

# THE ROLE OF OWNERS IN THE SUPPLY CHAINS OF HIGHWAY CONSTRUCTION PROJECTS: AN OVERVIEW OF INDONESIAN CASES

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## ABSTRACT

The availability and condition of Indonesia's road infrastructure is far from adequate to sustain the national economic development. One option to improve the state of road services is to seek funding from the private sector.

Owners play a central role in construction including in the integration of supply chains. Unlike in public projects, a private company as the owner of a toll road project has more flexibility and strategic role in better managing its construction supply chains. To obtain a portrait on road construction supply chain management practices by these private owners, a multiple case study was performed on three companies constructing toll roads in Java Island between 2009-2010.

The exploratory study involved interviews with project managers to identify the traditional practices and innovative ways in managing their construction supply chains. The study focused on investigating several aspects supporting the successful project management with reinforced role of the owner.

Findings showed that there were distinctive practices of managing the construction supply chains among the three cases. The distinguishing factors were the company culture, the expertise and progressive characteristics of managers and supporting staffs. Reinforced role of an owner could be effective in improving the project performance when the top management recognizes the potential value and implement strong leadership.

## KEYWORDS

Private owner, supply chains, management, road, construction, infrastructure.

## INTRODUCTION

The development of a society depends upon the availability of physical infrastructure to facilitate the distribution of goods and services. There is a strong correlation between the availability of adequate infrastructure facilities with a nation's economic development. According to a study conducted by the World Bank (Queiroz and Gautam 1992), the gross national product (GNP) per capita was influenced by the availability of road infrastructure, measured in road density (the total length of roads divided by the total land area).

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Roads are very strategic in supporting economic activities especially in developing countries, with a vital role in the distribution and marketing of produces, farm and plantation products, and access to health, education, and various other public services. Good roads increase a nation's competitiveness by making more efficient transfer of goods and services.

Road condition in Indonesia is rather far from adequate to support its national economic growth. Indonesia includes a vast land area, consisting of tens of thousands of islands. With a total land area of 1,890,754 km<sup>2</sup>, according to the latest data from the Directorate General of Bina Marga – Ministry of Public Works, there are only 36,000 km of national roads, with 6% of those are in poor condition. The government, through the Directorate General Bina Marga has realized the vital role played by roads, and has targetted a national road maintenance programs to reduce the number of roads in poor condition to around 3% of total road length by allocating Rp. 9 trillion (almost \$1 billion) in 2009 alone.

It is the responsibility of the government to build infrastructure to support the national economic development. However, due to limited public funding, the government has to obtain private investments by awarding commercial operational concessions for a specific time duration for the construction of infrastructure facilities including toll roads. Private investments in toll roads have been around for more than 30 years in Indonesia, but these investments have been slowly progressing; there is a total of only 649 kilometers of toll roads constructed during the last 30 years span. This figure is relatively short compared to the total land area of Indonesia. PT. Jasa Marga, the leading toll road operator, is a state-owned company which manages 501 km. The rest is operated by private companies. Compared to Malaysia which only started toll road construction ten years after Indonesia, they have constructed around 6,000 kilometers. Another fine example is China, which in 20 years, have built more than 90,000 kilometers of toll roads.

In 2006, the Ministry of Public Works have launched a program to construct more than 1,600 kilometers of new toll roads, including the Trans Java project which will span across the most populous island. This 583 kilometers road project will absorb more than Rp. 31.8 trillion (\$ 3.2 billion) in construction cost. This program has started to attract private investors; while improved regulations are implemented to boost more investments.

The participation of private companies in road infrastructure has been promising. Owners have played a central role in construction including in the integration of supply chains (McDermott 2012). Unlike in public projects, unrestricted by public procurement regulations, a private company as the owner of a toll road project can exercise procurement strategies and tendering procedures. Because they have much more flexibility in management (as opposed to facing the devastating bureaucracy in public sector, particularly with regard to public procurement regulations), these investors can implement viable alternative to increase the efficiency of project management through construction supply chain management.

In the context of Indonesia, an owner is generally in the position of dominance over the supply chains. This is due to the imbalance of supply and demand of construction projects. Moreover, it is the investor that makes the initial decision to procure construction works and the way in which procurement takes place.

