ABSTRACT

Recently, supply chain management has played an important role in enabling businesses to succeed in their goals, gain competitive advantage, and improve their performance. As a result, there has been extensive research into strategic supply chain management with the aim of improving business performance along each stage of the supply chain. This is because in the current business world, supply chain relationships are crucial in influencing many companies to continuously adopt proper supply chain management practices. However, there has been no attempt to study the impact of the supply chain relationships involving trust, commitment, strategic supplier partnerships and customer relationships management of the LPG supply chain in Indonesia. This study is a critical analysis of literature to develop the conceptual framework that is proposed as the basis for analysing the relationship among domains of the supply chain and LPG supply chain performance.

Keywords: LPG Supply Chain, Propane Supply Chain, Supply Chain Management

INTRODUCTION: SUBSIDIZED LP-GAS (PROPANE) MARKET

The Indonesian Government employs a policy of subsidizing household cooking energy. The annual subsidy for this energy reached $2.5 billion (all monetary amounts are in US dollars) in 2006 [1, 2], and the amount of subsidy has increased every year since. The traditional fuel for household cooking was kerosene. Its increasing price caused an increase in the amount of subsidy. The procurement, management, and distribution of the subsidized kerosene was outsourced to a government-owned oil company, Pertamina [3]. This company has enjoyed monopoly rights since it was established. The government’s intention in granting the monopoly was to regulate and protect the market and people’s welfare. The regulation is implemented through price control of the kerosene retail price. The amount of subsidy was set at 85 cents per litre.

During the last five years, the subsidy has drained the government budget. To reduce the amount of subsidy, the government initiated in 2007 a conversion of household cooking fuel to LP-gas (known locally as Elpiji) [1, 2]; this gas is also known as propane or LPG. The reduction of subsidy that was expected from the conversion to LPG was estimated to be $1.7 billion annually. The amount of saving is computed based on the following [4]:

- 1 litre of kerosene is equivalent to 400 grams of LPG.
- The subsidy for kerosene is 85 cents per litre.
- The subsidy for LPG is 67 cents per kilogram.
- The current annual subsidy for kerosene is $2.5 billion.
- The retail price of subsidized LPG is 45 cents (4,250 Indonesian rupiah) per kilogram; this retail price is set by the government.
The subsidized LPG is packaged in a 3 kilogram green steel bottle. This special bottle is designated for subsidized LPG. There are two other types of bottles in circulation, i.e. 12 kg and 50 kg bottles, which package non-subsidized LPG and are beyond the scope of this research.

During 2007 and 2008, the conversion program distributed 3.5 million and 12.5 million bottles respectively. The target of the conversion was to circulate an additional 13.3 million and 12.8 million bottles during 2009 and 2010 respectively. Based on these figures, by the end of 2010 the LPG consumption in Indonesia will reach 4.1 million metric tonnes of LPG per year, and the logistics system will demand a distribution channel for 42 million bottles [2, 5].

There are two risks that may prevent the fulfilment of this demand. The first risk arises from the scale of the distribution channel, which has a capacity of 42 million bottles spread throughout the 1.9 million square kilometre archipelago of Indonesia. The second one arises from the existing inadequate capacity of infrastructure for storage, transportation, refill stations, distribution channels, and retail outlets.

The likelihood of the risks is already indicated by consistent and frequent interruptions of supply, one of which lasted as long as one week. Another malfunction of the current LPG supply chain is indicated by an actual retail price that is higher than the USD 45 cents set by the government. This retail price violates the price regulation [4]. These events are symptomatic of a sub-standard performance of the existing supply chain of the subsidized LPG.

This research will analyse the structure and performance of the existing supply chain, and will propose improvements in the existing supply chain.

**THE STRUCTURE OF THE INDONESIAN LPG SUPPLY CHAIN**

Based on ownerships and business processes, the supply chain of LPG can be divided into four levels, each with its own external and internal environment. Upstream, there are producers and importers. The producers and importers sell LPG to Pertamina, which is in the second level of the supply chain, based on contracts involving pure B2B agreements. The Government of Indonesia is not involved in the business between these levels [5].

