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Measuring Inter-organizational Cost Management and Open Book Accounting

(Mengukur Pengurusan Kos antara Organisasi dan Perakaunan Open Book)

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ABSTRACT

This paper reports the findings of a study aimed at developing valid measurement for inter-organizational cost management (IOCM) and open book accounting (OBA) constructs. The conceptualization of these measures were based on the prior literature in the context of supplier firms of Malaysian manufacturing sector. Using Structural Equation Modelling (SEM), measurement models of the constructs were tested and the scales were validated. The results indicated a satisfying model with acceptable reliability and validity. The findings of this study provide instruments that could be utilized as tools to assess the adoption of IOCM and OBA practices in buyer-supplier relationships. This paper extends the understanding on the concepts of IOCM and OBA practices through the introduction of a comprehensive scale covering wide dimensions of IOCM and OBA.

Keywords: Inter-organizational cost management; open book accounting; new scales; buyer-supplier relationships.

ABSTRAK

Makalah ini melaporkan hasil kajian yang bertujuan membangunkan pengukuran yang sah untuk Pengurusan kos antara organisasi (IOCM) dan Perakaunan 'open-book' (OBA). Konsep bagi ukuran berkenaan adalah berdasarkan kajian lepas dalam konteks firma pembekal sektor perkilangan di Malaysia. Model pengukuran konstruk telah diuji dan skala telah disahkan menggunakan Pemodelan Persamaan Berstruktur (SEM). Hasil kajian menunjukkan model yang dibangunkan adalah memuaskan dengan tahap kebolehpercayaan dan kesahan yang boleh diterima. Dapatan kajian ini menyediakan instrumen yang boleh digunakan sebagai alat untuk menilai penggunaan amalan IOCM dan OBA dalam hubungan pembeli-pembekal. Kajian ini memperpanjangkan kefahaman tentang konsep IOCM dan OBA melalui skala komprehensif yang diperkenalkan yang meliputi dimensi IOCM dan OBA yang luas.

Kata kunci: Pengurusan kos antara organisasi; perakaunan 'open-book'; ukuran baru; hubungan pembeli-pembekal.

INTRODUCTION

The dynamics of present-day business environment have led firms' to disintegrate their boundaries and engage in new inter-organizational forms such as supply chains, networks or inter-organizational relationships. These new organizational forms have raise concerns over the sufficiency of traditional cost accounting as increased collaboration between firms require additional information for the exchange between partners to succeed. As results of these activities, cost management practices have been improved resulting in a wide range of inter-organizational accounting practices.

Over the last two decades, the concepts of inter-organizational cost management (IOCM) and open book accounting (OBA) have received considerable attention in the literature of inter-organizational accounting practices. Building on the work of Cooper and Slagmulder (1999), Munday (1992) and Kajüter and Kulmala (2005), researchers have argued that these practices affect transaction and production costs in inter-organizational relationships and networks (e.g., Agndal & Nilsson 2009, 2010; Cooper & Slagmulder 2004; Kajiiter 2002; Kulmala, Paranko & Uusi-Rauva 2002). IOCM is viewed as an approach that coordinates supplier firms' activities in order to reduce total network costs (Cooper & Slagmulder 1999). As such, IOCM seeks to introduce lower-cost solutions through firms' collaboration activities instead of working independently. On the other hand, Caglio and Ditillo (2012) conceptualized OBA as the systematic exchange of management accounting information between independent business partners beyond corporate borders that would otherwise be kept secret.

Although a considerable number of empirical studies have investigated IOCM and OBA, valid measures that incorporates their various practices have not been effective (Fayard et al. 2012; Windolph & Möller 2012). Recent studies that develop new scales for IOCM and OBA may have contributed to misleading findings about the nature and the contributions of IOCM and OBA. While acknowledging the argument of prior research that IOCM and OBA are two different constructs (e.g., Möller, Windolph & Isbruch 2011; Windolph & Möller 2012), Fayard et al. (2012) study incorporated both IOCM and OBA as one construct.

Caglio and Ditillo (2012) developed a new instrument to measure OBA practice. The instrument developed based on 34 items assessed information disclosure ranging from non-financial information such as lead and delivery times, resource consumption and productivity to financial information such as material costs, research and overheads costs. In another study, Caglio (2017) modified Caglio and Ditillo's (2012) instrument and used 46 items to measure the disclosure of management accounting information between partners. Although OBA are mainly practiced in manufacturing firms (e.g., Kajüter & Kulmala 2005; Möller et al. 2011; Windolph & Möller 2012), the study assessed the use of OBA in different sectors such as health care, travel and leisure, real estate and media. Notably, in these two studies, the scales developed utilized a large number of items that can create problems of respondents' fatigue.

In two German studies, scales of IOCM and OBA were developed by Möller et al. (2011) and Windolph and Möller (2012). As these studies adopted a broad approach to develop the measures, only three items were used to measure IOCM, indicating the extent to which joint activities are undertaken by the supplier and the buyer in relationship. These items include (i) assigning inter-organizational teams for relationship cost management, (ii) the existence of joint processes for cost-oriented product development and (iii) optimizing inter-organizational processes together. The studies also used only two items to measure OBA which emphasized on the disclosure of cost data yet neglected other types of data. In contrast with earlier work in the area, these studies introduced scales with too few items neglecting the practices of IOCM and OBA mentioned in prior studies. Arguably, the items used to measure a construct should cover all dimensions that reflect the definition of the construct (Churchill 1979).

Development of the IOCM and OBA scales should provide useful tools in evaluating the efficacy of coordination and disclosure of management accounting information between partners in the business network. Nevertheless, attempts to develop IOCM and OBA scales observed in prior studies showed lack of agreement with regard to the selection of the items and operationalizing the scales as either one or two constructs. The weakness in measuring the construct, may result in spurious findings. As the inter organizational accounting concept is relatively young and considering the practices may contribute to the success and effectiveness of business network, the effort to build systematic measures of IOCM and OBA is viewed as timely and relevant.

