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## Supply Chain Management to Overcome Demotivation in Adopting Industrialised Building System of Malaysian Construction Industry

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### Abstract

Low adoption rate of Industrialized Building System (IBS) is an issue in Malaysian construction industry. Promoting its use is one of the initiatives of the Malaysian Construction Industry Transformation Program. As incentives have been offered by the government to the IBS adopters, low adoption rates are seen to be potentially due to demotivation of the contractors. This paper reports on the progress to date of a Ph.D. research project aimed on Supply Chain Management (SCM) framework development on to increase the IBS adoption by contractors. Supported by successful examples in the UK, there is confidence that the proposed SCM framework would bring positive results if implemented in Malaysia. Malaysian Public sector governance has identified the potential of SCM and aimed to utilize it through the Construction Industry Transformation Program 2016. A thorough review of literatures, survey and structured interview approach will be used to achieve the research objectives. The outcome of the research will be the groundwork that addresses the root demotivating factors and determine the SCM tools implementation to diminish them.

**Keywords:** Industrialized Building System, Supply Chain Management, Demotivation, CITP, Construction Industry.

### Introduction

Construction industry is one of the main players in Malaysia that contributes to the GDP directly, has big contribution to the socio-economic growth and job creation. Malaysian

construction industry is a massive sector that affect economic activities (Ibrahim et al., 2010; CIDB, 2012) and which also influences to other industries may it be directly or indirectly. Yet, the Malaysia construction industry still being haunted with lack of quality; over-reliance on foreign labour which causes economic leakage, health and social issues; and low productivity problems (Sundaraj, 2006).

The industrialized building system (IBS) is seen to be the way to overcome these issues. Hanafi (2015) stated that IBS has the benefits in their usage such as improving construction site productivity; lessen in-situ concrete mixing activities time session; and shorten the construction period. Yet, the adoption of the IBS in Malaysian construction industry is still very low with calculated of 15% Malaysia project implementing IBS (IBS survey, 2013). Only 24% of IBS public construction project valued RM10 million and above achieves 70 IBS scores, while private IBS projects with 50 IBS scores only calculated at 14% in 2014 (Pang, 2016).

Past research supports the ability of Supply Chain Management (SCM) to improve productivity in construction. Successful examples also been proved in the past few applications (Brady et al., 2006; Potts, 2009) showing that positive improvements are possibly achieved through the use of SCM, thus the idea to eliminate demotivation factors of IBS adoption issues in public sector projects in Malaysia construction industry using these management methods.

### **Malaysian Construction Industry Overview**

Construction industry has been one of the productive sectors that constantly contributes to the economy (Sundaraj, 2006). It plays as an industry that contributes greatly to any country's capital formation (Lewis, 1955) that has growth multiplier effect for different industries (CIMP, 2007). It is estimated that every 10% increment in the output of construction will possibly increases 2.5% of national GDP (Ibrahim et al., 2010)

Yet, Malaysia construction industry has been haunted with problems such as lack of quality; over-reliance on foreign labour which automatically causing national economic leakage due to repatriation of earnings by them, health and social problems; and low construction industry productivity (Sundaraj, 2006). By 2015, the over-reliance of low-skilled foreign labour is still plaguing the Malaysian construction industry (CITP, 2016). Nonetheless as reported by CIMP (2007), Malaysian construction industry has been criticized with faulty dilemmas such as work duplicating, slow and tedious approvals, lack of cost and time management, and very lack clearness. Sundaraj (2006) stated that a drop is seen in the GDP of contribution of construction industry from a 4.8% in 1997 to 2.7% in 2005.

The industrialized building system or IBS is seen to be the way to handle this problem. Hanafi (2015) stated the IBS has beneficial advantage of usage which are boosting productivity of construction site; in-situ concrete mixing activities period would be lessen; and shorten the construction period. CIDB (2003) defined IBS as a method of construction that produced component under restrict supervision (on or off site), transported, positioned and assembled into a structure with minimum workload to be done at site. Yet, the adoption of the IBS in Malaysian construction industry is still very low. Only 15% project used IBS in Malaysia (IBS survey, 2013). Hamid et al (2008) stated that most contractor that used IBS in one government project were reluctant to use IBS in their next project. Public IBS projects valuing RM10 million

and above achieving 70 IBS scores were calculated at only 24% while private IBS projects with 50 IBS scores was only 14% (Pang, 2016).