The sole occupant of this second level is Pertamina, with all of its privilege for monopolizing the LPG market. Pertamina sells bulk LPG to the companies in third level. They refill LPG bottles and sell the filled bottles to the companies in the fourth (last) level. To become a member of the third level, a company is required to lodge an application to Pertamina, which will approve or reject the application. This scheme of membership is backed up by government regulation [5, 8], a practice that strengthens the dominance of Pertamina across the downstream component of the supply chain of LPG. In the supply chain literature, the relationship between the monopolizing Pertamina and the third level is known as a lock-in situation, in which the operations of one party (companies in the third level) depend heavily on the other party, that is Pertamina [6, 7].
Finally, the fourth (last) level within the supply chain sells the bottled LPG to consumers who use the fuel for household cooking purposes. The companies in the fourth level buy bottled LPG from the third level. The sale conditions require an exchange of empty bottles from the fourth level companies for full bottles from the third level companies. Similar to the membership of the third level, a company is required to lodge an application to Pertamina for membership in the fourth level.

Apart from companies in these four levels, there are supporting companies that provide transportation, warehousing, and logistics. The cost structures of these services are regulated at 4 cents for transportation and 1 cent for profit margin per kilogram of LPG.

These fees receive much criticism, in particular process of their calculation is unclear. A report covering a similar situation in the Spanish LPG market analyses a lock-in supply-chain [9], and will be used as a basis for the development of the conceptual framework in this research.

Besides the official structure of supply chain levels described above, the Indonesian LPG supply chain recognizes another, unofficial level. The firms at this level are known as sub-agents. The presence of this level poses several problems. The service that this level provides is: (a) absent in the design of the supply chain, and (b) the service charge is passed on to consumers. This charge is a reason why the there is violation of the government’s desired LPG retail price at 45 cents. Many reports suggest that this level comprises the firms that in fact provide access to the subsidy. This level actually performs a critical function to the distribution of the subsidized LPG, despite the illegal nature of its existence. This level will be formalised in this research in order to represent an actual functioning supply chain.

**THE RESEARCH QUESTION AND OBJECTIVES**

The main research question in this paper is: “How do supply chain relationships such as trust, commitment, strategic supplier partnership, and customer relationship management (CRM) affect supply chain efficiency and supply chain responsiveness in the Indonesian LPG enterprises?”

There are two objectives in this research project:

1. to describe the LPG supply chain framework in Indonesia, and
2. to develop a conceptual framework of supply chain relationship factors impacting on supply chain efficiency and responsiveness for the Indonesia LPG industry.
CONCEPTUAL FRAMEWORK

This section contains a conceptual framework of the Indonesia LPG Supply Chain Relationships (see Figure 1). There are two elements of this conceptual framework. First, the supply chain relationships of the Indonesia LPG industry can be segmented into four sub-elements: trust, commitment, strategic supplier partnerships, and customer relationships. Second, supply chain performance indicators are divided into two sub-elements: efficiency and responsiveness.

![Conceptual Framework Diagram](image)

Figure 1 A Conceptual Framework of the Indonesia LPG Supply Chain Relationships

RESEARCH HYPOTHESIS AND PROPOSED ANALYSIS

H1: Trust improves efficiency  
H2: Commitment improves efficiency  
H3: Strategic supplier partnerships improve efficiency  
H4: Customer relationships management has a positive influence on efficiency  
H5: Trust improves responsiveness  
H7: Commitment improves responsiveness  
H8: Strategic supplier partnerships improve responsiveness  
H9: Customer relationships management has a positive influence on responsiveness

In the analysis, the dependent variables are supply chain performance indicators, namely: efficiency and responsiveness. The independent variables are supply chain relationships, namely: trust, commitment, strategic supplier partnerships, and customer relationships. Factor analysis (Varimax Rotation method) was applied, combined with multiple regression, descriptive analysis and Pearson’s product moment correlation.

Before doing the statistical analysis, several assumptions were tested. They included:

- no outliers [10-12],  
- normality [11, 12],
- linearity [12],
- no multicollinearity [12, 13], and
- homoscedasticity [13, 14].

In addition, non-responder bias was tested [15, 16] and reliability – validity tests were conducted [17-19].

