

# Cost Information Exchange With Other Supply Chain Firms

## The Case Of Egypt

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**Abstract**— While exchanging cost information in supply chain (SC) context has been received as a crucial process supporting SC partnership and collaboration, a firm may avoid exchanging cost information with other SC parties or outside its boundaries fearing from an opportunistic use of this information from the other parties seeking their self-interest. The research had analyzed the effect of three factors affecting firm's willingness to exchange cost information with other SC parties; trust power, and the type of cost accounting system applied in the firm. And the effect of cost information exchange upon the efficiency and productivity of the firm's cost system and the whole SC. The research results based upon a survey study conducted in three sectors of pharmaceutical industry (governmental, private, and multi-national) along with applied study in two leading multi-national firms, The sample size of the survey was 140 with a response rate of 79.29%.The results of the research showed that there is a partial rather than full exchange of cost information in the society surveyed and that it would be difficult to exchange cost information even with threatening sanctions against opportunistic behavior without the existence of mutual trust.

**Keywords**- Exchanging cost information; trust; power; cost accounting system productivity and efficiency; SC productivity; efficiency.

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### I. INTRODUCTION

A great problem facing SCM specially in developing countries is that firms' managers actually view SCM as simply a purchasing function emphasizing on buying and selling functions they does not realize that SCM is a crucial process as the competition nowadays is no longer between companies as between SCs. Exchanging information is a key factor supporting a successful implementation of SCM and without which it is difficult to gain the benefits of SC coordination and collaboration and actually firms are fearing from exchanging cost information more specifically than other types of information as they consider it as the secret kitchen of their business, consequently researches are focusing on studying factors affecting firms' willingness to exchange cost information and the benefit of such exchange on the SC and individual SC firms.

This research had used a survey study on three sectors of pharmaceutical industry (governmental, private, and multinational) along with an applied study in a two leading multinational firms in cement and pharmaceutical industries to study the effect of SC relational factors like trust, structural factors like power distribution between SC parties and technological factors like the application of advanced versus traditional cost management techniques upon a firm's willingness to exchange cost information with other SC parties

also the research had studied the effect of exchanging cost information on the efficiency and productivity of firm's cost system and the efficiency and productivity of the whole SC and the research also had differentiated between the results of the three sectors.

### II. BACKGROUND

Over the last decades firms have turned to collaboration with other SC parties due to cost pressure focusing on their core competences which led to increasing the outsourced activities and replacing the intra-organizational relationships with the inter-organizational relationships IOR s [1], [2] had defined SC as a network of firms, activities, organizations, and technologies that performs the functions of procurement of material from vendor firms, transformation of this material into intermediate and finished products and the distribution of these finished products to customers [2]. A SC consists of the series of activities and organizations that materials move through on their journey from initial suppliers to final customers [3] have defined SC as a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from a source to a customer. Really it is not necessary for a SC to consist of three or more entities because one firm could perform more than one function of the main three SC functions that are procurement of materials, transformation of these

materials into intermediate and finished products, and the distribution of these finished products to customers.

ModernSC s seems to be more vulnerable than ever. Over the last decade, almost all industries have seen increased competitive pressure in the business environment and the globalization of markets. These changes have compelled firms to make their intra-firm business processes and inter-firm SC s either more efficient or more responsive [4].

In [3] Mentzer had identified SCM activities as;

1. Integrated Behavior
2. Mutually Sharing Information
3. Mutually Sharing Risks and Rewards
4. Cooperation
5. The Same Goal and the Same Focus on Serving Customers
6. Integration of Processes
7. Partners to Build and Maintain Long-Term Relationships.

SCM involves integration, co-ordination and collaboration between SC firms and throughout the SC that SCM requires internal (intra-organizational) and external (inter-organizational) integration.

In [5] Kulmala had indicated to three requirements for effective and efficient cost management in networks, the first; organizing the cost accounting of member firms to produce relevant, accurate and useful information, the second; network firms should share at least part or all of their cost information with their customers\suppliers so that consecutive firms in SC could cooperate to meet their mutual objectives, third; network firms should open their cost information multilaterally at least in situations of mutual benefits [5].

### III. INTER-ORGANIZATIONAL COST MANAGEMENT (IOCM)

IOCM refers to a set of activities, processes, or techniques that managers can use to manage costs that span organizational boundaries [6]. Some of the techniques associated with IOCM would be easily recognized as an inter-organizational application of traditional internal cost management practices like budgeting and performance, investment appraisal, target costing, and open book accounting, while other techniques may not be related to conventional management accounting [7]. The outcomes associated with IOCM techniques transcend the transactional cost benefits that are generally provided by SC integration by adding strategic advantages, which includes identifying ways of reducing costs and increasing revenues through activities such as joint product development and joint inter-organizational cost investigations [6]. However, all of the IOCM techniques are similar in that they are cooperative activities that have a common goal to create value for both partner firms through modification of inter-organizational cost structures.

Tomkins in [8] argued that the area of IOCM warrants more empirical research with greater emphasis on business processes

and the use of accounting information in negotiation and he calls for an increased focus on the management of inter-firm relationships. And he argued also that there seems to be no emerging need to develop new accounting techniques rather there is the need for cross-organizational design of management accounting systems. According to [8], inter-organizational accounting practices associated with intensive and long-term relationships include open-book accounting, target costing, inter-organizational cost management, value-chain accounting, integrated information systems, total cost of ownership, non-financial measurement, and informal control mechanisms.