The previous shortcomings suggest the need to extend IOCM and OBA concepts by introducing comprehensive scales that take into account their practices. This paper presents an empirical study to develop and validate scales of IOCM and OBA practices that can be a valuable extension to the scales that have been used in prior literature. This study follows Churchill's (1979) procedures to achieve research objectives. In the following sections, IOCM and OBA constructs are discussed and clarified based on the items generated in extant literature. This is followed by describing the procedures of the survey pre-testing, pilot testing and main study to validate the scales. The final section of the paper discusses the results and implications and identifies promising avenues for future research.

IOCM AND OBA

The inter-organizational accounting practices are adopted for controlling inter-organizational transactions and improving inter-organizational efficiency and effectiveness (Håkansson & Lind 2006). It was contended that approximately half to two thirds of inter-organizational relationships do not achieve their intended goals due to coordination problems (Gulati et al. 2005; Tsamenyi et al. 2010), lack of shared and accurate knowledge (Hanf & Dautzenberg 2007) and information asymmetries among partners (Ba & Pavlou 2002). These problems increase transaction costs (Montiel et al. 2012), create problems in monitoring performance (Clemons & Row 1992) and lead to greater operational inefficiencies and coordination costs (Patnayakuni et al. 2006). Inter-organizational accounting practices have been introduced (Håkansson & Lind 2004; Håkansson & Lind 2006) in order to manage coordination problems, address information asymmetry and reduce transaction costs. In buyer-supplier relationships, the emphasis on intensive collaborations with suppliers or customers is associated with the practices of IOCM and OBA as they present how supply chain related issues are integrated into cost management thoughts (Håkansson & Lind 2006; Seuring 2002).

IOCM has been developed to tackle the issue of information asymmetry between suppliers and buyers in inter-organizational relationships and networks and identify lower cost solutions by changing the specifications of the outsourced item or the end product (Cooper & Slagmulder 2004). Originally, IOCM can be traced back to the work of Porter (1985) who argued that linkages between suppliers and buyers lead to opportunities for cost reduction through two mechanisms: coordination and optimization.

Previous studies reported some variations in the practices of IOCM. These variations include practices such as target costing, functionality-price-quality trade-offs, inter-organizational cost investigation, concurrent cost management, kaizen costing, value analysis, value engineering, philosophies and techniques related to suppliers' costs - costs tables and inter-organizational applications of activity-based costing (Agndal and Nilsson 2009; Cooper & Slagmulder 2004; Kajüter & Kulmala 2005; Sohn, Shin & Park 2014). Nevertheless, most literature appear to agree on four practices which are i) Target costing, ii) Functionality-price-quality trade-offs, iii) Inter-organizational cost investigation and iv) Concurrent cost management. Table 1 summarizes the IOCM practices indicated in prior research.

TABLE 1. IOCM general practices

Authors	IOCM Practices
Cooper and Yoshikawa (1994)	i) Target costing systems, ii) Functionality-price-quality trade-offs, iii) Minimum cost investigations
Slagmulder (2002)	i) Target costing, ii) Functionality-price-quality trade-offs, iii) Inter-organizational cost investigation, iv) Concurrent cost management
Kajiiter (2002)	i) Target costing and chained target costing, ii) Functionality-price-quality trade-offs, iii) Inter-organizational cost investigation, iv) Concurrent cost management, v) Kaizen costing, vi) Value analysis, vii) Value engineering
Cooper and Slagmulder (2004)	i) Functionality-price-quality trade-offs, ii) Inter-organizational cost investigation, iii) Concurrent cost management
Agndal and Nilsson (2009)	i) Target costing, ii) Trade-off techniques and continuous improvement, iii) Inter-organizational cost investigations, iv) concurrent cost management, v) Value engineering, vi) value analysis and “kaizen” or “continuous improvements”, vii) Philosophies and techniques related to suppliers’ costs , viii) Costs tables, ix) OBA
Möller et al. (2011)	i) Target costing, ii) Functionality-price-quality trade-offs, iii) Inter-organizational cost investigation, iv) Concurrent cost management
Fayard et al. (2012)	i) Inter-organizational applications of activity-based costing, ii) Target costing, iii) Kaizen costing, iv) OBA
Windolph and Möller (2012)	i) Target costing, ii) Functionality-price-quality trade-offs, iii) Inter-organizational cost investigation, iv) Concurrent cost management

Prior research on OBA suggested sharing of cost information as the central of OBA practices (Agndal & Nilsson 2010; Axelsson, Laage-Hellman & Nilsson 2002; Caglio & Ditillo 2012; Carr & Ng 1995; Ellram 1996; Hoffjan & Kruse 2006; Kajüter & Kulmala 2005; Mouritsen, Hansen & Hansen 2001; Romano & Formentini 2012). The purpose of OBA is to facilitate cooperation between supplier and buyer leading to the identification of subsequent cost reduction potentials (Axelsson et al. 2002). Lamming et al. (2005) argued that managers can employ transparency as a basis for sharing tacit knowledge and sensitive information as it is seen as a manageable element in buyer-supplier relationships.

Accordingly, it is indicated that OBA includes the disclosure of different types of information beyond cost data. These information include financial and non-financial information (Alenius, Lind & Strömsten 2015), sales forecasts, detailed data on production processes, operating data, general supplier data, technical expertise and supply chain data (Agndal & Nilsson 2010; Kajüter & Kulmala 2005) and management accounting information (Caglio 2017; Caglio & Ditillo 2012). Table 2 provides a summary on the type of information disclosed as OBA practices.