**LITERATURE REVIEW**

**Trust**

There are several definitions of trust in supply chain relationships:

- Trust is a general expectancy that the word of an individual or organisation can be relied on [20].
- Trust is the willingness to rely on a trading partner in whom one has confidence [21-27]. Confidence in supply chain relationships is based on reliability and integrity, which is related in turn to consistency, competency, honesty, fairness, responsibility, accountability, predictability and dependability [26, 28-30].
- Trust is the degree to which partners perceive each other as credible and benevolent [21, 28-32] and is expected to have a positive effect on the degree of collaboration in supply-chain relationships.
- Trust is “the belief that a party’s word or promise is reliable and that a party will fulfil his/her obligations in an exchange relationship” [33, p.12].
- Trust is “the degree to which the channel member perceives that its relationship with the supplier is based upon mutual trust and thus is willing to accept short-term dislocation because it is confident that such dislocation will balance out in the long-run” [34, p.6].
- Trust is “one party’s belief that its needs will be fulfilled in the future by actions undertaken by the other party” [35, p.33].
- Trust is “the firm’s belief that another company will perform actions that will result in positive outcomes for the firm, as well as not take unexpected actions that would result in negative outcomes for the firm” [28, p.3].

Based on definitions above, there are possibly two ways to build trust in relationships among trading partners in the LPG industry: trading partners should demonstrate reliability in their operations, consistently performing as promised and meeting expectations; trading partners need full and accurate sharing of all information necessary for the effective functioning of the relationships.
Commitment

Commitment is characterised by a long-term relationship, which can be defined as the willingness of each partner to exert effort on behalf of the relationship [27, 36-40]. Commitment and trust are dimensions of a business relationship that determine the degree to which each party feels they can rely on the integrity of the promise offered by the other. There are several previous studies on trust and commitment in the following:

1. Trust is seen as central to successful relationships leading to higher levels of loyalty to the bargaining partner and thus to increased profitability because trust encourages partners to co-operate, seek long-term benefits and refrain from opportunistic behaviour [27, 28, 35, 41].
2. Research clearly shows that the presence of trust and commitment substantially improves the chances of successful supply chain performance (to increase the value delivered to end customers) [42].
3. Four dimensions of trust: honesty; safety; credibility and previous experience [43].
4. Trust and commitment (key influential constructs in channel relationships) have been considered in domestic buyer-seller relationships [27].
5. Trust has been examined in international buyer-seller relationships [44].
6. Trust is a strategic value of buyer-supplier relationships [45, 46]
7. Collaborative relationships in SCM need trust and commitment for long-term cooperation along with a willingness to share risks [47]
8. The concepts of trust and collaboration in the supply chain began to challenge the explanatory power of transaction cost theory [48, 49].
9. Trust with effective communication could create resources that lead to a competitive advantage [50].
10. Information sharing as a prerequisite for trust [51].
11. Trust and collaboration were becoming more prevalent in supply chain relationships because of their ability to reduce uncertainty [22, 52, 53].
12. Supply chain management is built on a foundation of trust and commitment [54].
13. The high levels of trust characteristic of relational exchange enable trading partners in supply chain to focus on the long-term benefits of the relationships [31, 55-66].
14. Trust is number one on the list of reasons why so many firms do not think that their partner relationships are working as well as they should [67].
15. Examine the nature and extent of commitment to supply chain collaboration and also the state of supply chain governance structures [68].
16. Top management commitment is a key component of successful implementation of SCM [69].
17. Trust and commitment can only be earned and built on actions such as communication, adaptation, cooperation, shared values, and quality satisfaction [66].
18. Three types of commitment emerge from the literature: calculative or continuance commitment, normative commitment, and affective commitment [70].
19. Commitment is viewed as critical in the literature of organisational purchasing behaviour. Researchers have used commitment as the most common dependent variable in buyer-seller relationship studies [71].

Trust and commitment for the LPG industry in Indonesia will improve relationships resulting in future value to both parties (buyer and seller). For example, in order for the relationship to
be sustained the supplier must deliver the correct stock, in the correct quantity, at a price that is reasonable to both parties. As a result, trust and commitment can improve supply chain performance (responsiveness and efficiency). For instance, it will allow trading partners in Indonesian LPG enterprises to maximise the efficiency of their capabilities and resources and lower their cost.

Based on the discussion above and literature studies, trust and commitment (antecedent cooperative behaviour) are considered in this research. Thus, seven sub-elements of trust and commitment are developed in the questionnaire. They are:

1. Our trading partners respect the confidentiality of all the information they receive from us.
2. Our trading partners have been open and honest in dealing with us.
3. Our transactions with trading partners do not have to be closely supervised.
4. Our firm has invested a lot of effort in our relationship with trading partners.
5. Our trading partners have made sacrifices for us in the past.
6. Our firm and trading partners always try to keep our promises to each other.
7. Our trading partners abide by agreements very well.