Much of prior researches have focused on four kinds of information that are commonly shared in a SC of a single product (1) order information; (2) demand information; (3) inventory information and (4) shipment information [9], but SC firms could share more private organizational information about other activities occurring in individual SC firms, only in demand not supply side,[10]. Actually SC structure and demand pattern affects the type of information sharing models to be used in each SC. In this research the focus will be on cost information sharing between SC members and the plausibility of an effective model for exchanging cost information and its effect upon the stability and cooperation of the firm with the other SC parties.

Inter-organizational cost information exchange usually lies between two broad extremes one of them is no information exchange and the other is Open book accounting (OBA). That could be no information exchange at all, partial information exchange with different levels, or full information exchange (OBA).

#### 1. Open Book Accounting (OBA)

OBA as explained in [11] is a general description of a situation in which accounting has recourse to information which is not available in one's own enterprise and is thus not available in the normal course of events. OBA is cost management in which firms reveal part or all of their cost accounting system or cost information to business partners [12].

OBA can be used as an instrument for optimizing inter-firm costs; it also can serve simultaneously as a commitment device by revealing private cost information [13]. [14] argued that an open books policy is not a cost management technique in itself. Rather, sharing information by opening the books is often done within the frame of formal cost management techniques to support cost management decision making in different ways but also not all firms applying OBA are using formal cost management techniques. [14].

#### 2. Willingness to exchange cost information

Kulmala in [5] argued that cost information transfer and utilization in an inter-organizational context depends on four factors that are, the balance of power between partners, trust between partners, the volume of firms' mutual business, and the state of suppliers' cost accounting [5].

Some researches in the literature have suggested that a relationship of trust should exist between SC members for an

exchange to take place [6, 8], while other researchers have suggested that an exchange could exist without the prevalence of trust [11] Hoffman A., had suggested that with an asymmetrical distribution of power an exchange of cost information can be achieved even without the prevalence of trust through creating incentives for fair cooperation and through using threatening sanctions in the event of opportunistic behaviors.

There is no one general exchange theory which comprises all aspects of exchange relations that the theoretical concept has a vast number of theoretical origins [15] but there are general factors that are negotiated repeatedly and many researches had tested its effect empirically. Piontkowski in [15] had analyzed the factors that were discussed in the literature as affecting SC parties' willingness to exchange cost information and the interconnection between these factors.

### 2.1 Trust

Trust is informal social control mechanisms that are usually negotiated in connection with information exchange and OBA in inter-firm relations [16, 1]. Trust has been frequently mentioned as a prerequisite for the implementation of IOCM and OBA [17, 18, 19, and 20]. The concept of trust has been defined in a variety of ways, but frequently refers to an expectation, based on experience and repeated interaction, that a partner will not behave opportunistically [6]. All relationships depend upon some extent of trust, trusting in a partner enables the other partners to act as if the uncertainty that they face is reduced, while actually it is not reduced. [6]. [21] suggested that trust requires close cooperation between the parties to exist. [22] argued that when trust exists in a transactional relation the parties will make a lower estimation of the risk connected with providing incorrect or incomplete information.

Tomkins in [8] defines trust as "The adoption of a belief by one party in a relationship that the other party will not act against his or her interests, where this belief is held without undue doubt or suspicion and in the absence of detailed information about the actions of that other party".

The most commonly accepted classification of trust is the classification of trust as contractual, competence, and goodwill trust proposed by Sako 1992 [21, 15]. Contractual trust is an expectation that the other SC parties will be committed to the agreement and rules proposed in the inter-firm contract, competence trust is expectation that the other SC parties possess the required technical and intellectual know-how necessary to run business, while goodwill trust is a long term open commitment between the allied parties.

Kulmala argues that the literature of OBA contains contradictory statements on the role of trust [18]. Piontkowski [15] argues that the relationship between the disclosure of cost information and the emergence of trust bears significant ambiguity, whether trust between the collaborating companies is a prerequisite for the disclosure of cost information or OBA can be looked at as an instrument to foster trust [15]. However some researchers had suggested that mutual trust is a requirement for the exchange of sensitive information such as cost data such as [20, 12, 6, and 11] had argued that the

exchange of cost information is also possible without the prevalence of trust with an asymmetrical distribution of power [11].

Tomkins in [8] had differentiated between two types of information in inter-organizational context the first type is information that is related to the willingness to build trust that it is the information exchanged to create trust while the other type is information that serve the actual objective of the inter-firm cooperation or the information that is needed for managing the main SC transactions and activities, Although the first information types is directly affecting the level of trust, the second information type also affects the level of trust by asserting the trust level developed by the first information type or decreasing it, and he found an inverse U-shaped function between the two types of information with respect to the level of the relationship maturity that a high level of information is needed at the beginning of the relationship to build trust than the level of information needed will decrease, and at the maturity point the level of information needed will increase again to sustain trust [8]. Cooper in [6] argued that the level and nature of trust differs depending on the relational contexts. They had concluded that the variation in the level of calculative trust can be viewed as the result of the interaction between mutual benefit and mutual interdependence.

