

MANAGING CONSTRUCTION SUPPLY CHAINS: THE COMMON SENSE APPROACH FOR PROJECT-BASED PROCUREMENT

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Abstract

This paper will provide an introduction to the argument that there is considerable evidence of poor thinking within the construction industry. The failure to understand the circumstances that are facing industry players will prevent clients, contractors and suppliers from achieving their own objectives. In response to these problems the paper will provide practitioners with a theoretical framework for understanding: the structure of the industry and its constituent supply chains; the attributes of buyer and supplier power; the appropriateness of certain relationships according to the firm's power position; and, the circumstances where the recent industry initiatives and an integrated supply chain approach may be implemented with success.

Keywords: Effective Supply Chain Management, Power Regimes, Construction Industry

Introduction to the Construction Industry

The activities of the construction industry are concerned with the planning, regulation, design, manufacture, construction and maintenance of buildings and other structures. Construction work embraces the sectors of building, civil engineering and the process plant industry and includes a wide variety of different activities in respect of size and type of projects and the professional and trade skills required. Whilst the principles of execution are similar, the scale, complexity and intricacy vary widely.

The importance of construction cannot be understated. Regardless of primary business, organisations will always require interaction with the construction industry to source the physical assets to house their operations. This requirement will range from the construction of large industrial units for the manufacturing operations of large organisations to minor repair and maintenance work for the offices of small organisations. The size of the organisation and nature of its' business will therefore determine the extent and regularity to which they source from the myriad of supply chains for construction products and services.

Indeed, there is no doubt that construction remains to be a key activity within the UK economy. The UK construction industry currently contributes approximately 7% to GDP. The total volume of all construction work in 1999 was valued at over £60 billion, with the total market divided almost equally between new work and repair and maintenance. The construction industry has remained a staid, tradition-bound sector due to its relatively stable environment. The literature on innovation and business management has overlooked this sector in preference for the more glamorous electronics, IT and automotive industries. This

lack of attention is somewhat surprising given the importance in terms of revenues, number of firms and employees within the sector.

The construction industry has undergone considerable change recently due to increasing pressure on already low margins and the many industry initiatives aimed at improving supplier performance and customer satisfaction. These initiatives have not addressed (or understood) the root causes of the inherent problems of the industry. Construction supply chains have remained contested, fragmented and highly adversarial due to the conflicting nature of demand and supply. This combined with the historical nature of the structure has resulted in the emergence and development of complicated structures of power in the materials, labour, equipment and professional services marketplaces.

The fragmentation has meant that there is a diverse supply market from which clients may source. There exists a large number of suppliers with which any firm may do business in the delivery of their construction requirements (from small specialist contractors to large multi-functional firms delivering complete solutions). However, the number of firms is not the only factor that has increased the inherent difficulties facing those sourcing from the industry.

In addition, significant technological advances with the actual construction products and services has opened up a range of different sourcing possibilities. The decision whether to internally maintain all the technological expertise they need to effectively compete is an increasingly difficult one; even for the informed and competent purchaser. As a response to this, firms increasingly turn to the use of external suppliers for construction related services, which were previously supplied internally. These facts have made construction supplier management an increasingly important concern.

The spectrum of construction products and services ranges from routine commodity components to highly specialised services that can only be performed by qualified experienced individuals. For this continuum of construction products and services with differing criticalities to the organisation, the gamut of possible supplier relationships ranges from purely independent transactional, price-based interactions through highly interdependent relationships to situations where dependent sourcing arrangements are the only alternative to the organisation purchasing the construction asset. Therefore, in order to maximise the business value of procured products and services, an effective supplier management strategy has become a critical component for a large number of end customers.

Another major factor adding to the complexity is the choice of the type of firm to deliver the solution. Because construction is widely misunderstood by those procuring the products and services, clients find it difficult to fully understand the implications of the selection of the supplier. The choice of whether to select a single supplier who integrates the constituent supply chains or go to each of these markets separately is a key decision. The client firm will have to decide to what extent to use the external market in terms of developing the solution, integrating the solution and managing the implementation. In addition, the services will be highly priced, and the careers of the key personnel within client organisations can rest on the success or failure of the decision. Therefore, high-perceived uncertainties would combine with the already risk-adverse corporate cultures to steer decision-makers towards 'safe' providers of the solutions.

