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INTEGRATED PROJECT DELIVERY (IPD): A COLLABORATIVE APPROACH TO IMPROVE THE CONSTRUCTION INDUSTRY

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ABSTRACT
The Malaysian construction industry is depreciating in comparison to other sectors where most of the construction supplies and materials have increased to unreasonable prices. This issue is bringing down the value of the projects which resulted in the construction players are not deriving any benefit from the projects. This will further demoralise the construction players, in addition to the inherent problem of fragmentation issues in the construction which is already killing the industry. The current building method is no longer relevant to to the industry anymore due to the lack of controlling specifically on the subject of cost leaking.he other issues that are leading to cost leaking such as rework, delay and wastage, are also causing threats to the survival of organizations within the construction industry. Consequently, this paper through the literature review highlights fragmentation as the primary issue in the construction industry and suggests the Integrated Project Delivery (IPD) as the result of all those events that had been placed. **Key words:** Integrated Project Delivery (IPD) ⋅ Malaysian Construction Industry ⋅ Fragmentation issues ⋅ Project Management

INTRODUCTION

Fragmentation issues have plagued the system of construction in Malaysia, which was inherited from the former generation and has become a norm in the diligence. This fragmentation is segregating the construction players into their own team and sharing of information is limited between teams working on the same project. The situation isolates the professionals (people) and the process. Clearly, the fragmentation had arisen due to the practices of traditional contract procurement. Many researchers (Abadi, 2005; Danti, et. al, 2001; Egan, 1998; Rowlinson, 1999 & Tommelein and Ballard, 1997) have shown that the traditional procurement system is lacking in sense of identity, promoting a confrontational culture and a lack of feedback loops or co-ordination between the design and construction process.

Furthermore, the character of the traditional construction method itself is conducted in a sequential manner and is made up of segregated the professionals (lack of interaction between client, contractors, designers other stakeholders) during the design and construction phase. The implications result in the inefficiencies during the construction phase, this will increase the project complexity, rework, increasing costs and longer construction duration (Evbuomwan & Anumba, 1998). This approach has labelled the construction industry as having a lack of continuity to form effective teams which resulted in inefficiency in the project delivery process (Gunasekaran & Love, 1998; Jha & Iyer, 2006; and Latham, 1994).

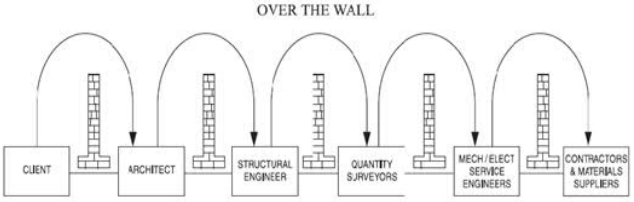

Figure 1: Over The Wall Syndrome (Evbuomwan & Anumba, 1998)

As a result of this fragmentation, the traditional construction process tends to incur more costs from rework stemming from errors, quality issues and inefficiency of project delivery times (Akintoye et. al, 2000; Egan, 2002; Evbuomwan & Anumba, 1998), poor performance (Love et. al, 1998) and client dissatisfaction with the product delivered (Egan, 2002; & Mohamad, 1999). Furthermore, this practice only permits the manufacturers and contractors to be involved in the project after the design stage. This condition creates problems in supply chain process (delays, wrong part and etc.) and constructability related issues. In summation, this fragmented traditional approach also will create some other troubles such as (Anumba et. al, 2002; & Matthews and Howell, 2005):

- Fragmentation of different participants in most construction projects leading to misconceptions and misunderstandings.
- The fragmentation of design, fabrication and construction data, whereas data generated at one stage are not readily re-used downstream, leading to design clashes, omissions and errors.
- The occurrence of late and costly design changes and unnecessary liability claims, occurring as a result of the above.
- The lack of true life-cycle analysis of projects (including costing, maintenance, operating etc.), leading to an inability to maintain a competitive edge in a changing marketplace.

The lack of integration, coordination and collaboration between the various functional fields involved in the life-cycle-issues of the projects, leading to inefficiencies during construction stage.

- Inadequate capture, structuring, prioritization and execution of client needs;
- Development of pseudo-optimal design solutions;
- Constructability, supportability and maintainability issue are considered late in the process;

- Characterisation of the design process with a rigid sequence of activity.

