to good representing of the factor, all factor loading for the ERP and performance ranged between 0.614 and 0.886.

**TABLE 4: KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.739
Bartlett's Test of Sphericity	Approx. Chi-Square	621.108
	df	21
	Sig.	.000

**TABLE 5: Rotated Component Matrix**

	Component	
	1	2
ERP1	.762	
ERP2	.835	
ERP3	.864	
ERP4	.808	
ERP6	.784	
ERP5	.886	
ERP7	.791	
PF1		.691
PF2		.760
PF3		.725
PF4		.734
PF5		.614
PF6		.749

Extraction Method: Principal Component

For the purpose of investigating the relationship between ERP and performance, table 5 confirms the result of significant and positive relationship between ERP and performance at the pharmaceutical industry in Yemen where ( $r=0.299$ ,  $p=0.000$ )

**TABLE 6: Correlations**

		ERP
PF	Pearson Correlation	.299**
	Sig. (2-tailed)	.000
N		226

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

ERP; enterprise resources planning; PF; Performance

Table 5 provides the result of the linear sample regression; the adjusted  $R^2$  value 0.48, which refers to the explanation of the impact ERP in predicting performance. Also, the result confirms a significant and positive impact of ERP implementation on the improving performance at the pharmaceutical industry in Yemen where ( $\beta=0.286$ ,  $t=4.682$ ,  $p=0.000$ )

**TABLE 7: Regression test**

Model	Standardized Coefficients	t	Sig.
1 (Constant)		13.961	.000
ERP	.286	4.682	.000
Adjusted R <sup>2</sup>	0.48		
F	21.918		

ERP; enterprise resources planning; PF; Performance

## DISCUSSION

The role of adopting technology has discussed extensively within the last decades, which emphasized the role technology in boosting the organization performance. Along to the technology adoption, enterprise resources planning has crucial role in improving the performance of organization (Ahmad & Cuenca, 2013; Damodaran, 2013; Fu, Ku, & Chang, 2015; Hong, Siau, & Kim, 2016; Huang & Yasuda, 2016; Janßen-Tapken & Pfnür, 2016). The result of this study confirmed

the significant and positive impact of ERP in improving the organization performance. Inline to the result of this study, Bansal and Agarwal (2015) stated that "The scarcity of accurate research examining the impact of ERP executions on the performance of the company." Although the internal impression of planning frameworks has not already been considered, Bansal and Agarwal (2015) have studied one area of performance: the market response to the use of enterprise resource planning frameworks. Comuzzi and Parhizkar (2017) found that market estimates for companies are increasing significantly when advertisements are issued on the use of planning frameworks. There were certain increases in the estimate of the offer when firms were informed about designs using ERP. Pharmaceutical companies had more positive market responses. Moreover, SAP and PeopleSoft have shown more constructive responses in the market than less ERP traders. Peng and Nunes (2017) with an examination confirmed these basic findings and found that "experts" a general response to the design designs used ERP system was confirmed, since the estimates of income after the announcement was completely higher than the average estimates before the announcement " Which puts resources into ERP executions by another group of specialists who have captured real financial information. Fu et al. (2015) found that "organizations that place resources in ERP tend to demonstrate higher performance over a wide range of measurements finance" The ERP completion from another point of view, the internal evaluation by senior financial officials within the same company.

## CONCLUSION

The lack of implementing ERP motivates this study to clarify the benefits behind adopting ERP by the pharmaceutical companies in Yemen. Information technology in healthcare sector provides effective delivery and control over the information for decisions makers. In healthcare, information technology is emerging i.e. the introduction of decision support system, access to the clinical knowledge for outpatient and inpatient support to the healthcare professionals (Asad Ilyas, 2014). The use of modern information technology produces opportunities for clinical error reduction, increase care efficiency, improvement in patient care quality and healthcare professional support (Seethamraju, 2015). As the welfare of people is on priority there has been a need of management of large-scale patient information so the "Enterprise Resource Planning System" has been employed as a solution to this problem. Originally the ERPs were developed for manufacturing industries for the complex manufacturing data and "supply chain management". Information technology has certain hazards associated with it in health care (Morris, 2011).

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