With the increasing competitive pressures and demands for profit, it is also surprising that most construction firms are still managed and organised in a traditional manner with no coherent business strategy. This fact has led to firms concentrating only the acquisition of work in the short-term and with survival of paramount importance, this myopic focus has adversely affected the levels of innovation within the industry.

Supply Chain Mapping in Construction

Within the UK construction industry there exists a myriad of construction supply chains. Each of these supply chains will exhibit different structural properties that need to be understood so that appropriate sourcing strategies can be developed for the specific products and services involved. The understanding of the structures of power at each stage of the supply chain is dependent on understanding the criticality of the product and service to the end customer and the nature of demand and supply within the industry as discussed previously. The construction industry is characterised by the following major supply chains: construction ‘integration’; professional services; materials; equipment; and labour. These supply chains display significant overlap.

Insert figure 1 here

Figure 1 illustrates the key generic supply chains that are required in the integration and delivery of a typical solution. The diagram suggests that the supply chain is rather simple but the reality is quite different. This paper has already highlighted some of the problems associated with procuring from the myriad of construction supply chains. The ultimate level of complexity involved with the management of the construction project will be determined by the specific requirements of the end customer. It is difficult to quantify the exact number of constituent supply chains that have to be integrated into a typical project—such a project does not exist due to its unique project-specific properties.

During the construction process, the end customer will appoint the construction firm and professional services where needed¹. Within the generic supply chain, the construction firm plays the major ‘integrating’ role for all upstream supply chains. However, it should be noted that there is a high degree of subcontracting within the industry with main contractors appointing third parties to deliver ‘packages’ that can be integrated within the solution. The use of subcontracting within the industry is further increasing the problems associated with adversarialism as there is another party in the supply chain who is attempting to earn margins to the detriment of other firms.

For each individual element of a construction project there will be a requirement to source from the respective labour, materials and equipment supply chains. Procurement professionals sourcing from these chains will face the same challenges and difficulties as those responsible for the selection of the construction firm. However, there may instances where the construction firm is able to engineer a guaranteed regular demand for specific products and ‘mobile’ services that are used in all solutions. This will only be achievable if the organisation understands the nature, regularity and location of their total sourcing requirements from the upstream supply chains.

Proposed Best Practice in the Construction Industry

Within the UK construction industry there is a significant malaise in what constitutes current 'best practice'. This debate, however, is not one that has surfaced recently. For the last seventy years, reviews (Banwell, Latham and Egan) have consistently and relentlessly blamed the inherent problems of the industry on the fragmentation of the supply market and the adversarial attitudes of players. The lack of integration between design and construction, and the way that problems are addressed in a contractual manner by, and between, supply chain participants are also purported widely as the root causes of the industry's ills.

In recent years there has been a tendency to believe that integrated supply chain management (ISCM), often referred to as lean thinking or supply, is 'best practice' (Hines, 1994; Womack and Jones, 1996; Handfield *et al*, 2000; and Hines *et al*, 2000). Based on practice within the Japanese automotive industry, its major distinguishing feature is that it is less arm's-length and more focused on the creation of jointly developed innovations in supply. These innovations were nearly always driven by the assembly company, and focused on the eradication of waste and inefficiency, so that better value products could be passed to the final customers.

It is worrying that all too often practitioners nowadays appear to be advised to undertake relational practices—like ISCM—when there is little opportunity for these ways of working to be implemented successfully. This was certainly the case within the Egan Report (DETR, 1998). This 'best practice' involves the rejection of a historic focus on adversarial buyer relationships with suppliers in favour of a more long-term collaborative approach based on trust and partnerships/alliances. Such a way of thinking is limited. This is because those who seek to adopt the ISCM approach have been guilty of a failure to properly understand the power circumstances within which ISCM practices were originally undertaken, and of a tendency to adopt a 'barefoot empiricist' approach to explanation (Cox, 1997).

This is not to argue that an ISCM approach is always inappropriate. The key, however, is to recognise that, while this approach can be made to work successfully in some circumstances, it cannot be made to work successfully in all. A more scientifically rigorous and practically useful way of thinking must be to understand that any corporate 'best practice' is clearly contextually and relationally dependent. Only by properly understanding the objective contextual (power) circumstances that exist between buyers and suppliers, and the range of relationship management choices available to them, will practitioners ever be able to understand what are the most appropriate ways of managing business situations (Cox, 2000; Cox, 2001).