In order to manage these problems, many researchers reports have all called on the industry to transform traditional method to amend the task performance through collaboration among the others (Bourn, 2001; Egan, 1998; Egan, 2002; Latham, 1994; Strategic Forum for Construction, 2003). Recent follow-ups challenged the building industry to produce a fully integrated service that hold the capability to save the most predictable outcomes to clients through operations and team integration (Egan 1998; UKCG Report, 2009). This integrated team practice appears to be the best and most significant strategy that resolves the issue of fragmentation in the traditional construction procurement. In the same fashion, this approach, could bring together diverse skills and knowledge and eliminate the traditional walls to be more efficacious and efficient delivery of a project (Achieving Excellence in Construction, 2003; Akintoye et. al, 2000; Baiden et. al, 2003; Fleming & Koppelman, 1996).

Many researchers proved that the 'Integrated Project Delivery (IPD)' is an effective project delivery system. IPD can be used in a multi-party contract (more than two parties selected) and it has a major impact on the state of the industry. IPD is designed to better the team integration in current construction project delivery (Anderson, 2010; Cho & Ballard, 2011; Fleming & Koppelman, 1996; Khemlani, 2009; Perlberg, 2009). This paper will discuss definition, features, and advantages of IPD as one of the new best integrated approach to improving the construction project delivery processes.

INTEGRATED PROJECT DELIVERY (IPD)

Definitions and Characteristics of IPD

There are many literatures that define what IPD is about, however, there are some variations in parts of the definition. Table 1 shows the definition of IPD by the scholars:

Scholar	Year	Definitions
AIA California Council	2007	IPD as a project delivery approach that integrates people, organizations, business structures and exercises into a process that collaboratively harnesses the talents and insights of all project participants to optimise the results, increase value to the owner, reduce waste, and maximize efficiency through all stages of design, manufacturing and building
Anderson	2010	IPD as a business model for design, execution and delivery of buildings by collaborative, integrated and productive teams composed of key project participants such as designer, client, contractor, manufacturer, and supplier
El Asmar et al	2013	IPD as an emerging construction project delivery system that collaboratively involves key participants very early in the project timeline, often before the design is started
AIA California Council	2014	IPD as a collaborative project delivery approach that utilizes the talents and insights of all project participants through all phases of design and construction
Rahim S. A.	2015	IPD as a method which requires early involvement of key participant in an engaging collaboratively and mutually dependent relationship throughout the entire phase of project delivery from design to completion.

Table 1: IPD definition by literature from year 2007 to 2015

Although the definition of IPD can be seen to vary depending on the different perspectives of the authors. However, there are similarities, in which all definitions mentioned. Table 2 below show the similarity in every definition by the literatures.

Scholars \ Similarity	Early involvement	Integration	Collaborative	Relationship	Project
AIA California Council (2007)	X	X	X	X	X
Anderson (2010)		X	X		X
El Asmar et al (2014)	X	X	X	X	X
Rahim S.A (2015)	X	X	X	X	X

Table 2: The similarities in various definitions of IPD

This indicates that the integrated team development is guided by following principles shows in figure 2 below:

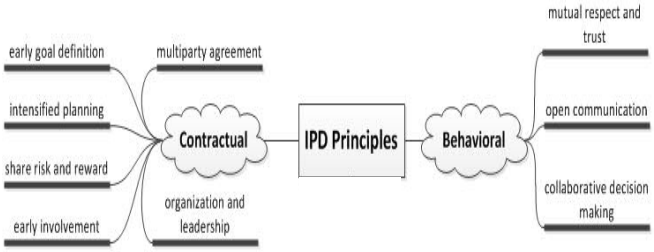

Figure 2: IPD Principals (AIA California Council, & AIA National, 2009; Anderson, 2010; Khemlani, 2009; Perlberg, 2009).

These IPD principles can be utilised into a variety of contractual activities for success in collaboration. This will commence from the initial design stage and continue through to project handover (Anderson, 2010; Perlberg, 2009). For example, this concept has been inspired by various alternative delivery models for building a project around the world. This is most notably the Project Alliance method that, in the last few years, has been successfully implemented in Australia on 30 to 40 projects (Khemlani, 2009).