TABLE 2. The data shared as OBA practices

Authors	OBA Practices
Carr and Ng (1995)	i) Packaging and shipping costs, ii) Material costs, iii) Overhead costs, iv) Profit margin

Axelsson et al. (2002), Ellram (1996), Seal et al. (1999), Singh et al. (2012)	i) Cost data
Mouritsen et al. (2001)	i) Cost structures, ii) Material flows, iii) Adjustment times for assembling machines, iv) The size of the intermediate product inventory, v) Rate of turnover
Kajüter and Kulmala (2005)	i) Cost elements, ii) Profit margin, iii) Sales forecasts, iv) Operating data, v) Technical expertise
Agndal and Nilsson (2010)	i) Cost elements, ii) Costs related to buyer-supplier interface iii) Detailed data on production processes, iv) General supplier data, v) Supply chain data
Hoffjan, Lührs, and Kolburg (2011)	i) Materials costs ii) Production costs, iii) Cost of items iv) Overhead costs, v) Profits
Caglio and Ditillo (2012) Romano and Formentini (2012)	i) Management accounting information i) Detailed estimations on materials, labor and overhead costs, ii) Detailed estimations purchasing and supply management costs, iii) Aggregated cost data on raw materials, labor and inventory, iv) Costs for quality control, special tools and equipment.
Alenius et al. (2015)	i) Financial information, ii) Non-financial information

When investigating IOCM and OBA constructs, prior research has examined these constructs either simultaneously or separately. Studying IOCM and OBA simultaneously follows the argument that OBA is required to implement and use IOCM practices (Cooper & Slagmulder 1999). Therefore, several studies recognized OBA as central to the concept of IOCM (Coad & Cullen 2006; Cooper & Slagmulder 2004; Fayard et al. 2012; Kulmala et al. 2002; Lamming et al. 2005). That is because establishing routines for sharing information is seen as a critical factor for the success of buyer-supplier relationship (Cooper & Yoshikawa 1994). However, OBA is not required by all IOCM practices. Both target costing and functionality-price-quality trade-offs, for instance, can be implemented without cost data disclosure (Cooper & Slagmulder 1999). In the case of target costing and functionality-price-quality trade-offs practices, the supplier and buyer teams work independently and this reduces the required shared cost data (Axelsson et al. 2002; Kajüter & Kulmala 2005).

IOCM and OBA are similar in terms of the disclosure of information between partners, however, the difference becomes apparent with the active involvement of the partners. With IOCM, the supplier's and buyer's design teams are required to actively work in a joint cost management. The supplier and buyer split responsibility for the establishment of the outsourced item's specifications and/or design (Cooper & Slagmulder 2004). With OBA, the supplier is required to disclose management accounting information to the buyer without any involvement of the design teams in a joint cost management (Caglio & Ditillo 2012; Kajüter & Kulmala 2005). Combining IOCM and OBA as one construct therefore, might cause losing important data that could otherwise be captured should these constructs be operationalized separately.

Accordingly, this study supports the view that IOCM and OBA as conceptually different and will predict inter-organizational cost reduction distinctively. Arguably, OBA is used to assist the buyers in determining the allocation adequacy of overhead costs (Möller et al. 2011; Windolph & Möller 2012). Therefore, OBA implementation does not necessarily yield in subsequent IOCM practices (Windolph & Möller 2012). In fact, the ideas that successful IOCM requires suppliers to share information with their buyers (Coad & Cullen 2006; Cooper & Slagmulder 2004) and that OBA is a prerequisite for IOCM implementation (Agndal & Nilsson

2009; Ellram 1996) has been recognized as the decisive reasons for implementing OBA (Kajüter & Kulmala 2005; Möller et al. 2011; Windolph & Möller 2012). Following these arguments, this study investigates IOCM and OBA as two independent cost management practices without observing their interdependent relationship (e.g., Windolph & Möller 2012).

DEVELOPING THE SCALES

THE DOMAIN OF IOCM CONSTRUCT

The domain of IOCM construct indicates two main dimensions, which are 1) assigning buyer-supplier teams' and 2) joint activities and practices to reduce costs. Review of extant literature suggest four practices of IOCM, namely, (i) Target costing, (ii) Functionality-price-quality trade-offs, (iii) Inter-organizational cost investigation and (iv) Concurrent cost management.

According to Cooper and Slagmulder (1999), target costing is a disciplining tool that keep partners on track to reach the required quality and price of the product. This practice is defined as cost management system that is utilized to support the development of new and redesigned products (Kee & Matherly 2013). Target costing seeks to establish the targeted costs at which a product can be produced (Ellram 1996). To define the targeted costs, Ellram (2000) indicates that the suppliers and buyers need to identify the estimated selling price which is derived from the market information and then subtract the desired profit. At the level of practice, the buyers are usually involved when the target costs are broken down to component level to achieve great improvement at the level of the product and the production processes (Ibusuki & Kaminski 2007). Therefore, target costing is viewed as a significant practice of IOCM that requires coordinated activities by the suppliers and the buyers to reach the targeted costs (Windolph & Möller 2012). Consequently, Cooper and Slagmulder (2004) recognized this practice as an arm's-length cost management that can be utilized by partners to meet the desired costs.

Dekker and Smidt (2003) suggest that the costs during products' design and development stages are critical for inter-organizational relationships' success. Thus, partners should direct their coordinated activities during these stages to reach the targeted costs (Roy, Colmer & Griggs 2005). In these stages, IOCM applies functionality-price-quality trade-offs practice to bargain among product's features (Cooper & Slagmulder 2004). This practice captures how the suppliers find ways to bargain with the buyers along the functionality, quality and targeted price, therefore, not merely with the focus on the price (Axelsson et al. 2002). Particularly, when the costs of the product relatively exceed their targeted costs, the partners can relax on product's functionality and/or quality in an acceptable way to achieve cost reduction.

Inter-organizational cost investigation is an advanced practice of IOCM. Based on this practice, the partners design teams can use value engineering techniques to alter the product components to achieve the desired cost reduction (Cooper & Slagmulder 2004). The design teams jointly identify whether the product features ordered by the customer can be altered in ways that allows the costs to be reduced significantly (Slagmulder 2002). Therefore, with inter-organizational cost investigation, the changes of the components or specifications usually are more than those under functionality-price-quality trade-offs practice. Consequently, this practice is utilized when functionality-price-quality trade-offs is not able to achieve the desired level of cost reduction (Cooper & Slagmulder 2004).

The most interactive practice of IOCM is concurrent cost management. According to Slagmulder (2002), it entails intensive interaction between the partners during the product design stage to suggest changes in the design of the components and product. This indicates the early interactions and involvements of the partners' design teams in the product development whenever the costs challenge faced is so severe. Thus, coordinated actions by design teams can lower costs to an adequate level (Agndal & Nilsson 2009; Cooper &

Slagmulder 2004). In concurrent cost management, the need for coordinated actions is identified earlier in the design process than in the functionality-price-quality trade-offs or inter-organizational cost investigation practices (Cooper & Slagmulder 2006).