In IORs, high levels of trust reduce the cost of governance (including coordination and monitoring costs), increase relationship investments in specific assets, increase the scope of inter-organizational activities, and increase effectiveness of the performance of the partners [21, 17].

[23] argued that accounting can serve both control practices and trust building while control and trust building rules of accounting practices are not just substitution or adding for each other, but they interact for the establishing and maintaining positive behavioral expectations of other parties. In order to achieve a positive expectations regarding future behavior, control must be exercised and trust must be built that accounting can serve both control practices and trust building together. The control practices usually are forms of instrumental accountability. They may include performance measurement systems, target costing, cost management systems and financial incentive systems. Control practices are needed to maintain commitment and long term alignment in an IOR.

### 2.2 Power

There are two determinants of power discussed in psychology; individualistic and relational notions of power, individualistic notions of power focus on either a person's motivation to acquire power or a person's individual characteristics like charisma, self-confidence and flexibility, which increase the possibility of attaining power, While the relational theories of power analyze the relative influence one party has over another [24].

In a SC context, power refers to the control by a company over the resources that a SC partner needs [25], Many studies have used the concept of the availability of alternatives (options of alternative buyers or suppliers) to refer to the concept of relative power [26, 24].

Social exchange theory examines power from the perspective of both parties; consequently it could be considered the most suitable theory for analyzing the factor of power in negotiation [24]. Power drives from a variety of power bases which is caused by difference in mutual dependence of individuals that allow power difference to exist [1, 26]. In inter-firm relation, the power a firm can exert does not depend only on its buying power or on its size, but also on the extent to which it is dependent on the exchange relation compared to how dependent the other SC partners on the working relationship based on that many researches discussing the role of power in IOR used the concept of relative power [1, 26].

[1] experimentally analyzed the effect of relative power in a buyer-supplier cost management environment. The author found that, to a certain extent, the availability and provision of detailed and comprehensive total cost of ownership cost information can alleviate a power disadvantage of firms when faced with a more powerful buyer [1].

The concept of relative bargaining power has an important role in theoretical analysis of strategic IORs because power can potentially influence firm's negotiation outcomes and consequently firm's performance [1, 26, 27, 24]. Also some researchers have studied the role of power on exchanging cost information including [11, 15].

In [13] argued that the existence of power asymmetry (unequal power distribution between SC parties) may negatively influence the propensity of both partners to use OBA. As the less powerful partners may fear exploitation, while more powerful partners may have no reason to cooperate with a less powerful partner [13].

#### IV. LITERATURE REVIEW

##### 1. *IORs variables and IORs performance, Clifford, p. G.,(2000) [30]*

The researcher conducted a survey based field study in a mature, relatively low technology SCs in the automotive industries to find to what extent does the form or structure of IOR and IOR process related variables affect the performance of IOR, and explain the differences between successful and less successful inter-firm relationships, based on TCE and the resources based approach he had developed a model to test the impact of specific IOR structure variables (involvement, power symmetry, and malleability), malleability refers to IOR flexibility, and IOR process variables (information integration and trust) on the performance of a set of close inter-firm relationship and had used measures of inter-firm related effectiveness (e.g. learning, capability building, reputation enhancement), and inter-firm related efficiency measures (e.g. cost reduction, productivity improvement) to assess IOR performance.

And he has found that first, structural and process variables both affect IOR performance. second, structural aspects of close inter-firm relationships have a stronger effects on relationship related efficiency and effectiveness than IOR processes of information integration and trust, more specifically participants' levels of involvement and relationship's symmetry. Third, information integration

processes has found to have greater effect in achieving IOR performance objectives than trust processes. Finally, initial IOR structural conditions have a powerful impact on the types and levels of processes that emerge in close inter-firm relationships.

The study did not develop a priori theory driven hypotheses for the relationship between structural and process variables, also the research had a small sample size that may affect results' generalizations, and the model were not wholly stable to test the involving control variables.

##### 2. *The application of IOCM, Chivaka R. 2005 [28]*

[28] conducted multiple case studies on three retailers dominates 80% of the South African retail market to analyze the application of strategic cost management along a product's SC in the developing country of South Africa, He found that

1. Budgetary control and variance analysis are the common intra-company cost management tools in all the studied SC s

2. Target costing and continuous improvement are the most common inter-company cost management tools applied in all three SC s

Contrary to the expectations of management accounting literature that suggests the use of advanced management accounting tools such as ABC, JIT, TQM and life cycle costing he found the members of this SC s had implemented cost management through tools whose characteristics mimic those of the advanced management accounting tools or at least some aspects of them.

It was an exploratory study which needs other studies to increase the extent to which findings can be generalized. Also the researcher had analyzed only cost management along coordinated SC s but did not handle the exchange of cost information along SC in case of non-coordination.

He also found a link between the widespread use of cost management practices and the stage of development of these SC s as such, the application of inter-company cost management tools across company boundaries may not be easily achievable during the early stages of SC development. He explained that SC partners are reconfiguring their inter-organizational settings through the deployment of collaborative practices, thereby creating a climate in which the adoption and application of most of the IOCM tools can flourish.