Investors constructing toll road projects have additional advantage because of the repetitive nature of the business. They can benefit from SCM by increasing their involvements in the supply chains, more of being as a “prosumer.” Because an owner is in fact the initiator of the project and is the eventual user of the construction end product, he or she needs to be more proactive to achieve the value that is desired through direct management of supply chain or directly controlling the process (Vrijhoef and Koskela 2000).

## **PRIVATE INVESTORS AS OWNERS OF TOLL ROAD PROJECTS**

The owner in the context of a toll road construction project is the concessionaire which has full authority on the construction activities and operational aspects of the toll road during the concession duration. Thus, the owner will exercise its authority to achieve maximum results by controlling its construction supply chains. The private investors in the toll road business are mostly companies specializing in infrastructure construction industry. These companies have vast experiences constructing and managing road projects. This repetitive nature of managing similar projects is relevant for implementing supply chain management.

Khalfan et al. (2008) suggest that a change towards increased integration among different supply chain partners through supply chain management should be driven by owners. Owners are generally more enthusiastic than the main contractors about retaining other supply chain members’ experiences. Also, the relationship between the main contractor and other members is affected by the relationship between the owner and the main contractor. Thus, the owner’s procurement procedures, including recommendation and nomination of subcontractors and suppliers to main contractors, will push supply chain integration.

As opposed to state-owned companies, a private investor as construction project owner has more flexibility in implementing innovative management and procurement of projects. The legal issue is not as restricted as those faced by the public sector. For example, a state-owned company, as an owner, does not actively involve in the selection of subcontractors and suppliers as a way to manage construction supply chains. This practice is prohibited by the public procurement regulations.

On the other hand, the recent trend on increasing participation of private companies in public-private partnership on toll road constructions, is expected to have positive effects on national road construction management. These private owners could expand their roles to involve in the construction supply chains.

To identify whether these private owners/investors have understandings and played their roles, this study focused on investigating several aspects supporting the successful project management with reinforced role of the owner.

In managing the supply chains, several aspects that must be considered by an owner have been identified in the literature (Fawcett et al. 2004, Wisner et al. 2005, Tommelein et al. 2009, Wirahadikusumah and Abduh 2010). These factors are: human resource management, value delivery management, financial management in the supply chains, the concept of trust within the supply chains, creating robust procurement, developing contractual setting in the supply chains, the role of construction management, the role of general contractor, organizational aspect, supplier management, and the encouragement from the top management of each company including the supporting regulations. These identified aspects have been

adapted in developing the model to assess the implementation of construction supply chains in our case study.

**CASE STUDY: 3 TOLL ROAD CONSTRUCTION PROJECTS**

Exploratory study on three projects was conducted to identify the traditional practices and innovative ways in managing construction supply chains. The study focused on investigating the aspects supporting successful project management with reinforced role of the owner (Sulistyarningsih 2010).

During the period of 2009–2010, there were three toll roads in Java Island (the most populous island) under construction, with private owners. To explore construction SCM practices, intensive interviews were conducted with owner representatives on the general and specific characteristics of each private company. The discussions were on the following issues: the organization structure of the project/company; human resources; the perception of value delivery; company finances; trust among parties; procurement process; main contractor management; subcontractors/suppliers procurement; and support from top management.

Most of Indonesia’s toll roads are managed by a state-owned company, PT. Jasa Marga. As the leading player in the business, the company operates 75% of toll roads. Recently, the boost its development, the company has been collaborating with local governments (provincial government) in establishing new firms as toll road investors. The partnerships with local governments is assumed to assist in overcoming the challenges of land acquisition process and with local community issues.

Table 1. The profile of three owners in the case study

Company	Project Profile	Owner Profile
X1 – owner of project X1	The second stage project (76.5 km), while the first stage (17 km) was completed by the same owner. Rigid pavement.	A consortium between PT. Jasa Marga and Central Java Provincial Government.
X2 – owner of project X2	The second stage project (11 km), while the first stage (3.8 km) was completed by the same owner. Rigid pavement.	A consortium between PT. Jasa Marga and West Java Provincial Government
X3 – owner of project X3	Total of 35 km, partly had been completed and fully operational. Rigid pavement with precast pre-stressed concrete pavement (PPCP).	Fully private firm, a new player in infrastructure business, has six subsidiary companies involved in the construction and operation toll roads.