Having described the domain of IOCM and explained its practices, an empirical study that seeks to capture these practices is warranted, beginning with identifying items that can be used to gauge IOCM. A comprehensive review of prominent academic journals and books was conducted to identify the construct and its components (Churchill 1979). These reviews suggested an initial list of 10 items (see Appendix 1). These items represent manifestations of the interaction between the supplier and the buyer that aims to reduce costs.

THE DOMAIN OF OBA CONSTRUCT

A broader definition of OBA entails exchanging and discussing management accounting information (financial and nonfinancial) among partners. For instance, Tomkins (2001) argued that sharing inter-organizational information indicates the disclosure of accounting information including information on quality, price, research and development, delivery terms, cost structures and targeted costs. Consistent with this ideas, Carr and Ng (1995) and Mouritsen et al. (2001) suggested that sharing of information on cost structure, capacity saturation, set-ups, cycle and movement times and delivery information refer to OBA practice. Similarly, Kajüter and Kulmala (2005) operationalized OBA as cost information and non-financial information disclosure. Recently, Caglio and Ditillo (2012) conceptualized OBA as management accounting information exchanged or discussed between collaborating firms.

To specify the domain of OBA construct, three dimensions should be discussed. First, the direction of information exchange i.e. it can be “one-way” where the suppliers share their management accounting information to the buyers or bidirectional where both partners openly share and discuss their information (Hoffjan & Kruse 2006; McIvor 2001). Nevertheless, Lamming et al. (2005) and Hoffjan and Kruse (2006) argued that one-way management accounting information sharing by the suppliers appears to prevail in practice.

Second, the type and level of information shared by partners that reflect the degree and quality of information disclosure which in turn depend on the purpose of exchange relationship (Windolph & Möller 2012). The level of information sharing varies widely when practicing OBA. It ranges from sharing internal accounting information to relatively unspecific cost data (related process information). Similarly, the type of exchanged information varies from the disclosure of cost data such as time and cost in production processes to cost relevant information disclosure like sales forecasts, capacity saturation, price, quality, delivery terms, research and development (Axelsson et al. 2002).

Third, the boundaries of openness which differentiate OBA as the exchange of information occurs in networks or in dyadic buyer-supplier relationships (Windolph & Möller 2012). However, survey-based and case-based studies mostly addressed OBA in the context of dyadic relationships (e.g., Kulmala 2004; Möller et al. 2011; Mouritsen et al. 2001; Windolph & Möller 2012). Although Kajüter and Kulmala (2005) investigated OBA in a network, the study found that suppliers in the network mainly share information to direct buyers rather than to the entire supply network. Arguably, OBA is operationalized as the disclosure and discussion of management accounting information between the supplier and the direct buyer in inter-organizational relationships.

In order to develop a scale to measure OBA construct, relevant literature of survey-based studies was reviewed to identify items developed in prior studies. Conceptual and case-based studies were analyzed to assist in generating the appropriate items. A comprehensive search of related books and academic journals resulted in 14 initial items (see Appendix 2) that indicate OBA nature, scope and practices.

METHODOLOGY

SAMPLE AND RESPONDENTS

In this study, the objective is to examine the role of specific inter-organizational accounting practices by Malaysian suppliers of manufacturing firms. The selection of suppliers of manufacturing firms was due to two main reasons. First, prior research suggested that IOCM depend more on the involvement of coordination practices from the suppliers side (e.g. Möller et al. 2011). Second, the disclosure of management accounting information from supplier to buyer in IOCM and OBA prevails in the practice (Hoffjan & Kruse 2006). Thus, in line with previous studies (e.g. Möller et al. 2011; Windolph & Möller 2012), a single supplier was selected as the unit of analysis. All manufacturing firms listed in the Federation of Malaysian Manufacturers (FMM) 2013 directory were examined to select potential supplier firms. Based on the list, further action which include inspecting the websites information and/ or direct contact was done to identify the supplier to manufacturing firms. This step resulted in 1000 sample firms considered as the most appropriate participant firms who are in relationships with manufacturers.

According to Kumar et al. (1993), the most knowledgeable individual should be identified as respondent in survey research. In this study, the key informant include accounting manager, chief financial officer (CFO) or individual directly involved in inter-organizational accounting practices with the buyers. Therefore, the informants were chosen based on the relevance of their position to the designated survey questionnaire, consistent with previous studies (Fayard et al. 2012; Möller et al. 2011; Windolph & Möller 2012). Additionally, Möller et al. (2011) and Windolph and Möller (2012) found that IOCM and OBA were mostly implemented in medium-sized and large suppliers' firms. Thus, size of firms was not considered in identifying the sample of study.

Validation of the instrument to measure IOCM and OBA underwent pre-test and pilot test before the actual survey was administered.

PRE-TEST

The initial lists of items for developing IOCM and OBA instrument were reviewed by three academicians from schools of Accounting and Management before conducting the pre-test. This includes review on the relevance of the items to the proposed constructs and the clarity of the statements explaining each item. The lists of items which was initially derived from prior literature were consequently assessed by a panel of seven academicians from Accounting and Management Schools and CFOs of supplier of manufacturing firms. The step was undertaken to allow for an evaluation of the face and content validity of the scales which include the consideration of the consistency of the items explaining their constructs, the wordings, the number of items to be included, and the ease of items interpretation. Slight modifications were made to statements to incorporate the respondents' feedback and based on the comments of the CFOs of supplier manufacturing firms, 5 items from IOCM scale were deleted to reflect the most frequent practices that prevail in Malaysian firms. For OBA's scale, the items were grouped based on their nature which resulted in 5 items to represent the exchange of management accounting information. The final revised scales were, then, used in the following pilot test. These steps were undertaken to add value to the IOCM and OBA instrument adapted from prior studies discussed earlier (refer Section 'Developing the Scales'). Table 3 presents the revised items of IOCM and OBA scales.