Moreover, incentives or motivation were given such as income tax exemption ranging from 70% or 100% for a period of 5 or 10 years; investment tax allowance from 60% or 100% on qualifying capital expenditure for 5 years; reinvestment allowance of 60% on qualifying capital expenditure for 15 consecutive years; and import duty exemption for raw materials/components and machinery and equipment to contractors who adopt IBS in their project, yet IBS system still lack the adoption.

It is seen that demotivation of the construction players in implementing IBS plays a big role in the adoption. Motivation and demotivation work differently according to Ng et al., (2004). Motivation may not be effective when strong demotivating factors exist (Ng et al., 2004). Other than that, Borcharding and Oglesby (1977) stated that by simply removing certain demotivators, there is possibility that the motivational aspects of the situation will increase without necessitating the addition of motivators. Therefore, the research is necessary to investigate the demotivating factors of IBS adoption (CIMP, 2007)

### **Motivation and Demotivation**

The construction industry is a unique industry which is dynamic, complex, full of uncertainties, and requires highly motivated workers to succeed (Smither & Walker, 2000). So, what is motivation? Motivation is one of the core determinants of the people's productivity (Venkatesan et al., 2009). As stated by Jenkins and Laufer (1982), motivation is an intangible hypothetical construct that reveals how human behaves which has a strong influence on work performance and may be affected positively or managed through external factors for through rewarding or incentives.

Motivational theories usage is seen to be able to improve productivity (Khan, 1993). Meanwhile, McFarland (1994) highlighted in the author's research that construction engineers achieved higher performance through motivating. Significant project improvement may be achieved through productivity improvement of the personnel on that specific site (Zakeri, et al., 1997; Bajaj, 2006; Kazaz, et al., 2008).

Meanwhile, "Demotivation" is seen to be an external and internal impact which decreases and recede the behavioural or ongoing action motivational basis (Dörnyei, 2013; Sakai & Kikuchi, 2009). Therefore, motivation may be a tendency to increase action, while demotivation decreases it, and shows that demotivation is regarded as the motivation's negative counterpart. According to Jin et al (2008), before motivator factors are catered, demotivators need to be first focused by the managers. Borcharding and Oglesby (1977) also stated: There is a likelihood that motivation can be increased without the need to add any motivating factors by simply eliminating certain demotivators.

Dörnyei & Ushioda (2013) defined Demotivation as "the dark side of motivation" which referring to unfavourable forces that eliminate the current motivation factors. Other than that, Ng et al (2004) stated that there is distinctive way of work for both demotivation and motivation. They added that the effectiveness of motivation may not be decreased whenever there are existing demotivating factors. Demotivation is the existing of any circumstances

which causes disagreement and reduces the satisfaction of individuals from achieving their target and not simply because of the lack of motivators. Parkin et al (2009) stated found that “money earned” in the eyes of the construction workers was not only the highest ranked motivation but also seen as one of the demotivating factors. This shows that a motivating factor may also act as demotivating factor in some circumstances.

Finally, there is a need to handle de-motivators through proper mediation and quickly so that the employee’s performance may be increased and at the same time removing the negativity that is related to such factors (Shroff & Sridhar, 2011). Smither & Walker (2000) also concluded that rather than simply adding motivation factors, abolishing the demotivating factors is seen to be the primary requirement to enhance the productivity of the employees.

### **Supply Chain Management as an Answer**

Construction industry has always seen to be inefficient thus the need to use of revolutionized practice. Not to mention, the Malaysian construction industry steps to progress have met a halt due to the high influence of traditional practices; even the Malaysian Construction Industry Master Plan (2006 to 2015) also lacked innovative practices (Hamid & Kamar, 2010) thus inability to meet the objectives.

The Supply Chain Management (SCM) represents a modern way of to manage business and relationships between members in the supply chain which has been recognized over the past several years as a tool to guide the construction industry players to a better integration. Previous research recommended SCM as the way forward (e.g., Egan, 1998; Barker et al., 2000; Egan, 2002; Love et al., 2004). Other than that, improvement in operating cost reduction, efficiency and productivity can be achieved through SCM implementation (Lambert et al., 1998). Some examples of successful SCM implementation cases recorded which reduced delay were British Airport Authority (Brady et al., 2006) and the Heathrow T5 project (Potts, 2009). Both of these cases indicated that SCM has the ability to improve the productivity and performance in construction project.