This argument demonstrates that the recent industry reports (Latham, 1995 and DETR, 1998) suffer from an inappropriate methodology to analyse the causes of inefficiency in construction procurement. Having started from a faulty methodology, and having an apparent subjective preference for 'partnering' solutions, the approach they are advocating cannot hope to resolve the major problems in the industry. The authors of these reports are espousing inappropriate advice to pursue a generic approach based on thinking from other industries. They have clearly misunderstood the fact that it is the circumstances that confront the industry that cause the numerous problems. It will require something more fundamental than the mere adoption of partnering relationships or prime contracting. There needs to be radical change to the

structure of the industry for certain approaches to be implemented successfully. It is questionable whether certain restructuring can, or will, take place.

However, despite the causes being contested, the effects of the problems are not. Ineffective management of the supply chain results in the industry suffering from delivered construction projects that are unsatisfactory from the clients' perspective due to the high costs, poor quality and late delivery and unprofitable for those within the numerous construction supply chains. Before we discuss a framework that allows practitioners to understand the factors that provides buyers and suppliers in the construction industry with power it is important to recognise the relationship management choices available for practitioners.

The Alternative Buyer-Supplier Relationships

The current preference for collaborative ways of working has failed to understand why exchange relationships take place. The authors view is simple—organisations enter into such relationships to appropriate value. Therefore, one thinks about the range of choices that buyers and sellers may make about the ways in which they conduct exchange relationships one must focus, first, on what is the share of value appropriated by both sides in the relationship.

Insert figure 2 here

When making choices about how exchange relationships might be conducted, it is therefore clear that the choice offered between adversarialism and collaboration is simplistic and the choice is a false dichotomy. The real choice for all sides is between how much conflict over value appropriation will occur between the two parties to the exchange (level of adversarialism), and how closely they will need to work together to achieve their individual profit maximising or satisficing goals (collaborative or arm's-length). The basic choices are illustrated in Figure 2. It should be recognised that the figure over simplifies these choices and one should understand that the choices lie on a continuum on both axes.

Robust Thinking for Construction

It is simply not possible to provide construction practitioners with a generic answer to the problems inherent within the industry. This is because there is no single way of doing anything because the circumstances that firms operate within vary all the time. We are not just talking about the project environment and the fact that every project is unique. Different supply chain players also need to be brought together for each individual solution. The competitive business environment is also changing all the time with clients and construction firms, at all stages of the supply chain, operating within rapidly evolving markets and as a consequence adopting different strategies. These changing circumstances means that there is no single business strategy or contractual relationship that will allow players within the industry to be highly profitable.

Instead of proposing misguided generic solutions, such as partnering and lean supply, industry initiatives should be advocating a way of thinking that will allow practitioners to understand the key issues and challenges. Previous discussion has demonstrated that providing a specific

answer to a particular problem is theoretically flawed. Instead, industry advisors and practitioners need to understand the correct questions to ask. Only when these questions have been answered in a robust manner can a firm begin to think about what is the appropriate thing to do.

Appropriateness

The key for most practitioners is to possess two abilities in order to succeed in business. First, they must understand what is the universe of tools and techniques that are available to them to act. This may include concepts such as 'partnering' (non-adversarial collaborative relationships), lean construction and the 'traditional' relationships that are being discounted by many within the industry as obsolete. Second, they must understand the circumstances they are in. This itself is by no means an easy task but is critical as certain tools and techniques are likely to be only appropriate under certain circumstances. Indeed, as circumstances change then the tools and techniques that are likely to be required will also have to change (Cox, 1997b).

The studying of a large number of firms within the construction industry who are seeking to improve their approach to supply chain management has led the authors to a number of conclusions regarding this. Firstly, the majority of firms do not have the necessary methodologies in place to provide the necessary knowledge to fully understand the supply chain circumstances within which they operate. In particular, the methodologies should address those factors that impact upon the nature of demand and supply within the industry. Indeed, it is the conflict between demand and supply that causes much of the conflict in the industry (Cox and Townsend, 1998; Cox and Thompson, 1998).