In assessing these aspects of the supply chain, it will be essential to analyse the impact of the various aspects of regulation imposed on the LPG distribution system by the Indonesian Government.

**Strategic supplier partnerships**

Strategic supplier partnerships are “a co-operative and collaborative way in which buying and supplying firms interact to achieve mutually beneficial outcomes, these relationships position participants to be more competitive in the marketplace” [72, p.616]. Another definition of strategic supplier partnerships is the long-term relationship between the organization and its suppliers [22, 73-76]. They are designed to leverage the strategic and operational capabilities of individual participating organizations to help them achieve significant ongoing benefits.

There are several studies on strategic supplier partnerships in different sectors.

1. The evolution of supply chain partnerships in the British beef industry, driven by changing consumer demand, food safety legislation, a concentrated and highly competitive retail sector and the BSE crisis [77].
2. The use of procedural justice and distributive justice to measure the fairness of trading relationships is a useful and comprehensive way of categorizing the many different aspects of retail buyer behaviour in trading relationships with suppliers [78].
3. Long-term relationships influence the strategic and operational capabilities of individual participating organisations to achieve important ongoing benefits to each party (delivering value to customers and profitability to partners) [22, 37, 73, 75, 79-83].
4. Elements of partnership in SCM are: high levels of communications; provide managerial assistance; exchange personnel; make relation specific investments and ensure suppliers have world-class capabilities [84].
5. Elements of partnership in SCM are: trust; coordination; information sharing; interdependence; information quality; joint participation (problem solving and conflict resolution) [22, 81, 85].
6. Businesses seek to form strategic supplier partnerships to work closely together and eliminate wasteful time and effort [37, 86-88].

7. Four elements of strategic supplier partnerships are: long-term commitments; open communications and information sharing; emphasis on cooperative and continuous improvements and the sharing of risks and rewards of the relationships [24, 87, 89-92].

8. Creating more cooperative and integrative relationships with key organisations (including effective supplier partnerships) can be a critical component of a leading edge supply chain [38, 76, 93-97].

9. Disagreements between the firms are mostly due to the inconsistent level of treatment, the failure in achieving goals as well as changing priorities of the partners [98].

10. Strategic partnerships improve information sharing among trading partners, and result in cost reduction, quality improvement and service enhancement [99, 100].

There is little previous research on LPG supply chain management. Thus, it is important that the research investigates whether the strategic supplier partnerships in the Indonesian LPG supply chain relationships can have positive or negative impacts on supply chain performance. Again, the inclusion of the influence of Indonesian Government regulation will be important to the assessment.

**Customer relationships**

One of the major challenges that most businesses experience is providing a consistent service level across the wide variety of customer touch points that it provides (for example, over the telephone, face-to-face contact and via email). The implementation of a suitable customer relationship management (CRM) process will allow the organisation to achieve this service consistency. The CRM system will also allow the company to come closer to its customers and more aware of their needs. Close customer relationships may lead to improved customer retention and also positive word-of-mouth promotion for businesses.

Keeping existing customers is less expensive than attracting new customers, so businesses will gain from becoming more aware of their customers’ requirements [101]. The central point of a successful CRM system is information. This foundation of information is then utilised to deliver relevant services to the customer [102]. The information for each customer can then be shared within industry, providing a full 360-degree view of the customer [103]. As a result, the information within the CRM system must be kept up to date and relevant to the business. Development of new IT infrastructure within an industry may be required to assist the CRM process.

While the introduction of a CRM system for the firm may assist in the improvement of customer relationships, customers will still require individual attention to their own unique needs.

The development of the CRM process for the industry requires commitment from a number of different stakeholders within the company. Whilst dedication from senior management is seen as critical to success, a company-wide commitment is also required [104]. Employees must see the benefit from the system and its relationship to improving customer service in order for it to succeed. Without this commitment the CRM system will battle for credibility.

In order to gauge the needs for the CRM process and what customers want, a survey, focus group or in-depth interview are to be developed.