TABLE 3. Items of IOCM and OBA

Items	Code	Original Source
IOCM		
The firm and its partner.....		
Jointly assign inter-organizational team for managing relationship's costs.	IOCM1	Cooper and Slagmulder (2004), Slagmulder (2002)
Jointly establish the target cost of the product based on the expected selling price.	IOCM2	Agndal and Nilsson (2009), Cooper and Slagmulder (2004), Slagmulder (2002)
Jointly negotiate along three dimensions "functionality-price-quality" in order to manage joint costs.	IOCM3	Agndal and Nilsson (2009), Cooper and Slagmulder (2004), Kajiiter (2002). Slagmulder (2002)
Jointly involve in product development and major functions changes at early stage.	IOCM4	Agndal and Nilsson (2009), Cooper and Slagmulder (2004), Kajiiter (2002), Slagmulder (2002).
Jointly find ways to redesign the product so it can be manufactured at desired cost.	IOCM5	Agndal and Nilsson (2009), Cooper and Slagmulder (2004), Kajiiter (2002), Slagmulder (2002)
OBA		
Cost data are exchanged and/or discussed openly with the buyer.	OBA1	Axelsson et al. (2002), Ellram (1996), Seal et al. (1999), Singh et al. (2012), Carr and Ng (1995), Mouritsen et al. (2001), Kajüter and Kulmala (2005), Hoffjan et al. (2011), Caglio and Ditillo (2012), Romano and Formentini (2012)
Productivity data (e.g. machinery productivity, labor productivity and delivery time) are exchanged and/or discussed openly with the buyer.	OBA2	Alenius et al. (2015), Mouritsen et al. (2001), Kajüter and Kulmala (2005), Agndal and Nilsson (2010), Caglio and Ditillo (2012)
Quantity data (e.g. finished goods and work in progress quantity) are exchanged and/or discussed openly with the buyer.	OBA3	Alenius et al. (2015), Mouritsen et al. (2001), Kajüter and Kulmala (2005), Agndal and Nilsson (2010), Caglio and Ditillo (2012)
Quality data (e.g. raw materials) are exchanged and/or discussed openly with the buyer.	OBA4	Alenius et al. (2015), Caglio and Ditillo (2012)
The buyer frequently requests open book accounting (exchange of management accounting information).	OBA5	Möller et al. (2011), Windolph and Möller (2012)

PILOT TEST

A pilot test was conducted to evaluate the reliability of items measuring the IOCM and OBA instruments. The questionnaire survey was mailed to 150 accounting managers or CFOs of suppliers of Malaysian manufacturing firms. This sample was selected from the main sample of 1000 firms. Accordingly, the sample of the pilot test was excluded from the final sample of the study. The mailing yielded 22 usable or a response rate of 15 percent. The result of the pilot test suggested adequate level of IOCM and OBA reliability with Cronbach's Alpha of 0.85 and 0.83 respectively (Nunnally & Bernstein 1994). Therefore, no changes were made on the scales for the main data collection.

SURVEY ADMINISTRATION

Following the result of the pilot test, the main questionnaire survey was mailed to 850 accounting managers or CFOs of suppliers firms for manufactures listed in the directory of Federation of Malaysian Manufacturers (FMM) year 2013. Due to the expected low response rate in this type of studies, Dillman's (2000) method was followed to increase the response rate. The mailing, then, was carried out in two waves during April and May 2016. The initial mailing was sent in April 2016 including cover letters and return self-addressed envelopes. Following that, reminder postcards were mailed two weeks later to encourage those who did not respond. Approximately one month later, second mailing was conducted including a copy of the survey and a note to those who had already responded to ignore the survey. The two waves mailing resulted in 207 usable responses with a response rate of 24.3%. Table 4 presents profiles of the respondents for this study.

TABLE 4. Profile of respondents

Number of Employees	Number of Firms	Percentage
Below 100	57	27.5
100-199	54	26.1
200- 299	52	25.1
300- 399	30	14.5
400 employees or more	14	6.8
<i>Total</i>	<i>207</i>	<i>100</i>
Industry		
Automobiles	36	17.4
Electrical and electronics	35	16.9
Chemicals	27	13.0
Wood and related products	15	7.2
Basic metals	21	10.1
Radio/ television	22	10.6
Rubber and plastics	22	10.6
General manufacturing	29	14.0
<i>Total</i>	<i>207</i>	<i>100</i>

Table 4 showed that the number of full-time equivalent employees was diverse indicating distribution of firms ranging from small and medium to large-sized. The respondents were from diverse industries ranging from 17.4% of automobiles to 7.2% of wood and related products.

Armstrong and Overton (1977) assumed that late respondents have more characteristics of non-respondents than early respondents. Therefore, the responses from first and second waves were tested for non-response bias. Responses were divided into two groups based on the arrival time of returned questionnaire. The returned questionnaires before sending the second mailing were included in the first group as early responses. Questionnaires returned after the sending the second mailing were considered late responses. Based on that, the early responses group included 133 responses, while 74 responses were included in the late responses group. Independent samples t-test was conducted on the items and constructs between the two responses groups. The result of the analysis indicates no significant differences ($p > 0.05$) between the two samples along the constructs and items of scales, suggesting that non-response bias is not present in the data.

REFLECTIVE AND FORMATIVE MODELING

Prior to developing the measurement model, this section illustrates the modeling of IOCM and OBA constructs. It is critical to understand the type of latent constructs and their indicators as they are significant to structural modeling and validation. Jarvis, MacKenzie and Podsakoff (2003) proposed four decision rules that should be considered when deciding between reflective and formative modeling. These four rules are: (i) direction of causality from construct to indicators, (ii) interchangeability of the indicators (iii) covariance among the indicators and (iv) nomological net of the construct indicators. The rules of assessing reflective and formative constructs are discussed with regards to IOCM and OBA as follows:

DIRECTION OF CAUSALITY FROM CONSTRUCT TO INDICATORS

In a reflective model, the latent construct exists independent of the indicators (Coltman et al. 2008). Reflective construct is usually viewed as producing behavior that is captured by its indicators, meaning that variation in a construct leads to variation in its indicators (Bollen 1989). Therefore, the indicators are viewed as reflections or manifestations of their construct. Practically, majority of the scales in business and related methodological contexts on scale development use a reflective approach to measuring constructs (Coltman et al. 2008).