##### 3. *Cooper R. and Slagmulder R., (2004) [6]*

Cooper in [6] conducted an exploratory field study to examine the IOCM practices during product design of SC s. They have examined the IOCM practices of seven Japanese manufacturing companies, belonging to three different SC s relying upon open-ended interviews with managers, design and manufacturing engineers, and blue-collar workers at the seven firms in the sample and the interviews focused primarily on their IOCM practices during product design of SC s.

They have observed three IOCM techniques. The first technique, functionality-price-quality (FPQ) tradeoffs which helped to resolve relatively minor cost overrun problems and

involved only modest specification changes. The second technique, inter-organizational cost investigations, was applied when FPQ trade-offs were unable to produce the desired level of cost reductions and involved more significant changes both to the design of the outsourced item and occasionally to the specifications of the end product. The final IOCM technique was concurrent cost management, which had addressed cost problems that demanded the most significant cost reduction levels of all three techniques and led to fundamental changes in both the buyer's product and the outsourced components.

According to the sample selected they have identified three distinct clusters of IOCM, each of which was associated with a different hybrid relational context. The first cluster contained firms that could undertake all three of the observed IOCM techniques (FPQ tradeoffs, inter-organizational cost investigations, and concurrent cost management); this cluster was associated with the relational context of family member, which provided the richest support for interactions between buyer and supplier. The second cluster contained firms that could undertake only two of the IOCM techniques (FPQ trade-offs and inter-organizational cost investigations); it was associated with the relational context of major supplier, which could support an intermediate level of interaction between the design teams at the buyer and supplier firms. Finally, the third cluster consisted of firms that could only undertake FPQ tradeoffs and was associated with the relational context subcontractor, which only supported low levels of buyer-supplier interactions.

Field research suffers from two main problems; biased observations and a lack of external validity highlights the following three major sources of bias. First, the researcher's selective perception and interpretation of events may influence the data collection and/or analysis stage. Second, the interviewees' reports may be biased, due to natural human tendencies and limitations finally, because the researcher is on site only for a limited period of time, abnormal instances of the studied phenomenon might be mistakenly treated as if they were normal conditions. The second criticism of field research relates to the risks associated with generalizing case study findings in other settings that one cannot draw generally valid inferences from observations at a small sample of companies.

#### 4. Agndal H., Nilsson U., (2009) [ 29]

They have conducted three case studies following an exploratory approach to investigate the use of management accounting and IOCM techniques in regard to activities in the exchange processes between organizations. they have classified IOCM techniques into three types: (1) target costing (TC), (2) trade-off techniques and continuous improvement Including QFP trade-off, Inter-organizational cost investigations and concurrent engineering, Value Engineering (VE) and Value Analysis (VA), also "kaizen" or "continuous improvements", and Minimum Cost Investigations (MCI s), and (3) philosophies and techniques related to suppliers' costs including cost tables or cost analysis, and open book accounting (OBA).

And they had concluded that:

(1) IOCM practices appear to vary according to different types of components, relationship characteristics, type of transaction, and the different activities in the exchange process.

(2) The activities perceived as offering the greatest opportunities for cost savings justify the deepest collaboration on IOCM issues and the greatest joint use of supplier's management cost data by using various IOCM techniques especially in earlier stages of the exchange process.

(3) IOCM is not something that is only implemented by the buyer for the buyer's benefit. Rather, suppliers play important and active roles in IOCM. Management accounting of the supplier can clearly support joint work around IOCM and sharing cost data by using various IOCM techniques benefits sellers as well as buyers. And that there is no automatic connection between the degree of cooperation around IOCM and the extent to which suppliers' managerial accounting is used.

Also, They have argued that applying target costing can be more problematic than implied by the literature especially in the case of selecting suppliers for complex components that require a great deal of R&D when attempting to apply the "pure" target costing logic, since neither party can specify the component in detail at this stage.

Research limitations, as other case study based researches the result of this study cannot draw general conclusions. Additionally, the findings of the research unlikely to be valid regarding IOCM practices in less mature relationships or practices in relationships where IOCM has more recently been introduced. Also this study has focused on relationships as they are relevant for particular projects.

#### 5. Fayard D., et al. (2006) [7]

They had used path analysis to study the effect of internal cost management, electronic integration, and absorptive capacity on IOCM. They focus on the IOCM practices of target costing, kaizen costing, open book accounting, and information sharing. The components of absorptive capacity in their study were the relevant knowledge, the communications network, and the communications climate, which included trust. They used electronic integration to refer to the degree that a firm's information technology (IT) systems are integrated and accessible both internally and externally. Internal cost management was used to refer to the cost system used to analyze costs and manage organizational resources. Their model is tested using a sample of managerial accountants who work for organizations that are part of the SC.

They had concluded that electronic systems integration, absorptive capacity, and internal cost management all play a role in determining IOCM practices in a firm, which in turn results in firm's benefits. They found that the level of internal cost management may impact an organization's involvement in IOCM as moderated by the level of dependency between a firm and its partner SC firms and the extent of the electronic integration between the firms. They focused on the importance of employing cost management practices both within the organization and beyond the boundaries of the organization that the benefits of IOCM range from operational cost-saving

strategies to strategic benefits like new business opportunities and increased levels of product and service innovation.