For example, a potential large, regular and profitable workload will provide the client with greater leverage over the contractor. Clients need to understand this fact and use such knowledge to engineer a situation to attain their business objectives. In contrast to this, if the contractor understood the nature of demand by certain clients in certain industries it may provide them with the opportunity to increase their leverage. Recognising less knowledgeable clients (or those with a highly fragmented spend) may enable the contractor to position themselves to act opportunistically. Practitioners, therefore, need to develop a way of thinking based around a robust methodology that provides the necessary knowledge and understanding to fully understand the appropriate way to procure external resources and manage their supply chains.

The Appropriate Segmentation of Construction Products and Services

It is also important that firms are fully aware of the products and services that they purchase. Research by the authors in industries ranging from construction to financial services has demonstrated that practitioners are not always in possession of the information that will allow them to act in a professional and effective manner. Such information can have an internal or external focus and be used for understanding all parts of the business so that appropriate strategies can be developed.

The internal information is critical to the development of a consolidation and leverage strategy for the effective procurement of external resources. The collected data will enable

practitioners to understand what is being purchased, the level of expenditure, the regularity of purchase, the actual suppliers providing the products and/or services and how important the expenditure is for the suppliers. This is the first fundamental step in determining who has the power in the buyer-supplier relationship so that an initial consolidation and leverage can be developed. It should not be assumed that such a strategy will automatically reduce the number of suppliers. There may be circumstances where the number of suppliers is increased to avoid situations of potential dependency. Despite this forethought, actions based on this information tend to be reactive.

The external information will include detail about the current and potential supply base and also the wider supply chain. This data will provide the basis for more proactive management and development of suppliers and other players in the supply chain.

The collection of the key supply information is critical to strategy development. The first stage of which is the segmentation of expenditure so that specific focused strategies can be formulated that are fit for purpose and appropriate for the circumstances faced. Segmentation can also indicate those areas where the dedication of internal resource may yield the greatest benefit. The potential to impact on the bottom-line through cost-reduction initiatives will be most significant for large value items that you purchase regularly and for which you are a key customer to the supplier. In comparison, focusing on low-value items purchased infrequently from a powerful supplier will be a waste of time and effort.

The most common tool used in the segmentation of external spend is the Purchasing Portfolio Matrix. Developed by Peter Kraljic in 1985, the tool (or adaptations of it) is frequently used by the major consulting firms in the procurement area, as well as the leading tool taught by academics. This matrix effectively segments a buying company's spend into four categories, on the basis of the value of the spend to the buyer's business relative to the supply market complexity that the buyer faces with any supplier.

Initially, firms use the tool to segment their spend to understand which products and services are critical to their business. Having done this, most then seek to develop only those suppliers in the critical/strategic quadrant of the matrix. Firms undertake a *pareto* analysis to determine the worst performers in this category so that they can be eliminated. This leads to supply base reduction and a focus on the remaining suppliers as the candidates for supplier development.

However, the first question that any company should ask after it has segmented its spend using the Kraljic methodology is not, how many suppliers can be removed, but what is the current structure of power in the supply market for the items that have to be purchased?ⁱⁱ It is vital that this is done because what the buyer may or may not achieve in the way of an improvement in the relationship with any supplier is always based on their relative power. The following section will present thinking that will allow practitioners to begin to understand the factors that will determine the power of firms within supply chains.

The Power Perspective in Construction Supply Chain Management

The previous discussion has demonstrated that there is considerable danger about applying the principles of integrated supply chain management throughout the construction industry without understanding that the successful selection of the best approach for any buyer or supplier will vary over time and under different supply chain circumstances. As a result, buyers and sellers face complex and difficult choices about how to conduct their relationships in circumstances of uncertainty and without knowing the motives of the other side.

It is not surprising, therefore, that industry initiatives have called for the development of mutual trust and the collaborative sharing of information between buyers and sellers in order to overcome these problems. It is our view as stated throughout this paper, however, that such recommendations can be dangerous—except on those occasions when both sides can objectively trust one another because there is no grounds for opportunism on either side. This is rarely the case as the UK construction industry is renown for its adversarialism and opportunism as contractors pursue increased revenues to supplement their small margins.