In contrast, formative construct is formed by its indicators since the construct is induced by the measures (Fornell & Bookstein 1982). The latent construct depends on a constructivist, or instrumentalist interpretation by the scholar (Coltman et al. 2008). According to Edwards and Bagozzi (2000), formative construct is commonly conceived as composite of specific component variables or dimensions. In contrast to the reflective model, few examples of formative models are seen in the business literature (Coltman et al. 2008).

The nature of IOCM and OBA constructs seemed to suggest that both constructs should be modeled as reflective constructs. Changes in IOCM and OBA appear to result in changes in their indicators and not the other way around. For example, when suppliers and buyers agree on extensive use of IOCM, this will lead to more practices of target costing, functionality-price-quality trade-offs, inter-organizational cost investigation and concurrent cost management. In other words, with great adoption of IOCM, the partners may implement all practices instead of some of them. Similarly, high level of OBA adoption means more information disclosure including different types of information such as costs, quality and quantity information. This, shows that the variation in IOCM and OBA leads to variation in their indicators. Thus, these constructs exist independently of their indicators or measures and the indicators do not define characteristics of the constructs.

INTERCHANGEABILITY OF THE INDICATORS

In the reflective model, indicators for the construct's should be interchangeable (Jarvis et al. 2003). Under this decision rule, the indicators need to be assessed based on whether: (i) the indicators have similar content? (ii) the indicators share a common theme? (iii) dropping one of the indicators alters the conceptual domain of the construct? (Coltman et al. 2008; Jarvis et al. 2003).

All indicators are expected to share similar content and theme to be interchangeable. According to Churchill (1979) and Nunnally and Bernstein (1994), indicators' interchangeability enables researcher to measure the construct by sampling the relevant indicators of the construct. Thus, adding or removing one or more indicators from the domain does not materially alter the content validity of the construct (Jarvis et al. 2003). In contrast,

in the formative model, each sub-dimension is a component of the construct, and the construct becomes incomplete if any components are excluded.

Indicators of IOCM and OBA are interchangeable if they have the same content and theme. Both constructs will not become incomplete with the exclusion of any indicator. In the case of IOCM, for example, all indicators have positive implications toward the construct and have the same theme which is managing the costs in buyer-supplier relationships. The indicators of IOCM depends on the extent of IOCM usage and adding or removing one or more of these indicators will not alter the content validity. Similarly, OBA indicators share the same content and theme as they indicate the disclosure of management accounting information. The inclusion or exclusion of indicators will not affect the construct. For example, OBA is indicated by only cost information disclosure or the disclosure of management accounting information including financial and-non financial information.

The third consideration is related to the concern of whether the indicators should covary with each other. In other words, a change in one of the indicators should be associated with changes in the other indicators.

For example, when inter-organizational team is assigned to manage relationship's costs, the team will increase the chance of implementing other IOCM practices such as target costing and functionality-price-quality trade-offs. Another example is the indicator of target costing. This practice requires identifying the desired costs to be achieved, however, functionality-price-quality trade-offs, inter-organizational cost investigation and concurrent cost management are required to trade-offs and redesign the product features to achieve the targeted costs. Based on that, IOCM should be modeled as a reflective construct. In the case of OBA indicators, disclosure of high product cost for instance, will require disclosure on the quality to justify the high costs. Consequently, OBA should also be modeled as reflective construct as well.

NOMOLOGICAL NET OF THE CONSTRUCT INDICATORS

In a reflective model, the indicators are required to have the same antecedents and consequences (Jarvis et al. 2003). In other words, the indicators in a reflective model have a similar (positive/negative, significant/non-significant) relationship with the antecedents and consequences of the construct. In contrast, the requirement for interrelated indicators is not the case for formative indicators as they do not necessarily share common theme and, therefore, do not have the same types of linkages with the antecedents and consequences of the construct (Coltman et al. 2008).

Arguably, IOCM indicators are expected to have similar relationships with the antecedents and consequences of the IOCM since these indicators share common theme (collaboration) and have the same target (reducing cost). Thus, any antecedes are expected to have the same effect on IOCM indicators as they have same theme. Furthermore, the indicators are expected to have the same consequences (positive or negative impact). Similarly, this argument is applied to OBA indicators which have the same theme (management accounting information disclosure) and same target (cost reduction). Based on these arguments, the study models of IOCM and OBA are considered as reflective constructs.

ANALYSIS AND RESULTS

An exploratory factor analysis (EFA), using Statistical Package for Social Sciences (SPSS) 22, was performed to evaluate the factors structure and refine the items lists. Then, a confirmatory factor analysis (CFA), using Analysis of Moment Structure (AMOS) 22, was conducted to

validate the underlying constructs. According to Hurley et al. (1997), using both EFA and CFA in the same data allows for comprehensive evaluation of the instrument.

EXPLORATORY FACTOR ANALYSIS (EFA)

Principal components method with varimax rotation was conducted to extract the factors. The Kaiser–Meyer–Olkin measure of sampling adequacy showed a value of 0.846 with a significant Bartlett test of Sphericity ($p = 0.000$). This indicates that correlations between items are sufficient to conduct the factor analysis (Tabachnick & Fidell 2007). The EFA resulted in two components with eigenvalue greater than 1 which explain around 62% of the variance. The resulted components were in alignment with proposed factors supporting the construct validity of the instrument. All items had substantial loadings on their proposed factors (greater than 0.74) with cross-loadings below the suggested minimum factor loading of 0.40 (Bagozzi & Yi 1988). Therefore, all items were retained for further analysis. Results of the EFA are shown in Table 5.