The primary limitations of this research are the small sample size and low response rate, another limitation is that they had collected data about a SC partnership from only one of the partners.

#### 6. *The propensity to share cost information and to engage in IOCM*

1- Hoffjan A., et al. 2009 [11]

The researchers had developed a model within a dynamic strategic game to analyze whether the exchange of cost information is possible, in a two-stage SC, even without the existence of trust between SC' parties, Also they had tested the effect of asymmetric and symmetric power distribution on the incentive to share cost information.

They had concluded that the exchange of cost information is possible in the case of an asymmetrical and equal distribution of power without the prevalence of trust. However, with a balance of power, no sensitive data will be exchanged if opportunistic behavior cannot be avoided, They argued that a complete and reciprocal exchange of cost information is more likely in the case of an asymmetrical distribution of power, than with a balance of power between the partners, That with an asymmetrical distribution of power, an exchange of cost information can be achieved by threatening sanctions in the event of opportunistic behavior as well as by creating incentives for fair cooperation. The more powerful SC partner can threaten to break off the contractual relationship, to the extent that the required cost data is not made available and by creating additional positive incentives for information exchange However in contrast to the case of symmetrical power, a unilateral exchange of sensitive information can also occur, if the more powerful SC partner is allowed to perform an opportunistic behavior by not providing information or by providing an incorrect or misleading information. However, the desired fair behavior can be brought about by extending the decision-making horizon by payments in future periods, as well as by the exchange of securities in the form of specific investments.

In general game theory approach suffers from the oversimplification of reality and excessively restrictive assumption of rational behavior in addition to the special model assumptions.

Also the premises of the tit-for-tat strategy which was applied to the dynamic solution strategy and to a once-off determination of an action, limit the power of the research results and whether the results obtained also would remain stable with other environmental conditions.

2- Piontkowski 2008 [15]

He had conducted an experimental research in a controlled environment that he had extended to include behavioral factors influencing the institutionalization of a collaborative cost information exchange.

He found a positive cause and effect relationship exists between the offer of specific asset investment and the

willingness to exchange private cost information in a non-asymmetric (or symmetric) power position. In power asymmetry the direction of specific asset offering affects the willingness to exchange cost information that when the more powerful partner offer specific asset to the less powerful partner the fear of opportunism and accordingly the willingness to exchange to exchange cost information will not be affected, while when the less powerful partner offer specific asset to the more powerful partner the more powerful partner willingness to exchange cost information will be reduced as the more powerful partner perceives the proposal of specific asset as an attempt to affect the power

Also he found a positive relationship between the initially offered cost information quantity and the willingness to exchange cost information under equal power situation. He also found the positive relationship between the offer of specific relation specific asset investment and the willingness to exchange cost information exists only when there is a small quantity of initially offered cost information but when there is a large initially offered cost information the offer of relation specific asset does not positively affect the willingness to exchange cost information. The results of this research are consistent with the results which propose that IOCM depends upon the balance of power between SC parties.

Experimental studies usually suffer from a lack of external validity and consequently insufficient generalization and it can be viewed as a simplification of reality as experimental set-ups can never provide an environment as complex as real world also he had used a one move experiment which neglects the possible effects resulting from multiple steps of interaction.

#### 7. *Open Book Accounting (OBA)*

1-Piontkowski J. O., Hoffjan A., (2009) [13]

They had conducted an experimental study to examine how the quantity of cost information disclosed and the offering of a joint specific investment influence the willingness of a buyer and supplier to engage in open book cost data exchange.

They concluded that when a large quantity of cost information is offered initially, participants reciprocate and reveal more cost information themselves, consistent with a tit-for-tat strategy. They also showed that information quantity and the offering of a joint specific investment exhibit substitutive effects rather than additive effects on the willingness to engage in open book cost data exchange. For example, when a small amount of cost information is disclosed, the offering of a joint specific investment increases the willingness of the partner to engage in cost data exchange. However, consistent with the theory of reactance, a large quantity of cost information coupled with the offer of a joint specific investment does not result in a greater willingness than when a large quantity of information is offered alone.

They found that the initially offered information quantity does not influence the buyer's willingness. However, when a partner firm initially revealed a large amount of cost information, the target firm perceived the initiating partner to be significantly more willing to engage earnestly in further cost information exchange. Whereas an extensive initial offer of cost information did not influence the buyer's willingness, it

did lead to an increased amount of reciprocated cost information.

The generalization is always a major concern in experimental research. In general, experiments cannot provide an environment that is as complex as the real world. Moreover, because the sample consisted partially of undergraduate students, the question arises as to whether the behavior patterns found in this research can be applied to real firm interactions. And the experiment applied neglected the effect of power asymmetry on SC parties' willingness to apply OBA.

2-Agndal H., Nilsson U. (2008) [14]

They had conducted a case study in the automotive industry to examine how OBA policy among SC partners support SC decision-making in different stages of a SC.