The main focus in Integrated Project Delivery is the final value that formed for the owner and the structure. Rather than each participant focusing exclusively on their share of construction without considering the implications on the whole project operation. This IPD method will bring entire participants together in early with collaborative inducements to maximize project value for the client. This integrated approach will allow members to make decisions in early project planning where most of the cost can be prepared. The close teamwork can get rid of a large trade of waste in the blueprint, and allows data sharing at once

between the design and construction team eliminating a great barrier to increased productivity of the project.

Traditional Project Delivery	Characteristic	Integrated Project Delivery
Fragmented, assembled on "just-as needed" or "minimum-necessary" basis, strongly hierarchical, controlled,	Teams	An integrated team entity composed key project stakeholders, assembled early in the process, open, collaborative
Linear, distinct, segregated; knowledge and expertise	Process	Concurrent and multi-stage; early contributions of knowledge and expertise; information openly shared; stakeholder trust and valued
Individually managed, transferred to the greatest extent possible	Risk	Collectively managed, appropriately shared
Individually pursued; minimum effort for maximum yield; (usually) first-cost based	Compensation/ Reward	Team success tied to project success; value based
Paper-based, 2-dimensional; analog	Communication / Technology	Digitally based, virtual; BIM (3, 4 and 5 dimensional)
Encourage unilateral effort; allocate and remove risk; no sharing	Agreements	Encourage, foster, promote and support multi-lateral open sharing and collaboration; risk sharing.

Table 3: IPD vs Traditional Project Delivery
(AIA California Council, 2007)

Primary Areas of IPD

IPD has many areas that can involve in the project and in the construction. But there are five primary areas which affect IPD that based on the case studies presented in IPD Guide. These primary areas can be further described as the following Figure 3 and Table 4;

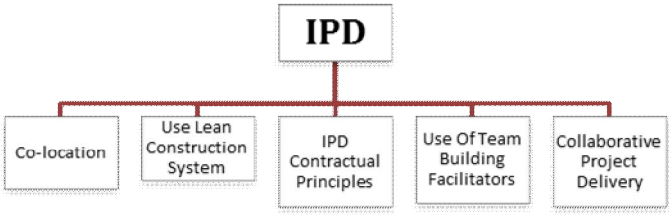

Figure 3: Primary areas of IPD

IPD areas	Description
IPD contractual principles	Provides several benefits of projects, shared financial risk and reward incentives, use of liability waivers, and fiscal transparency had a positive result on the teams' perception of trust and respect for project partners.
Use of a Lean construction system	Positive result in various vital areas such as sharing project information with all team members, sharing thoughts and opinions with team members, and on task efficiency.
Co-location	Perceived as positively affecting participants' ability to communicate with team members from other contracting parties, the efficiency of the work process, and their direct interaction with team members who work for the other parties.
Role of team building facilitators	Although there are contrasting results, in some cases, team building facilitators triggered a positive impression on their perception of sharing of project info with all team members equally, their understanding of team members' roles, and effective communication between team members.
Collaborative project delivery	Integration between team members i.e. owner, designers, contractors, suppliers, subcontractors and engineers are creating collaboration for mutual objective and destination in a construction task. This collaboration also creates an understanding among members and fewer problems created in the construction project

Table 4: IPD primary areas

The Advantages of IPD

In previous studies, these IPD is not just a utopian vision, but a practical reality that can actually can be implemented on large, as well as small projects for more efficiency results (AIA California Council, & AIA National, 2009; Khemlani, 2009; Matthews & Howell, 2005; Perlberg, 2009). In Achieving Construction Excellence (2003) report show the example that the implementation of an integrated team approach has been estimated that the construction cost can be reduced in about an average of 2-10% for single projects and up to 30% over a sequence of construction projects.