There is also a low level of trust in the buyer-supplier exchange relationship because of the frequent asymmetry of buyer and seller power attributes. By understanding the resources that augment and diminish the relative power of buyers and suppliers in specific exchange relationships is it possible—in our view—for practitioners to know what the objective circumstance is facing the parties in the relationship. Only by understanding this, is it possible for buyers and suppliers to know what is the most appropriate relationship management approach available to them.

Firms aiming for superior performance in procurement and supply chain management may use the Power Matrix, as illustrated in Figure 3, as the starting point to understand the objective position they have in commercial relationships. The objective power circumstances in which buyers find themselves can be defined either as *buyer dominance*, *interdependence*, *independence* or *supplier dominance*. The Power Matrix is explained in more detail elsewhere (Cox et al., 2000) but it is basically constructed around the idea that all buyer and supplier relationships are predicated on the relative utility and the relative scarcity of the resources that are exchanged between the two parties. (Cox, Sanderson and Watson, 2000; Cox et al, 2001).

Insert figure 3 here

The use of the matrix requires the practitioner to understand what are the key questions that must be asked in order to understand the relative attributes that provide power and leverage to buyers or suppliers. These questions need to be addressed before a buyer or supplier can locate their own position and that of their current adversaries in the matrix and are centred around the following factors:

- The balance between the number of buyers and suppliers;
- The salience of the buyer's expenditure to the supplier;
- The number of available alternative purchasers to the supplier;
- The extent of supplier switching costs;

- The extent of buyer switching costs;
- The extent to which the product or service is commoditised;
- The extent to which the product or service is standardised;
- The level of buyer search cost; and,
- The level of information asymmetry advantage that one party has over the other.

As the figure reveals a buyer can be located in any one of four basic power positions. However, it is without question that the best position for the buyer to be in (and one that ensures that suppliers innovate and pass value to buyers) is the maintenance of perfectly competitive supply markets, with low barriers to entry, low switching costs and limited information asymmetries. Indeed, the *buyer dominance* box must be the preferred location from which supplier relationships should be managed. In part, therefore, procurement practitioners must eradicate those resources that augment of the power of the supplier over the buyer as well as seeking at all times to ensure that their suppliers operate only in highly contested markets and earn only normal returns.

The problem for the buyer is, however, that it is not always possible to achieve this desired goal of structural leverage. If it were possible to achieve this then few suppliers would ever have the luxury of operating in either the *interdependence* or for that matter the *supplier dominance* boxes. This ideal circumstance for the buyer is not always possible in the real world because of the counter-veiling power resources available to the supplier.

Power Regimes

The discussion of the power resources in the dyadic buyer-supplier relationship is only of limited value for practitioners as one has to consider the entire supply chain in which the firm is operating. Within the construction industry, the dyad between the client and the main contractor is also affected by the relationship that the main contractor has with its sub-contractors and their relationship with component, equipment and labour suppliers. Therefore, one has to understand the extended network of dyadic power relationships so that appropriate relationship management strategies can be developed (Cox et al. 2000).

As stated previously, the majority of construction procurement is one-off and the typical buyer sees no need to develop a proactive strategy for supplier selection as the highly competitive nature of the industry 'guards' against pre-contractual opportunism. Such a proactive strategy would involve selecting more effectively from amongst existing suppliers and supply offerings to obtain indirectly a better quality and/or price.

However, buyers who require construction on a more regular basis may wish to transform the current supply offering directly. For such clients, there will be a need to work closely with some of their suppliers in order to develop their own, and their supplier's, competence to provide a new supply offering. With proactive supply development, the buyer is directly attempting to encourage innovation by working with suppliers, rather than relying on indirect market leverage to encourage selected suppliers to achieve breakthroughs in the relationship between cost and quality on their own. Whether or not this can be achieved effectively is not however a matter of chance.

We have stated previously that ideally, buyers seek to operate in the buyer dominance box; while suppliers seek the certainty of the supplier dominance box. Common sense tells us therefore, that since buyers and suppliers pursue goals that conflict, there must be an objective tension in the relationship. It follows therefore, that only certain sets of circumstances can be conducive for the development of an integrated supply chain management approach.

Therefore, it is most likely that integrated supply chain management will be possible within supply chain structures (and power regimes) based on buyer dominance or interdependence where power and influence can be used to force its implementation, rather than those characterised by independence or supplier dominance. Within the construction industry, the majority of clients are not in position of dominance over the supply base because of the nature of their *ad hoc* construction profiles combined with their misunderstanding of the marketplace. Those clients who possess such regularity of expenditure are in a better position to be able to leverage the supply chain effectively and implement ISCM successfully. It is interesting to note that the client members of the Construction Task Force for the Egan Report all had regular expenditures which would make ISCM a more distinct possibility.