They argued that an open books policy can be used books is not a cost management technique in itself rather, sharing information by opening the books is often done within the frame of formal cost management techniques to support cost management decision making in three development stages of a SC (the supplier selection stage, the pre-production stage, the full-speed production stage). They focused on four formal cost management techniques

- Concurrent engineering (CE),
- Inter-organizational cost investigations (IOCI) and
- Quality–function–price trade-off (QFP)
- Kaizen,

Also they argued that OBA can be used informally in all three stages of the exchange process.

They found that open books plays the greatest role in the pre-production stage, although they found to OBA support decision-making relating to supplier selection and decision-making during full-speed production to a greater extent than was recognized in the literature. And, they argued that an open books policy is not necessarily implemented by the supplier something it is implemented by the buyer solely for the buyer's benefit. They have found open books to take place in a collaborative environment where it is recognized to have beneficial effects for both parties. Even if it occurs at the initiative of the buyer, cost transparency can clearly help the seller when contracts become unprofitable and must be renegotiated due to cost increases.

The findings was based on a single case study that general conclusions cannot be realized especially for the connection between cost management techniques and decision- making processes, which remains highly contextual. Also they have not identified all SC decision-making processes that may be supported by open books, or all relevant or possible cost management techniques used to that end.

V. RESEARCH HYPOTHESES

H1-The exchange of cost information (between the firm and other SC parties) increases the efficiency and productivity of firm's cost accounting or cost management system.

H2-There is a positive relationship between cost information exchange and SC efficiency and productivity.

H3-Power distribution between SC parties affects their willingness to exchange cost information.

H4-There is a positive relationship between the existence of trust between SC parties and the exchange of cost information.

H5-SC partners are willing to exchange cost information if there are threatening sanctions against any prospective opportunistic behavior and if the SC parties are confident about the benefits of such exchange even without the existence of mutual trust.

H6-The exchange of cost information is affected by the type of cost accounting or management system applied by individual SC firms and the similarities between such systems.

VI. THERESEARCH MODEL

The main component of the model

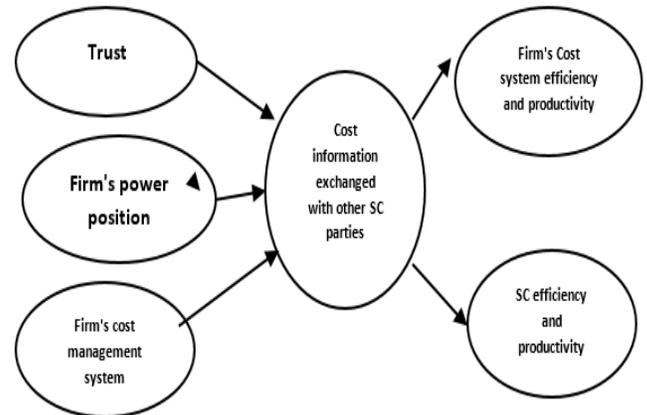


Figure 1. Main component of the model

The research model can be classified into two parts;

The first is measuring the effect of trust, firm's power position, firm's cost management system on firm's willingness to exchange cost information with other SC parties so for the first part of the model

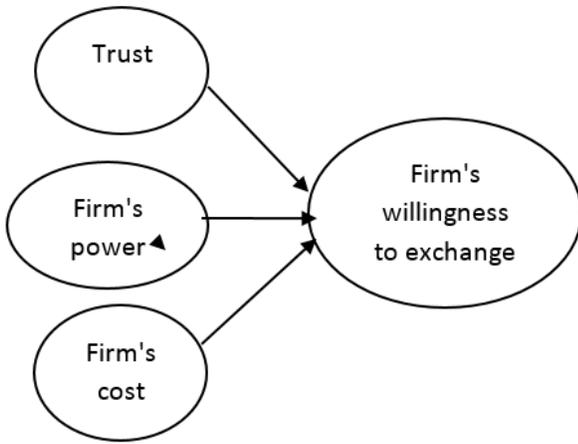


Figure 2. The effect of trust.

The independent variable are

- 1- Trust
- 2- Firm's power position
- 3- Firm's cost management system

The dependent variable is firm's willingness to exchange cost information with other SC parties

The second part is measuring the effect of exchanging cost information with other SC parties on the efficiency and productivity of the firm's cost management system and the efficiency and productivity of the whole SC accordingly for the second part of the model.

The independent variable cost information exchanged with other SC parties.

The dependent variable firm's cost system efficiency and productivity, and SC efficiency and productivity.

### 1. Research independent and dependent variables

Trust: trust is used to refer to whether there is a trusty relationship existing between the firm and other SC parties. Three conditions are used in the analysis and survey questions

- No trust
- Partial trust
- Complete and mutual trust

The research tests whether the existence of complete mutual trust is a condition for exchanging cost information with other SC parties or a firm could exchange cost information with other SC parties if there are threatening sanctions against any prospective opportunistic behavior and if the SC parties are confident about the benefits of such exchange.

Trust measured the type of partnership existing between the firm and its SC parties and the number of years the firm has been in business with its current SC parties.

Power position: power position is used to refer to the distribution of power between the firm and other SC parties, there are three power conditions used in the research

- The firm is in a weaker power position than other SC parties
- The firm is in an equal power position with other SC parties
- The firm is in a stronger power position than other SC parties

Power distribution is measured by the size of financial investment of the firm in relation to the size of financial investment of other SC parties and also by the number of alternative SC parties that the firm has for the current parties, if the firm has no alternatives then it is depending on its current SC parties and it has a weak negotiation power while if it has a list of alternative parties then it is in a stronger position.