Riazi & Lamari (2013), defined SCM as “an Innovative and revolutionary management style that involves a working culture change and a voluntary initiated agreement for integration and synchronization of two or more inter-dependent members within variety of organization level ranging from the whole construction life-cycle processes (initiation to handover). It promotes joint effort and strategy on all activities which are underpinned by mutual trust, responsibility, benefit and risk sharing based on a long-term perspective of relationship. Value is achieved through optimization and management of processes, resources, core competencies, talent, information, power and technology within the supply chain towards accomplishing set of shared objectives, enhance competitive advantage, breaking down any discontinuities and meeting distinctive client needs. Consequently, jointly agreed benchmarks, targets, expectation and values are put in place for continuous improvement efforts and are supported by aligned incentive schemes towards sustaining the endeavour”

Table 1

*Traditional method vs Supply Chain Management*

Traditional	Supply Chain Management
Working individually (fragmented)	Working in group - synchronized teamwork
Independent effort	Joint efforts
Individual risks	Risk sharing (joint risk)
Individual profit	Profit sharing
Individual goals (contradictory)	Common goal (joint objective)
Blame game culture (may attract dispute)	No blame game culture (no dispute clause)
Project manager as boss	Project manager as moderator/champion
Private and confidential information	Information sharing (transparency)
Adversarial (suspicious thoughts)	Mutual trusts
Short term - individual project based	Long term mindset - framework agreement

The philosophy of SCM is seen to support overcoming of demotivators. The needs to shift of current practice have received awareness worldwide (Pearson, 1999; Vrijhoef & Koskela, 2000) and SCM has been recommended as the way forward in many studies (e.g., Egan, 1998; Barker et al., 2000; Egan, 2002; Love et al., 2004). The benefits of SCM for construction performance have been proven (Dubois & Gadde, 2000; Horvath, 2001; Cheng et al., 2010). The SCM is seen to be an effective project management tool (Love et al., 2004) and a very promising approach to solve construction industry problems (Mehdi Riazi, 2014). The British Airport Authority and Heathrow T5 project were some of the proven successes of SCM tools implementation (Potts, 2009). Riazi (2014) however also added that in order to support SCM implementation, it is essential to use appropriate tools.

Unfortunately, the implementation of proper supply chain management in Malaysian construction industry is still very low. This may be due to rather low SCM understanding (Abdullah et al., 2010). Other than that, SCM is seen to be at an adolescent stage (Abd Rashid, 2002; Riazi, 2014). Abd Shukor et al (2011) also stressed that effective construction supply chain integration practices need to be in line with the current trend in Malaysia in order to enhance its competitiveness and innovativeness. In the past, there has been a short fall of contemporary strategies by the Malaysian government plans due to unsuitability in implementing the concept (Riazi, 2014).

### **Research Methodology**

Three objectives were to be accomplished through the completion of this research namely: to rank and establish the main demotivating of IBS adoption in Malaysian Public Sector Projects, to establish the latent demotivating factors of IBS adoption and finally to identify suitable SCM tools and consequently develop a validated SCM framework to overcome the demotivators of IBS adoption.

To enable the achieving of all the research objectives, several methods of collecting data and analysis would be implemented. The first objective would be achieved by establishing the main demotivating of IBS adoption in Malaysian Public Sector Projects through comprehensive literature reviews. Other factors that may be distinctive to the Malaysian locality and real-world scenario will be captured through a series of audio-recorded semi-

structured preliminary interviews. The interview will be undertaken on six experts from the construction industry with at least 20 years of experience.

Table 2

*Research Methodology*

Objective	Data collection	Sample Size	Data Analysis
Rank Motivating & Demotivating Factor	Literature Review	-	Paper review
	Preliminary Interview	Minimum 6 respondents with $\pm$ 20 years experience construction industry player	Content analysis
	Questionnaire survey	Population to be identified. Sample size will be determined based on number of population	SPSS
Determine Latent Demotivating factor	-	-	Partial Least Square (PLS)
Develop & validate final research framework	Literature Review	-	Paper review
	Audio recorded semi-structured interview	60 respondents with more than 10 years experience	Content analysis

Riazi & Lamari (2013) stated this way for selecting preliminary interview respondents as they claimed this number is ample in providing significant response for their industrial experience exposure level and overview on the industry. The whole factors taken from the literature reviews and preliminary interview would be merged and used in the survey development through questionnaire forms. A minimum target of 30% response rate from the sample size determined would be achieved to ensure validity of the outcome.