Summary

Understanding the current circumstance of power between a buyer and supplier alone is insufficient to understanding which relationship should be selected, or the way in which it should be managed. The way in which practitioners should begin to think about what can be achieved presupposes, of course, that they understand what is the ideal position for them to be in. From a buying perspective, it seems self-evident that buyer dominance is the most favourable location, while for the supplier dominance over the buyer would be the location of first choice. Operational improvement must, therefore, reside in the capability of buyers or suppliers moving their respective supply chain partners into positions in which dominance over the other can be achieved, or, if this cannot be achieved, as close to this ideal as possible. Although this is not in dispute, there is considerable uncertainty surrounding the way in which a relationship should be managed, or the way in which suppliers will need to be developed. In the process of developing suppliers, it is important for buyers to understand which ones will be conducive to improvement. The buyer must, therefore, have a clear idea of the competence and congruence that is required from the supplier after an acceptable position of power has been established.

In summary, the discussion in this paper has demonstrated that there is no single way for buyers or suppliers to pursue supply chain relationship management. It is evident that the problem for buyers and suppliers is to have in place a methodology (or way of thinking) that allows them to understand a number of key factors. These are:

- the importance of the product or service to the business;
- the nature of demand and supply for the product or service;
- the objective power circumstances the firm is in;
- the opportunities for cost reduction, quality improvement and revenue enhancement that exist for the product or service;
- the type of competence and congruence that is required in the relationship; and,
- the appropriate relationship and its subsequent management.

It seems clear from what currently is advocated as ‘best practice’ within the construction industry, companies are some considerable way from understanding what constitutes effective supply chain management and how superior performance can be achieved. This will only be achieved when the concept of power in business relationships is understood within the construction industry (Cox and Ireland, 2002).

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ⁱ The need for professional services will be eliminated if the end customer has an internal capability or the works are procured on a design and build basis. Under these circumstances the construction firm takes all responsibility for the design and execution of the work and will deliver the complete package.

ⁱⁱ It should be noted that many current users of the Kraljic methodology fail to pay as much attention as the author did in his original article to the power in the buyer-supplier relationship. They appear only to focus on part of his work – segmenting the relative importance of the spend to the buying company.