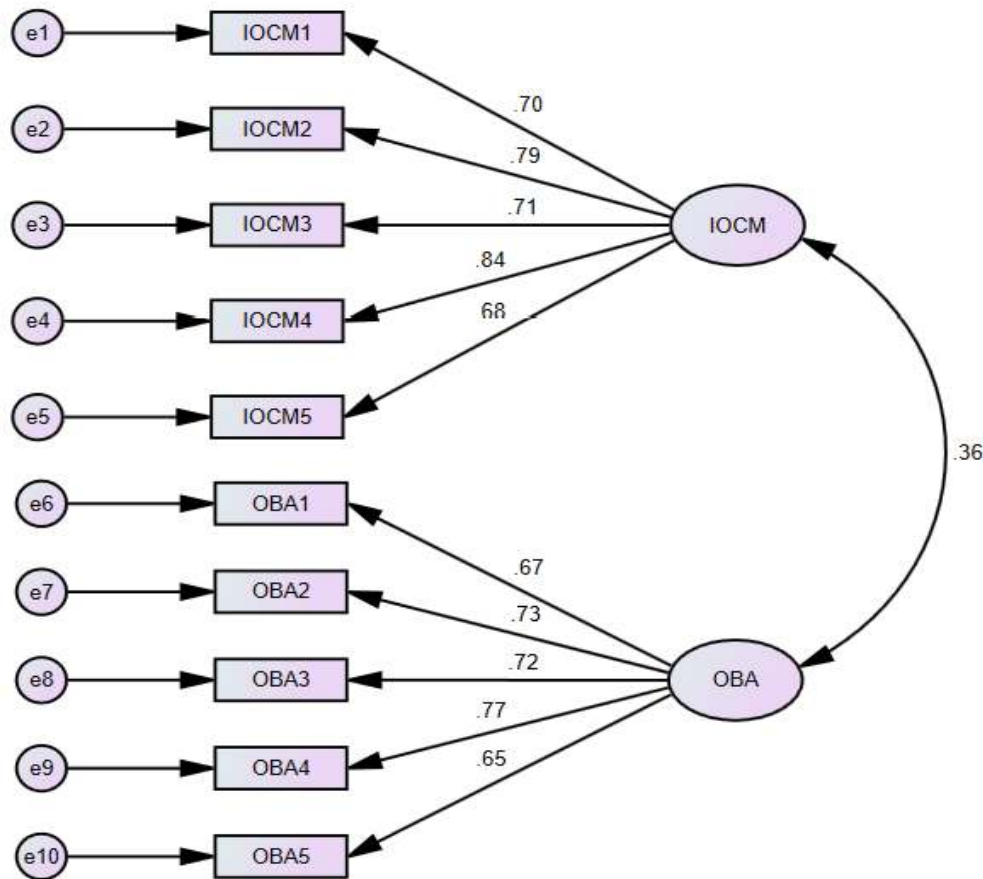
TABLE 5. Principal components analysis: Items loadings

Items	Communalities	Factor 1 IOCM	Factor 2 OBA
IOCM1	0.597	0.764	
IOCM2	0.694	0.821	
IOCM3	0.602	0.769	
IOCM4	0.741	0.850	
IOCM5	0.579	0.752	
OBA1	0.568		0.745
OBA2	0.628		0.787
OBA3	0.622		0.773
OBA4	0.657		0.791
OBA5	0.552		0.741

Note: $n = 207$; only loadings in excess of 0.40 are shown.

CONFIRMATORY FACTOR ANALYSIS (CFA)

The CFA was performed to evaluate the measurement model and validate the instrument. This allows incorporating latent variables measured indirectly by indicators while accounting for the effect of measurement errors in multi-item variables (Hair et al. 2013). The CFA depicts the relations between the latent factors and the indicators, as well as the correlations between the factors. It is concerned with the extent to which the indicators are produced by the underlying latent factors.



$X^2 = 49.937$, $P = 0.038$, $X^2/df = 1.469$, SRMR = 0.033 RMSEA, 0.048. GFI = 0.955, AGFI = 0.927, CFI = 0.981, TLI = 0.974.

FIGURE 1. CFA model

Figure 1 depicts the CFA model of IOCM and OBA constructs. The X^2 value is 49.937 with a probability of 0.038 and the chi-square statistic adjusted for the degrees of freedom ($X^2/df = 1.469$) which is lower than the threshold of 2 (Kline 2005). In addition, both absolute and incremental fit indices indicate a good fit of the measurement model. The values of SRMR = 0.033 and RMSEA = 0.048 are less than the thresholds suggested by Kline (2005) and Browne and Cudeck (1993). Similarly, values of other indexes show acceptable fit with GFI = 0.955, AGFI = 0.927, CFI = 0.981 and TLI = 0.974 that are greater than 0.90 (Hu & Bentler 1999; Hooper, Coughlan & Mullen 2008).

Table 6 presents the results of composite reliability, convergent and discriminant validity for IOCM and OBA constructs. The values of the composite reliability met the criteria with values greater than 0.70 as suggested by Nunnally and Bernstein (1994). Convergent validity of the constructs in this measurement model was assessed with factor loadings and AVE (Hair et al. 2010; Fornell & Larcker 1981). All factor loadings on their corresponding constructs are high, ranging from 0.65 to 0.84. In addition, AVEs are higher than the threshold of 0.50 indicating adequate convergent validity of IOCM and OBA. This indicates that indicators of each constructs are correlated and statistically significant (Byrne 2010). Lastly, the discriminant validity was achieved since the square roots of AVE (values in brackets) are greater than the constructs' inter-correlation which suggests that IOCM is truly distinct from OBA (Fornell & Larcker 1981; Garver & Mentzer 1999).

TABLE 6. Inter-construct correlations, validity and reliability

Constructs	Composite Reliability	AVE	1	2
IOCM (1)	0.861	0.556	(0.745)	
OBA (2)	0.836	0.506	0.359	(0.711)

CONCLUSION

The acknowledged roles of IOCM and OBA practices in managing production and transaction costs in networks and inter-organizational relationships underscore the need to understand their nature. Notably, measures of these constructs in prior studies has been inconsistent, thus, making it difficult to compare findings and contributions. Development and validation of comprehensive scales for IOCM and OBA constructs help to ensure valid measures of these practices. The main theoretical contribution of this study, thus, lies in the identification and confirmation of factors covering the domain of IOCM and OBA constructs.