After completely rank and established all the main demotivating factors, these factors will go through Partial List Square (PLS) analysis to develop the main latent demotivating factors that cause the lack of IBS adoption. Relevant SCM tools will be finally drawn through literature review. These tools will then be taken into two audio recorded semi-structured interview session with respondents that have ten or more years of experience in construction industry. This would be done to develop and validate the final research framework with target of thirty to sixty respondents (Issac & Michael, 1995) or it shall be enough when the result reaches saturation point.

In term of the scope of research, this research shall focus on projects implemented by the G7 contractors in accordance to Pang (2016) which stated that the adoption of these level of contractors has very low adoption of IBS. Therefore, there is a need to investigate this level of contractor. Other than that, focus of this research will only be on building projects. Riazi (2014) claimed that adoption of SCM on complex projects may not be successful as SCM in

Malaysian construction industry is still at early stage. Therefore, the author stated it is more suitable to start implementing SCM on building project, which is less complex and complicated to boost the chance for success. Lastly, only projects within the Peninsular Malaysia would be targeted as to avoid the difference in Sabah & Sarawak in terms of culture, locality and public sector project management (Riazi, 2014).

### Research Theoretical Framework

To establish this research framework, the research required to formulate the main demotivating factors that affect the lack of IBS adoption. This will then be further analysed and categorized to achieve their unique latent factors. These root/latent factors would then be matched with all the SCM beneficial tools which is seen to be able to eradicate the particular root causes. This is hoped to ultimately improve the IBS adoption in Malaysian construction industry projects. A framework of similar nature was previously developed by Riazi (2014) which matched beneficial SCM tools to overcome distinctive pathogens of delay; thus, this research aims to achieve the same by focusing on IBS adoption demotivators.