As shown in Table 1, the three toll roads under construction are owned by three different private investors, namely X1, X2, and X3. Firms X1 and X2 are joint ventures between PT. Jasa Marga and local governments with controlling share retained by local provincial governments. Firm X3 on the other hand is a fully private company with toll road infrastructure as their new business. Firms X1 and X2 have relatively similar characteristics and policies since both are from the same holding company. Despite the similarities, these two companies were analyzed as case studies to understand the dynamics in the project level management. Firm X3 is interesting to

be included in the study to gain insights on how a private investor managing its projects. The advantages of having more flexibility compared to companies X1 and X2 have been investigated.

### **COMPANY X1**

X1 is a concession holder and owner of a 76.5 km toll road construction project in Central Java. The owner is a consortium of PT. Jasa Marga, as an experienced toll road operator, in cooperation with local provincial government. At the time of the interviews, the first stage of 14 kilometers construction had been completed and continuing using the same contractors.

The project included several overpass and underpass structures, in addition to regular rigid pavements. The general contractor was also responsible for environmental management during construction particularly because of the numerous on site production processes involved. In general, the owner in this case gave much reliance to the main contractor. However, since the construction period was relatively short, the owner fully recognized the complexity; to ensure targetted schedule completion, the owner had to be involved in the procurement process of materials and equipments.

The owner intensively involved on suppliers procurement process. The owner always accompanied the main contractor in the procurement process to ensure that materials and major equipments were of the highest quality and in accordance with the owner's "value." The main contractor had to consult the owner regarding the selection process for the supply chain partner candidates. This included evaluating the tenders together, since the administrative review phase, jointly interviewing and reviewing technical presentations, and site visits to potential suppliers. The owner's approval was compulsory for the selection of supply chain candidates in this project.

The involvement and even "intervention" of the owner were not specifically addressed in the contract, however this practice was due to the owner's higher bargaining position. The project manager as the owner's representative was a dominant and very competent professional who was exercising his leadership role.

Owner's involvement on the various activities during construction was quite informal. There was no particular company procedure in managing the supply chain and there was no specific personnel assigned to deal with this issue. The owner was not fully aware of the importance of designing its direct involvement as a step towards SCM. Besides, there were also several policies of its holding company which were incompatible with the implementation of SCM. As a new consortium company, X1 was in fact not fully obliged to follow rigid government regulations, however, there was some cautiousness on the part of the project manager.

Although SCM practices were not yet fully implemented, company X1 possessed adequate competency in managing all aspect of construction projects. They were soild in financial management, human resource management, and had the willingness and seriousness to conduct quality construction. The highlights from case X1 included the facts that procurement process was well conducted and there were trusts between the owner and the contractor, and among its supply chains. In effect, the entire construction supply chains were attempting to provide satisfactory construction to achieve the "value" targetted by the owner.

## **COMPANY X2**

Company X2 holds a concession for 11 kilometers toll road West Java. Similar to the first case, X2 is a consortium formed by PT. Jasa Marga and the West Java Provincial Government. During observation period, 3.8 kilometers of road was completed and started to be operational for public. The design and construction of rigid pavements were not technically complex.

During construction stage, company X2 implemented “traditional” project management practices; full authority related to construction activities was delegated to the main contractor. While both firms X1 and X2 had similar organizational characteristics and were part of the same holding company, there were differences between project management practices of the two cases/projects. These were due to due to the different project leader characteristics; not because of the lack of managerial competency but rather because of more internal obstacles faced by X1. Compared to X2, X1 as a consortium had only been operating more recently. Thus, internal consortium problems were overriding and impairing the authority of the project manager.