IOCM's proposed scale assesses the degree to which a firm in the network engages in coordinating activities with its partner to reduce total costs. The proposed measure of OBA aims to assess the level of management accounting information exchange and discussion between the partners.

In the first stage, the domains of constructs were specified to determine what practices are included in each construct. Then, initial lists of items were generated to capture the domain of constructs as specified. In the second stage, the lists of items were reviewed by academicians and CFOs of suppliers of manufacturing firms and resulted in excluding some items to improve the content validity. These revised items were used in a pilot test where the scales showed adequate level of reliability. In the last stage, the survey was used to collect the final data to validate the scales. The EFA was used to determine how distinct the constructs were from each other. The results of EFA support a two-factor structure with 5 items measuring each factor. Then, the CFA was undertaken to determine whether the factor structure obtained using EFA could be confirmed. This analysis allows assessing the degree of reliability, convergent and discriminant validity of measures. The results of the CFA suggest an acceptable degree of fit between the data and the proposed model. In addition, the results confirm the two-factor structure with strong level of convergent and discriminant validity.

The newly developed scales found IOCM and OBA as two separate constructs thus supporting several prior studies (Möller et al. 2011; Möller 2012; Caglio & Ditillo 2012; Caglio 2017). The steps to develop the scales was carefully considered, starting with reviewing relevant literature to identify the domain and practices of IOCM and OBA, followed by a pretest and pilot test sent to the academics and industry practitioners to revise the initial items. The involvement of practitioners in identifying relevant items to measure the construct provide confidence on their practical implications. Additionally, series of statistical analyses using EFA and CFA were applied to confirm the relations of the items to their intended constructs. These procedures yielded acceptable number of items for each constructs, that is, 5 items measuring each IOCM and OBA. The number of items found in this study was considered more practical to measure the instrument compared Caglio and Ditillo's (2012) and Caglio (2017) who include 34 items to measure IOCM and 46 items to measure OBA. Less number of items in a questionnaire is expected to increase survey responses. According to Hinkin (1995) studies which utilized a large number of items in the questionnaire survey can create respondents' fatigue or response biases. Nevertheless, the scales developed in this study differ from Möller et al. 2011 and Möller 2012 who utilize a broad concept to measure both constructs. The data from this study indicate that specific practices such as target cost and importance of negotiating functionality, price and quality was found to be relevant measures additional to the items

exercised by Möller 2012. Additionally, OBA was found to involve not just frequency of buyers' request for disclosure of cost data, but also the extent of exchange of productivity, quantity and quality data between supplier and buyer.

LIMITATIONS AND IMPLICATIONS

Certain limitations should be acknowledged when interpreting the findings. First, the findings of the study are based on a single-perception response on behalf of the firm which may not be a true representation for the entire firm. It would be interesting to take a group of individuals from within the firm and average their scores to be used. Second, the data used in this study were only collected from the supplier's perspective and this could lead to some bias in the results obtained. Future research can collect the data from matched suppliers and buyers. This would generate additional insights into the interactions between the suppliers and the buyers and provide comprehensive results based on their perspectives. Third, while this study seeks to develop and validate IOCM and OBA constructs in inter-organizational relationships, the buyer-supplier relationship is only one type of inter-organizational relationships. Further research should validate these constructs in other relationships forms such as networks, strategic alliances and joint ventures as the findings may differ in other settings.

Despite these limitations, this study has some important theoretical and practical implications. In terms of theoretical implications, the study expands knowledge in inter-organizational accounting context by introducing new scales for IOCM and OBA that incorporate the defined domain captured in literature and evidenced in practice. These scales assist in understanding the contributions and implications introduced by these practices in achieving advantages for partners. The results suggest several directions for future research. IOCM and OBA scales could be employed to examine predictive or correlational relationships between these practices and related variables such as cost reduction and competitive advantages. Therefore, it might enable examining of causal model and hypotheses using different techniques.

With respect to practical contribution, the findings of study might be useful for firms in inter-organizational relationships. It is argued that many of inter-organizational relationships fail to achieve their expected results due to information asymmetries, coordination problems and misalignment of actions (Dong, Ju & Fang 2016; Dyer & Hatch 2006; Yan & Dooley 2013). IOCM and OBA are introduced as efficient practices to reduce the information asymmetries and manage the costs that span the firm's boundaries (Cooper & Slagmulder 2004). Therefore, introducing reliable and validate scales to measure these practices can facilitate the assessment of their role in inter-organizational relationships. IOCM and OBA measures can be used as tools for assessment or as outcome measures to evaluate the efficacy of coordination and disclosure of management accounting information between partners.

In sum, results of this study provide useful instruments for better understanding on how partner firms coordinate with their partners in buyer-supplier relationships. By introducing reliable and valid scales of these constructs, we hope that they may contribute to future research and development in this area.

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APPENDIX 1

Initial list of IOCM scale

Items

The firm and its partner...

Analyze and manage our overall supply chain or value chain costs that extend beyond our firm and our partner's firm.

Assign inter-organizational teams for the relationship's cost management.

Decide on the features of the product.

Use inter-organizational target costing processes to meet market prices for our product while providing a profit margin to our firm and our partner.

Negotiate along three dimensions "functionality-price-quality" in order to manage joint costs.

Engage in inter-organizational cost investigations in order to analyze the cost structure of processes/products which impact both firms.

Involve in early product development and major functions changes.

Place employees at each other's location for the purpose of coordinating activities and collaborating on product or service plans, design or development.

Use processes to manage and control inventory levels to control inter organizational costs.

Achieve the established target cost.

APPENDIX 2

Initial list of OBA scale

Items

The following data are exchanged and/or discussed openly with the buyer.

Cost data.

Supply chain data.

Technical expertise data.

Rate of turnover data.

Financial data.

Non-financial data.

Profit margin data.

Material flows.

Adjustment times for assembling machines.

Detailed data on production processes.

Sales forecasts.

Operating data.

Finished goods

The buyer frequently requests open book accounting (exchange of management accounting information).