There are five strategic sub-processes in customer relationships [105] that LPG enterprises may need to embark on in order to implement a proposed CRM process:
1. Review corporate and marketing strategy (for example, strategic decisions – this provides a snapshot of the firm);
2. Identify criteria for categorizing customers (via surveys to determine customer needs);
3. Give the guidelines for the degree of differentiation in the product/service agreement;
4. Develop framework of metrics;
5. Develop guidelines for sharing process improvement benefits with customers (value attributes).

The customer relationships management process gives the structure for the way in which the relationship with the customer is developed and maintained [105]. There are several previous studies on customer relationships:

1. Customer relationship management (CRM) is a combination of technology and business processes that is used to satisfy the needs of customers [106].
2. The main function of CRM is to closely interact with the customers of a business to increase the level of service given to them [104].
3. The primary goals of CRM are to build long-term and profitable relationships with chosen customers; get closer to those customers at every point of contact; and maximize the company’s share of the customer’s wallet [107].
4. CRM is a management tactic to manage customer complaints and to also build long-term customer relationships. Improvements to customer satisfaction are also an output of CRM [76, 108-112].
5. Customer relationship management includes the processes of managing customer complaints and feedback, developing long-term customer associations and increasing customer satisfaction [108, 109].
6. Within supply chain management, the management of customer relationships is important [76, 108].
7. Creation of strong, long-term customer relationships is a form of competitive advantage as is creates barriers to competition [113].
8. Close relationships among supply chain members including customers can increase the value offered to the customer [114].
9. Strong and close customer alliances allow a company to differentiate its product or service from its competitors. This can then lead to increased customer loyalty and increase the value offered to the customer [111].

Based on existing and previous studies by researchers over many years in different sectors, it is clear that customer relationships should be included in the conceptual framework of the Indonesian LPG supply chain relationships. Whether customer relationships significantly influence supply chain performance needs to be investigated using a statistical approach. Government regulation will again be an issue that forces itself into the CRM equation.
Supply Chain Responsiveness and Efficiency

Some selected previous studies from 1979 to 2006 on supply chain performance indicators (customer responsiveness [81, 115-127] and efficiency [54, 81, 115-129]) in manufacturing, food, transport, steel production, horticulture and other sectors. It is proposed that this measurement of performance will form part of the conceptual framework that we are developing.

The application of supply chain performance indicators (customer responsiveness and efficiency) has been proposed across the various industries. Taken together they contain characteristics that have common features with the Indonesian LPG industry. Most previous studies have focussed on efficiency as a supply chain performance indicator. This seems to confirm that supply chain performance efficiency is essential to the Indonesian LPG industry.

Supply Chain Responsiveness

Responsiveness is the velocity at which a supply chain provides products to the customer [130]. There are six sub-elements of responsiveness as a supply chain performance indicator that are considered in this research. These sub-elements are to be presented in the questionnaire. They are:
1. Our firm fills customer orders on time.
2. Our firm has a short lead time (the time between when the order is placed and when it is received by the buyer).
3. Our firm has a fast customer response time.
4. Our firm always delivers on time.
5. Our firm has a customer return policy.
6. Our firm has no shipping errors.

Supply Chain Efficiency

The supply chain performance indicator efficiency is defined as cost reductions related to planning, making, sourcing and delivery to consumers. Based on the discussion above, there are six sub-elements of the efficiency supply chain performance indicator in this research. These sub-elements are presented in the questionnaire. They are:
1. Our firm has had a low inventory cost.
2. Our firm has had high labour costs.
3. Our firm has had low transportation costs.
4. Our firm has had low operations costs.
5. Our firm has had minimal waste cost.
6. Our firm has made high profits.

CONCLUSION

This paper proposes a conceptual framework of supply chain relationships factors that impact on supply chain performance of Indonesia’s LPG supply chains. According to a review of related studies, the supply chain relationships factors along a supply chain of different industries have different effects on supply chain performance. Thus, their impact on LPG supply chains can be different from previous studies.
To test two main hypotheses of this conceptual framework, an empirical approach will be implemented in this research project because it can represent particular characteristics of the LPG supply chain, and relate to the conceptual framework. The mail-questionnaire survey will be distributed to about 1,000 enterprises. The statistical techniques of hypotheses testing will involve the use of reliability analysis, factor analysis, multiple regression analysis, and Pearson correlation analysis.
REFERENCES


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