There was no involvement of the owner on suppliers’ management. All subcontractors and suppliers were independently procured and managed by the general contractor. Owner’s approval was mostly for administrative purposes. It was found that the procurement policy on the part of the general contractor was acceptable and eliminating the need for further owner’s involvement. Procurement on this project utilized approved vendors lists (or suppliers, subcontractors, and specialists) which were put together by the general contractor’s main office. The head office administers lists containing the names of companies which had passed has been through systematic selection criteria and verification process.

In general, X2 had not formally implemented SCM principles in this project. Nevertheless, according to interviews with the project manager, there was a possibility for its eventual implementation on the next stage of the project. Based on his experiences in the early stage of this project, the project manager realized that more focused and sustained efforts were necessary and were planning to identify elements of the main supply chains to be managed directly by the owner.

## **COMPANY X3**

The owner of project X3 is a fully private company awarded a 35 kilometers concession of toll road in Cirebon, West Java. X3 has six subsidiary companies involved in the construction and operational aspects of the project. Company X3 has been a conglomerate for various businesses in Indonesia. Since the last few years, it has invested in the infrastructure sector, thus X3 already had an integrated vision between the toll road business and its other line of businesses. The owner was very serious in managing its construction supply chains.

The construction included the use of precast pre-stressed concrete pavement (PCPP), which was not common in Indonesia. The decision to implement the unfamiliar design/method was risky but the owner went forward with close control. The project manager was aware about potential advantages of managing its construction supply chains. Company X3 instigated a rule that the main contractor had to use 70 percent of its supply chain partner companies affiliated with X3.

The contract between the owner and the main contractor was conventional, but there was an agreement between both parties to collaboratively develop the construction supply chains, and to employ companies affiliated with X3. The scheme included jointly conducting an inventory of project requirements and procuring necessary resources through tenders or direct appointments. The decisions had to be mutual, approved by both parties, while the proposals partner candidates could come from either the owner or the main contractor. Each supply chain partner selected was then maintain contractual relationship solely with the main contractor, although in effect the owner was still in charge with its performance evaluation. The general contractor received additional fees proportionate to the value of works conducted by the supply chain partners. The fee was a compensation for his efforts in maintaining project coordination and the associated risks.

To facilitate the complexity in managing its numerous partners, the owner assigned additional personnels forming several work groups. One work group was particularly dedicated for procurement. This group/division was relatively strong with a manager and several personnels, maintaining close contacts and coordination with other divisions to evaluate and rate the performance of the company partners. The rating was then recorded in the database, only qualified partners were considered for the next tasks and even the subsequent projects. The development of these partner companies were promoted, they were invited for periodic meetings to build dialogues aligning the company's visions with theirs, ensuring long-term relationships. Trusts had grown among these companies and had been shown through consistent performance. On the other hand, the owner also provided exemplary attitudes by on-time payments to all parties and maintaining orderly supervisions towards the payments of the main contractor to all subcontractors/suppliers.

As a fully private firm, this particular case had shown that when an owner had some flexibility in implementing various potential management strategies, different results in the supply chain performance could be significant. The project manager was also utterly supported by the top management of the head office, the trust from the highest level of management passed on to all levels in the project organizations and to the construction supply chains as well. While SCM had not been entirely implemented, the company was optimistic to improve their practices for the next stages/projects due to their positive initial experiences.

### **COMPARISONS OF THE THREE CASES**

In the previous sections, the exploratory study of cases X1, X2, and X3 through intensive interviews with project managers was presented. The study focused on investigating several aspects supporting the successful project management with reinforced role of the owner. The comparisons among the three cases are shown in Table 2. The comparisons consider: human resource management and organization; the perception of value delivery; company finances; trusts among parties; subcontractors/suppliers procurement; main contractor management; support from top management; supplier management; policies on SCM.