The research tests whether the symmetry of power between SC parties encourage them to exchange private cost information between each other or there could be an information exchange even with an asymmetric power distribution between SC parties.

Cost management system; cost management system is used to refer to the type of cost accounting or cost management technique applied by the firm. There are three conditions for cost management system applied by firm

- Traditional cost management technique
- Traditional and advanced cost management techniques
- Advanced cost management technique

The firm could be applying more than one of the traditional and advanced cost accounting and management techniques, all of them could be traditional or advanced, or some advanced with other traditional techniques. The research tests whether the application of advanced cost accounting techniques affects the firm's willingness to exchange cost information with other SC parties.

The researcher tests whether the application of similar cost accounting techniques by all of SC parties would affect their willingness to exchange cost information positively or dissimilarity of cost accounting techniques applied by SC parties would affect their willingness to exchange cost information negatively.

### 2. Exchanging cost information with other SC parties

This variable is a dependent variable in the first model while testing the effect of trust, power, and cost management system on it and independent variable in the second model while testing its effect on the efficiency and productivity of both the firm's cost system and the SC.

There are six alternatives for exchanging cost information with other SC parties used in the research

- No exchange

- Order information; demand information; inventory information; and shipment information
- operating information
- Profitability information
- Total cost of ownership (TCO)
- Open Book Accounting (OBA)

Research hypotheses shall be evaluated through survey study applied on pharmaceutical industry using SPSS program for statistical representation of the data collected and an applied study in two leading multi-national firms in pharmaceutical and cement industries.

Pharmaceutical production is one of the leading production industries in Egypt and had grown obviously in the last few years also it faces a great internal competitions and external threats making it one of the important industries also the superiority and significancy of the product provided by this industry added to its importance.

The researchers had taken a random sample of 20 factory (11 from private, 5 from governmental and 4 from multinational sector) in pharmaceutical industry 14 of them had accepted to cooperate with the researcher and to answer her questions and the questions of the survey while the other 6 (4 from private, 1 from governmental and 1 from multinational sector) had apologized because the employees was busy at that period of time or the policy of the firm does not allow to distribute surveys to employees in general without even looking to the component of the survey. Accordingly the researcher had entered, interviewed the managers, and surveyed 14 firms (7 from private, 4 from governmental and 3 from multinational sector), the researcher distributed 10 surveys in each the 14 factory so the total number of distributed surveys was 140 and collected 111 answered surveys with a response rate of 79.29%.

The researchers had visited the factory of each firm, interviewed the head of cost department to understand the cost system applied their and to explain each question in the survey and also interviewed a SC manager in each firm to understand the nature of the relationship between the firm and other SC partners, to understand the type of information exchanged with other SC partners and also to make sure that each question is understood. Then the researcher distributed 10 surveys in each firm 5 to be answered by employees in cost department and the other 5 to be answered by SC management department.

From the 70 survey distributed in the private sector 57 survey where answered with a response rate of 81.43%, From the 40 survey distributed in the governmental sector 29 survey where answered with a response rate of 72.5%, From the 30 survey distributed in the multinational sector 25 survey where answered with a response rate of 83.33%.

TABLE I. SECTOR'S DISTRIBUTION PERCENTAGE:

Sector	Frequency	Percentage
Private	70	50%
Governmental	40	28.6%
Multi- national	30	21.4%
Total	140	100.0

TABLE II. SECTORS' RESPONSE RATES:

Sector	Distributed surveys	Answered surveys	Response rate
Private	70	57	51.4%
Governmental	40	29	26.1%
Multi- national	30	25	22.5%
Total	140	111	79.29%

The relationship between trust, power, cost accounting system, cost information exchange, cost accounting system efficiency and productivity, and SC efficiency and productivity.

VII. DISCUSSION AND RESULTS

The researcher found that there is no full exchange of cost data between SC parties, that there is no application of OBA strategy in pharmaceutical industry in Egypt and accordingly there is no application of IOCM. Managers of cost department and SCM managers have explained that conclusion by mentioning that it is difficult to apply systems like OBA and IOCM specifically in pharmaceutical industry because each manufacturer depends upon a long list of suppliers of raw materials, not only one or two supplying alternatives, that list of suppliers also deals with competitor manufacturers also there is more than one distribution alternative for the manufacturing firm and most of IOR s between SC parties are done in an arm length contracts seeking each firm self-interest that makes the fear of opportunistic behavior from other SC partners the main obstacle of applying OBA and IOCM. They consider information as their main success factor and information spread would strongly affect the firm competitive advantage among its competitors. Also in Egypt as a developing country it is difficult to have a culture of mutual trust and applying a system that would increase the value of the whole SC with guaranties of commitment and threatening sanctions against opportunistic behaviors of any of the parties.