Khemlani, (2009) asserts that time for structural design was reduced from an expected 15 months to 8 months, and planning using information from other disciplines that is not usually obtainable which led to better design quality. The same author further highlighted that in spite of all the time spent to perform the planning and the design process also meeting to do 3D coordination (all of which were billable hours), the cost for the designing was below than predicted. Thus, up to the design stage, the process was completed faster, with no quantifiable increase in cost, and better quality work. Beyond these benefits, IPD also provides other positive values into the project such as fortification the project team's understanding of client's needs and streamlines the communication among the project team[5]. This approach also allows all of the contractors to contribute their knowledge in construction techniques early in the design process. The experts contributing in early project planning will finally serve the designers to produce an accurate budget of estimation and reduce design-related issues during the construction phase such as, constructability, reworks and wastages (AIACC & AIA National, 2009; AIACC, 2007; Matthews & Howell, 2005; Perlberg, 2009). Furthermore, the combination of IPD and Building Information Modelling (BIM) will shift the construction industry overall to be easier to not only predict,

but also, to achieve a high - quality outcome (AIACC, 2007).

Benefits	Description
Market advantage	IPD may give the firms valuable experience upon which to market themselves as industry leaders. Improving the delivery may also be a market advantage if measurable results can be achieved.
Cost predictability	All projects would like to fit budget, however, for some the predictability of monetary value is a notably driving factor.
Schedule predictability	Schedule predictability: Similar to cost, all projects shares the goal of conforming to their projected schedule, but for some projects this is a major factor.
Risk management	Reducing or managing risk can be tied to cost or schedule, but also may include transaction risk inherent to design type, site or other conditions. If risk management is a critical factor, the increased communication in IPD may be of particular advantage.
Technical complexity	A high degree of complexity will usually demand integration of expertise and require a level of coordination that is achievable in an IPD environment.

Table 5: IPD Advantages (AIA Minnesota, 2012)

THE IPD AGREEMENT

The beauty of IPD is the integration, the collaboration and early involvement among the key participant that engage directly or indirectly in the construction projects. To put them together wasn't easy, more than 100 years the construction players has been in the comfort zone of the old legitimate problematic traditional method and procurement. Perlberg (2009) mentions, a group of 22 leading construction associations representing a diverse coalition of owners, contractors, sureties, and design professionals joined together to develop the first catalogue of consensus standard contracts based on best practices and fair risk allocation for all parties. From this group, the result is a first contracting document that can involve by multiparty to sign the agreement. The agreement includes the address of 80 contracts for all project delivery method. Then, the consensus DOC300 is created and become an IPD contract for multiparty agreement in the construction.

One of the goals of the ConsensusDOCS drafters is to write straightforward and easy to understand contracts. The 300 addresses the culture that parties bring to the project to determine why the ConsensusDOCS drafting organizations created the first standard IPD contract with its library of contract documents, one simply needs to reference section 3.2 in the agreement, which states:

> *The Parties agree that the project objectives can be best achieved through a relational contract that promotes and facilitates strategic planning, design, construction and commissioning of the project, through the principles of collaboration and lean project delivery.*

Construction contracts generally plan how to handle failure, rather than design for success. Delegating responsibility to an individual party, as opposed to the task as a whole, leads project participants to compete to accomplish their individual responsibilities first and first. Contract obligations often lead practitioners to work more like competitors than collaborators. Optimizing an individual's functioning in isolation is extremely fertile; however, the design and building process is highly interdependent. Therefore, if not adequately coordinated, an individual who optimizes their isolated performance may actually be wasteful.

CONCLUSION

There is an urgent demand for a paradigm shift within the traditional project delivery. As previously highlighted, the traditional contracts are trans-organizational in nature. Contrastingly, the building industry is affected through relationships that include a network of transactions. It is highly recommended that the traditional construction lifecycle process should engage the adoption of new business strategies, with the objectives of integrating the well-designed disciplines at the early phases of the project. The demand for greater collaboration in the project delivery team is paramount towards achieving more successful construction projects especially in the Malaysians construction industry.

However, to achieve integration, improvement in communication and relationships are needed. This includes maintaining long-term relationships with supply chain members, working cooperatively without boundaries between the various project members, free information sharing with the supply chain, strong commitment at all levels of the multidisciplinary project team; and to operate in an atmosphere where relationships are equitable, members have respected each other and has a 'no blame' culture. Besides that, early participation of regulatory authorities, specialist contractors and manufacturers provide the chance of reducing the documentation and construction stages. This is the main reason why IPD operates through the relational contracts that recognize the reality of what needs to happen for successful project delivery. Therefore, it can be summarized that efforts towards integration team such as IPD is crucial to bring the Malaysian construction industry to the next level.

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