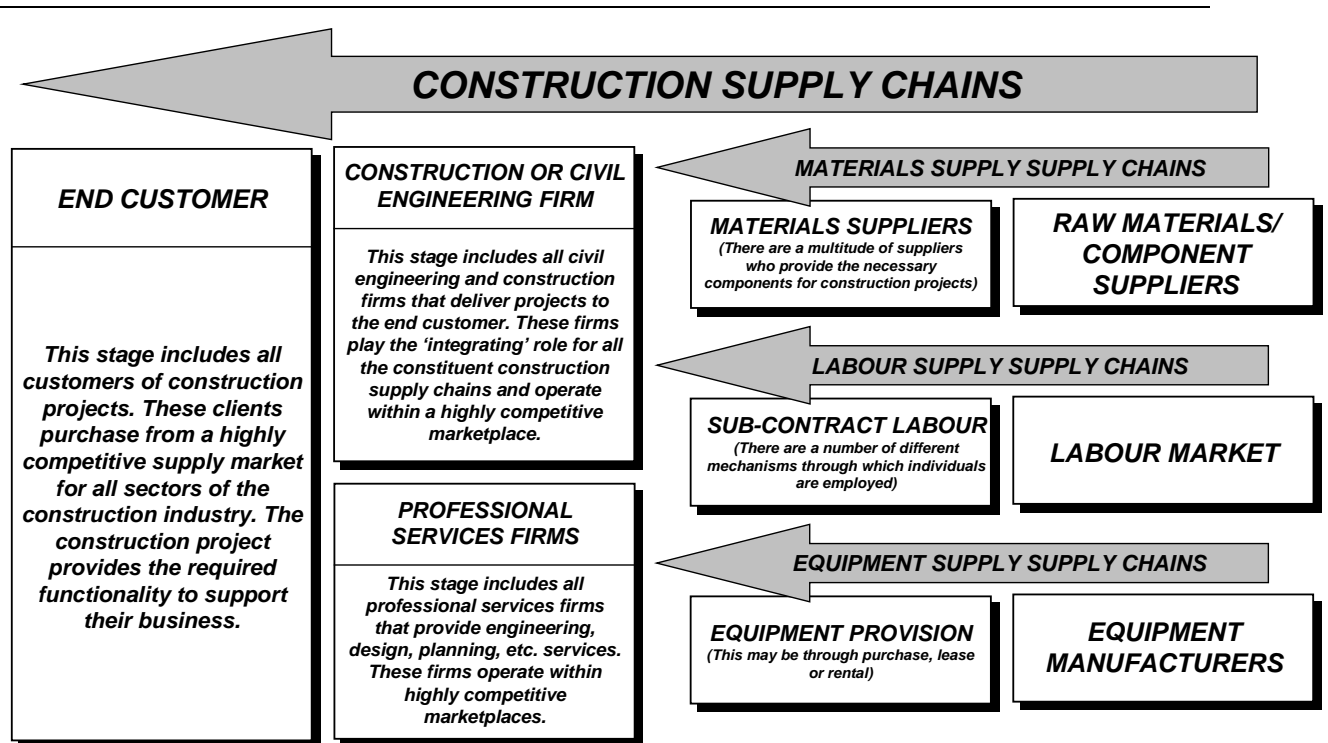


Figure 1: The Myriad of Construction Supply Chains

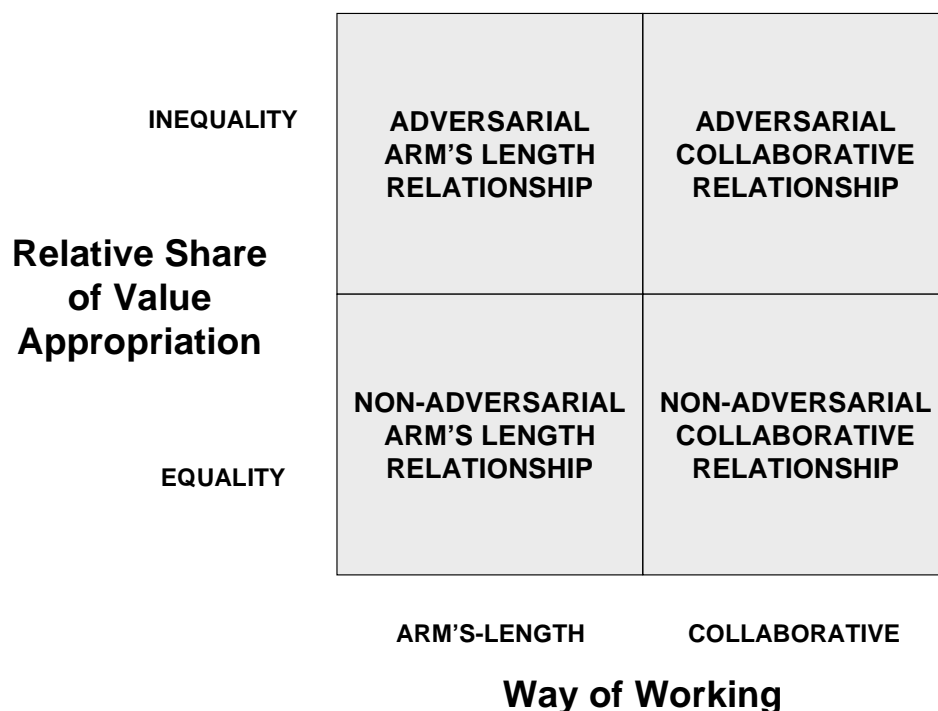


Figure 2: The Alternative Relationship Management Choices
Source: Cox (1999)

BUYER POWER ATTRIBUTES RELATIVE TO SUPPLIER	HIGH	BUYER DOMINANCE (>)	INTER- DEPENDENCE (=)
	LOW	INDEPENDENCE (0)	SUPPLIER DOMINANCE (<)
		LOW	HIGH
SUPPLIER POWER ATTRIBUTES RELATIVE TO BUYER			

Figure 3: The Power Matrix
Source: Cox et al (2000)

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