TABLE I. THE DIFFERENT EFFECTS OF DIFF-ELEMENTS

			Cost information exchange	SC efficiency and productivity	Cost accounting System efficiency and productivity	Trust	Cost accounting system	Power
Spearman's ratio	Cost information exchange	Correlation Coefficient	1.000	.268	.325	.371	.350	.207
		Sig. (2-tailed)		.004	.000	.000	.000	.029
		N	111	111	111	111	111	111
	SC efficiency and productivity	Correlation Coefficient	.268	1.000	.481	.162	.287	.145
		Sig. (2-tailed)	.004		.000	.090	.002	.129
		N	111	111	111	111	111	111
	Cost accounting System efficiency and productivity	Correlation Coefficient	.325	.481	1.000	.079	.085	.160
		Sig. (2-tailed)	.000	.000		.412	.378	.093
		N	111	111	111	111	111	111
	Trust	Correlation Coefficient	.371	.162	.079	1.000	.135	.111
		Sig. (2-tailed)	.000	.090	.412		.159	.248
		N	111	111	111	111	111	111
Cost accounting system	Correlation Coefficient	.350	.287	.085	.135	1.000	.157	
	Sig. (2-tailed)	.000	.002	.378	.159		.099	
	N	111	111	111	111	111	111	
Power	Correlation Coefficient	.207	.145	.160	.111	.157	1.000	
	Sig. (2-tailed)	.029	.129	.093	.248	.099		
	N	111	111	111	111	111	111	

Fear of future opportunistic behavior from other SC partners was the first ordered obstacle of exchanging cost information with other SC parties followed by parties' belief that the benefit expected from such exchange would not cover the cost of doing it then the existence of previous opportunistic behavior or bad intents from other SC partners lastly the use of different cost accounting or cost management techniques in each individual firm of the SC.

Fear of wrong or misleading information from the other SC parties was the main obstacle of implementing IOCM followed by the fear of future opportunistic behavior, or the existence of bad intents or previous opportunistic behavior from other SC partners then parties' belief that the cost of applying IOCM would exceed the benefits expected from

such system then the use of different cost accounting or cost management techniques in individual SC firms.

A partial exchange of cost information exists, Order information, demand information, inventory information, and shipment information was found as being the dominant types of information exchanged between SC parties according to the sample examined while 72% of the respondents also exchange operating and profitability information and 19% of the respondents exchange total cost of ownership information.

The research also studies the factors affecting the willingness to exchange cost information with other SC parties including trust between SC parties, power distribution between SC parties and the application of traditional versus

advanced cost accounting systems and the similarity between the systems applied in SC individual firms.

There is a significant positive relationship between the existence of mutual trust between SC parties and parties' willingness to exchange cost information and according to the sample tested it is difficult to exchange private cost information without the existence of mutual trust even with the existence of threatening sanctions against any prospective opportunistic behavior, like specific asset investment, and even if the SC parties are confident about the benefits of such exchange.

There is a significant relationship between power distribution between SC parties and their willingness to exchange cost information. Symmetric power distribution between SC parties would encourage them to exchange cost information while asymmetric distribution of power would restrain them from exchanging private cost information that firm of weaker power position would fear to exchange cost information with the stronger partner because it cannot exert forces to prevent the stronger partner from misusing of such information for their own interest while the strong partner would not be willing to exchange its key information with a less stronger party believing that such exchange would not be worthy.

There is a positive relationship between the application of advanced cost accounting techniques and parties' willingness to exchange cost information also the application of similar cost accounting techniques by individual SC firms would facilitate cost information exchange and the application of OBA and IOCM and the application of different cost accounting or management techniques would negatively affect parties' willingness to exchange cost information

There is a positive significant relationship between cost information exchange and the efficiency and productivity of firm's cost accounting system, and the efficiency and productivity of the whole SC

With regard to the difference between the three sectors of pharmaceutical industry the governmental sector has the highest degree of trust between SC parties followed by the private sector while the multi-national sector has the weakest trusty relationship with other SC parties, the multi-national sector has the strongest power position with the other SC parties followed by the private sector then the governmental sector, and the multi-national sector is more close toward the application of advanced cost management techniques followed by the private sector then the governmental sector.

The governmental sector was the highest, followed by private sector then multi-national sector, on believing that;

- there would be a willingness to exchange cost information even without the existence of mutual trust if there are threatening sanctions against any prospective opportunistic behavior and if the SC parties are confident about the benefits of such exchange

- Power symmetry between SC parties would encourage them to exchange private cost information

- Applying different cost accounting or management techniques by individual SC firms negatively would affect their willingness to exchange cost information

- There is a positive relationship between applying advanced cost accounting and management techniques and SC parties' willingness to exchange cost information

#### VIII. LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

The research used a survey study to gain insight about the exchange of cost information and the factors affecting SC parties' willingness for such exchange in Egypt as a developing country while future research could apply a case study to analyze the research variables in more detail.

The survey study of the research focused on manufacturing companies in pharmaceutical industry, future research could apply a study on other upstream, downstream firms, or a complete SC.

It was not allowed for the researcher to have numerical information to measure the improvement in firm's cost system efficiency and productivity as a result of exchanging cost information with other SC parties and the researcher had covered such problem by interviewing cost and SCM managers at the firms included in the research sample and by including questions asking about the improvement in firm' cost system efficiency and productivity as a result of exchanging cost information with other SC parties in the survey delivered.

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