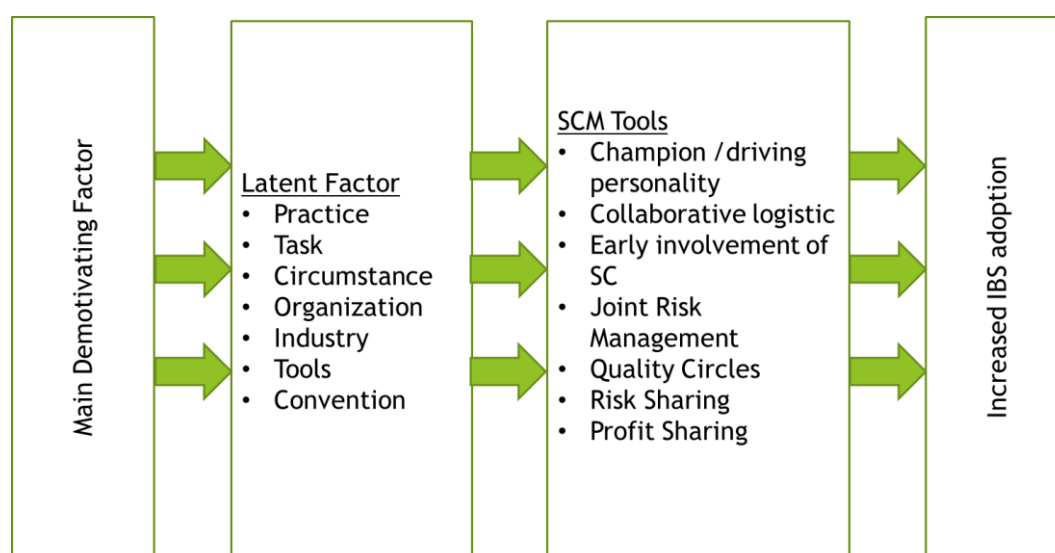


Figure 1. Research Theoretical Framework

Based on Figure 1, the root causes / factors affecting low labour productivity represents few that was adopted from research work by Busby & Hughes (2004), others may arise as this research progresses. In their study, Busby and Hughes used the term "Pathogen" whereby they defined it by a number of qualities which are: (1) "They are a relatively stable phenomena that have been in existence for a substantial time before the problem occurs"; (2) "Before the problem occurs, they would not have been seen as obvious stages in an identifiable sequence failure"; (3) "They are strongly connected to the problem, and are identifiable as principal causes of the problem once it occurs" (p. 428). They also categorized Pathogens into eight categories namely "Practice", "Task", "Circumstance", "Organization", "Industry", "Tool", "Convention" and "System" (p. 429). Pathogen in other word describes the root cause of a problem whereby Reason (1990) described it as latent conditions that remains unidentifiable within a system until a problem arises. In fact, Riazi (2014) suggested that the term is just a concept that can be adapted to variety of research which is in line with claims by Busby & Hughes (2004) that the concept is suitable for any failure-related research; whereby no doubt lack of IBS adoption is one of them.



On the other hand, the SCM tools used in Figure 1 also represents few examples that have been proposed by different authors – Collaborative Logistics (Huang et al. (2001), Teambuilding (Eriksson, 2008), Staff Development (McCreadie & Rice, 1999), Champion / Driving Personalities (Kumaraswamy et al., 2007), Joint Risk Management (Potts, 2009), Early Involvement of Supply Chains (Pearson, 1999) and Interface Manager (Cigolini et al., 2004). Other SCM tools are expected to surface as this research progresses.

### **Contributions to Body of Knowledge**

Plenty numbers of previous research had been done to find the answers on the problem of IBS adoption in Malaysia (Shaari, 2006; Nawi et al., 2012; Kamar and Hamid, 2011; Kadir et al., 2006; Yunus et al., 2016; Mohamad et al., 2016; Kamar et al., 2009; Kamar et al., 2014) however, past research has been short of studying the demotivating factors of IBS adoption generally, and in Malaysia specifically. Therefore, the outcome of this research would certainly add to the body of knowledge regarding the main demotivating factors of IBS adoption. Not only that, past research also fell short in identifying the underlying causes of many project deficiencies including the lack of IBS adoption. Outcome of this research will propose a more systematic approach in studying the demotivating factors by looking at their latent conditions.

This research would then go further to identify the beneficial SCM tools to overcome low IBS adoption problem and consequently develop a validated SCM framework to overcome low IBS implementation issues in Malaysian public sector construction projects. While SCM has been actively promoted over the past years; research on it is still relatively immature & fresh (O'Brien et al., 2008) and that a holistic approach is still missing (e.g., Barker et al., 2000). Instead, coverage has been only on split issues (Love et al., 2004) while frameworks / models proposed in the past (e.g., Love et al., 2004; Cheng et al., 2010) also lacked comprehensiveness in term of addressing specific industry deficiencies except for a framework by Riazi (2014) which proposed an SCM framework that matched beneficial tools to overcome distinctive root causes of delay. Therefore, the outcome of this research would enhance the richness of literature both regarding the beneficial SCM tools to overcome low IBS adoption but also on the available SCM framework to overcome specific industry deficiencies.

### **Conclusion**

Malaysian construction industry has the capability to influence other industries as it is a massive sector which affect the national economic activities, yet it is now scourged with quality scarcity; over-reliance on foreign labour and low construction industry productivity problems (Sundaraj, 2006).

Industrialised Building System (IBS) has been seen to be the way to handle the issue however is still far from the targeted adoption. Previous research had shown the lack of IBS adoption in the construction industry and most contractor that used IBS in one government project were reluctant to use IBS in their next (Hamid et al., 2008).

So, the motive of this research paper is to reveal that through SCM acceptance, improvement communication, integration, collaboration and coordination can be obtained (Mehdi Riazi et al., 2011). In regard to the issues risen, the need for the construction industry in Malaysia and

the success rate of SCM adoption, the research targets to develop a framework that match specifically with the distinctive root cause or factors affecting the demotivation factors of IBS adoption using proper SCM tools. This will potentially increase the adoption of IBS in Malaysian public construction projects.

This research is expected to be at a better success rate as it uses solutions to wipe uproot the root cause factors that causes the demotivation of IBS adoption. The proposed framework will not only be useful to the nation but also with proper adjustment may well suit other countries as well.

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