Table 2. Toll Road Project Management of Owners X1, X2, and X3

No	Company X1	Company X2	Company X3
1.	<i>Human resource management and organization</i>		
	The management and organization do not differ from typical projects. The project was relatively large, thus there were more employees involved, management was more complex accordingly.	The management and organization do not differ from typical projects.	More complex than on typical projects. To facilitate reinforced role of the owner, there was a division solely assigned for procurement of suppliers/subs.
2.	<i>Awareness on value delivery</i>		
	Had been aware and started to implement.	Had been aware, but not yet started to implement.	Had been highly aware and started to actually implement.
3.	<i>Financial resources</i>		
	Investors were state-owned and regional state-owned companies with strong/fixed finances. Company finances were healthy and considered adequate for supporting SCM.	Investors were state-owned and regional state-owned companies with strong/fixed finances. Company finances were healthy and considered adequate for supporting SCM.	Investor was a fully private company supported by guarantor banks. Company finances were healthy and considered adequate for supporting SCM.
4.	<i>Trusts among parties</i>		
	Trust management had been conducted, but not intentionally designed to support SCM.	No trust management.	Trusts among parties had been well defined and managed. Project manager provided open access of information within internal company and also externally to company partners.
5.	<i>Procurement process</i>		
	Procurement of subs/suppliers were conducted by the main contractor. However, the owner was in fact actively selecting the company partners.	No active involvement of the owner on the procurement of subs/suppliers.	Tenders of subs/suppliers were conducted jointly with the owner, while they maintained contractual obligation toward the main contractor only. The partners were mostly affiliated with the owner (70%).
6.	<i>Main contractor management</i>		
	Traditional	Traditional	There was informal agreement between the owner and the main contractor, so that the owner could “intervene” in the supply chains. The main contractor was compensated with additional fees.
7.	<i>Support from top level management</i>		
	Not available	Not available	Full support from top management

8.	<i>Supplier management system</i>	Not available	Not available	Suppliers were selected and managed by the owner, while maintained contractual obligations with the main contractor.
9.	<i>Supporting company policies on SCM</i>	Not available	Not available	Internal policies and procedures to support the implementation of SCM had been existed.

Table 2 shows that each owner has different characteristics, particularly in the aspects of human resource management and organization; value delivery awareness; procurement process; and trust management. The major differences are apparent in the case of X3, compared to X1 and X2. This was due to the flexibility of X3 to implement effective strategies to manage the construction project down to its supply chains. Meanwhile, the legal status of X1 and X2 as joint venture companies involving state-owned companies, made it more difficult for them to exercise the authority to fully involve in managing their partners. X1 and X2 had traditionally been part of public organizations, thus these companies had been more reluctant to execute innovative project management. In the project level, the managers were inclined to totally follow the procedures designated by the head office. The level of awareness towards value delivery within the owner's organization might also be a determining factor in SCM.

While X1 and X2 are similar companies (with the same holding company), there were differences on the project level management. X1 was more involve in managing its supply chain, this was because X1 used a project manager who were highly aware of his role. A director of a joint venture company such as X1 and X2 had basically functioned as a project manager. This fact suggests that the project manager's leadership and authoritative style was a determining factor. Both X1 and X2 faced similar regulations and company policies, but there was some latitude and X1 proceeded with better project management.

In case X1, the project manager was very concerned with the targets. He persisted with internal project procedures to monitor the progress and quality of works, he did not stop with the main contractor but also expanded his role to actively select and monitor the subcontractors and suppliers. These partners were selected based on technical presentations and site visits, in which the owner was committed to the whole process. Meanwhile, in the case of X2, the role of owner had been limited to mostly administrative, the responsibility of quality control and assurance were handed over to the main contractor.

## **CONCLUSION**

In the multiple case study, the different role of owners had been explored. It was found that the differences were mainly attributed to the company's characteristics (fully private vs. semi-public); the project organization; value delivery awareness; procurement process; and trusts among parties. Furthermore, internal factors were

also significant, i.e., the leadership style and knowledge of the project manager, in the implementation of SCM by reinforcing the role of the owner.

From this exploratory study, it is concluded that private investors as owners of toll road projects had not fully managed the supply chains. The regulations are more accommodating for these owners, however, they lacked the knowledge and experiences to experiment with innovative project management.

Early steps towards construction supply chain management had been observed in these cases, further extension of an owner's role in assuring the project's success and efficiency still remains. To achieve a change towards more collaborative relationships among supply chain participants, the owners' (i.e. project managers) procurement behavior is critical. Furthermore, Indonesian road investors should put more focus on project leadership, strong leadership on the part of a project manager is key towards integration of the supply chain.

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