Adopting an integrated project delivery collaboration framework: a case study of a wastewater treatment plant project in Vietnam

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Abstract: Integrated project delivery (IPD) is introduced as a new delivery system that aims to transform and enhance the current delivery systems. For such an accomplishment, the IPD integrates people, systems, and business into an integrated platform delivering accurate information and new technologies in a collaborative team environment. In this sense, the current research reviews the IPD principles, benefits, and challenges, and creates a proposed framework

that applies a percentage ratio with mathematical weight calculation to classify and identify the IPD collaboration level present in a construction project. For the data validation, a case study is performed, where the information of the WWWTP project is inserted into the proposed framework. The results illustrate that the case study scores a total sum of 30% of IPD collaboration present in the project, where it is classified as having a low IPD collaboration level. The significance of this study is that it helps project stakeholders in the construction industry to understand the important factors that lead to IPD adoption and develop the principles of IPD. The current study creates an updated and simple approach framework aiming to support the professional area as well as allowing a solid basis for future research.

Keywords: integrated project delivery; IPD; collaboration; framework, classification; Vietnam.

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1 Introduction

As the construction complexity increases, projects with the ability to assist and secure a proper delivery by applying collaboration and integration are currently considered essential (Yee et al., 2017). In this regard, according to Hamzeh et al. (2019), the available methods in the AEC industry are inappropriate and inefficient due to the incapability to follow the current demands (Hamzeh et al., 2019). To improve the current methods, integrated project delivery (IPD) aims to improve the construction triple constraint (cost, time, and quality) outcomes through a series of characteristics, namely early involvement of key stakeholders, multiparty contract agreements, and shared risks and rewards, among others (Hall and Scott, 2016; Hamzeh et al., 2019; Sive, 2009). With that in mind, the American Institute of Architects (AIA) defines the method as "a project delivery approach that integrates people, systems, business structures, and practices into a process that collaboratively harnesses the talents and insights of all project participants to optimise project results, increase value to the owner, reduce waste and maximise efficiency through all the project phases" (AIA California Council, 2007). In addition, the method in question requires specific principles for a proper application, namely optimise the whole, not the parts; early and clear goal definition; collaboration; integration (people and systems); joint ownership; respect; trust; transparency; a safe environment; shared risk and reward and lastly, good technology, that must be applied along all the seven phases (AIA California Council, 2014; Fischer et al., 2017).

When it comes to transition, especially from the traditional to the IPD method, some concerns and steps should be made to ensure an easy process while at the same time, analysing the benefits and challenges (AIA California Council, 2014; Fischer et al., 2017). In terms of the research area, according to Abdirad and Pishdad-Bozorgi (2014), IPD has available materials in several subjects such as benefits, challenges as well as principles. For the classification level subject, AIA California Council (2007) created a method that classifies the IPD in a project in three levels of collaboration or integration, namely collaboration level one – typical, level two – enhanced, and level three – required (AIA California Council, 2007). However, the development of an updated and simple approach framework for classifying the IPD collaboration level present in a project has yet to be developed (Abdirad and Pishdad-Bozorgi, 2014). In this sense, to address this issue, the current study developed a framework that classifies the IPD level present in a project through a percentage ratio with mathematical weight calculation.

2 Literature review

In this section, the definitions related to IPD are reviewed; in addition to the benefits, challenges and levels of collaboration.

2.1 Integrated project delivery

Throughout the construction history, delivery methods such as design-bid-build, construction management, and design-build have been used to deliver the final product to the customer. In this regard, when it comes to history, according to Kent and Becerik-Gerber (2010), in the 1940s the delivery methods started with the design-bid-build approach, being largely used for a long period. However, some

drawbacks begin to appear, such as inefficiency, fragmentation, and resource waste (Hamzeh et al., 2019). To overcome such drawbacks, a new method was created in the 1960s called the construction management method, where applies specific characteristics during the project as team supervision and information control (El-adaway, 2013; Hamzeh et al., 2019). Aiming to improve even further, in 1990 the design-build method was created, however, even though the improvements were visible, the quality criteria drastically decreased (Fischer et al., 2017; AIA California Council, 2007).

To keep up with the modern constructions, the IPD method surged as a tool to enhance the traditional methods aiming to avoid their drawbacks and secure the construction triple constraint (time, cost, and quality) at the same time (Viana et al., 2020; AIA California Council, 2007; Fischer et al., 2017; Mesa et al., 2016). For such accomplishment, the method applies unique characteristics as early involvement of key participants, multi or poly-party contracts, open communications, collaborations, goals and team alignment, BIM technology, as well as foster a shared risk and reward (Kahvandi et al., 2017; Hall and Scott, 2016; Fischer et al., 2017; AIA California Council, 2007). In addition, it is important to mention that for a proper IPD application some essential principles should be applied. The principles in question, according to AIA California Council (2014), could be divided into eleven different principles namely optimise the whole, not the parts; early and clear goal definition; collaboration; integration (people and systems); joint ownership; respect; trust; transparency; a safe environment; shared risk and reward and lastly good technology along with all the seven phases (AIA California Council, 2014).

2.2 IPD benefits and challenges

When it comes to IPD benefits, according to Collins and Parrish (2014), such method has a direct impact on cost, time, quality as well as control of unforeseen issues (Viana et al., 2020; Collins and Parrish, 2014). The impacts in question could be related to more feasible estimations, fewer project changes, integration, agreement, communication, technology, and minimum waste of material (Fischer et al., 2017; Kahvandi et al., 2017; Azhar et al., 2014). As the positive impacts took place, the quality criteria rapidly increase, where according to El-Asmar et al. (2015), such characteristic could be considered as the most essential among the IPD method (Kahvandi et al., 2020; El-Asmar et al., 2015). On the other hand, some drawbacks and barriers in IPD must be properly measured before the application (Ebrahimi and Dowlatabadi, 2018). According to Ghassemi and Becerik-Gerber (2011), the drawbacks and barriers mentioned could be divided into four categories named cultural, technological, legal and financial challenges. In the cultural challenge for example, as the industry has been mainly applying the traditional methods created a comfort zone, where a different approach could cause some discomfort and uncertainty (Viana et al., 2020; Fischer et al., 2017). In the technological challenges, the IPD method requires that the building information modelling (BIM) software should be used, however, such tool needs proper training and some contractors might not be open for such investment (Rached et al., 2014). In the legal challenge category, problems related to insurances and liabilities due to the numerous members involved could create a complex environment allowing spaces to possible lawsuits (Alinezhad et al., 2020; Ashcraft, 2008). The last category, financial challenges, could occur problems related with the IPD unique compensation and incentive distribution

among the teams. Finally, the method shared the profit equally among all, not allowing individual performance (Kahvandi et al., 2018; Fischer et al., 2017; Ashcraft, 2008).

2.3 IPD levels of collaboration

As the construction industry commonly applied the traditional method, the transition to a new one should be made through steps or phases, while analysing the benefits and possible challenges throughout the way (AIA California Council, 2014). In this regard, the road to IPD can be made thought collaboration or integration levels, such as low, medium and high applications (Fischer et al., 2017). The AIA California Council (2007) states that the IPD method could have three levels of collaboration or integration, namely collaboration level one – typical, level two – enhanced and level three – required. In the collaboration level one, namely typical, the IPD application is considered low level, where the use of IPD multi or poly-party contract and procurement strategies are both not considered as a requirement. The contracts, for example, could apply the open-book, cost-plus with a guaranteed maximum price (GMP) or fixed fee. In addition, the procurement strategy could apply the qualifications-based selection (QBS) and best value in the design and construction phase, respectably. In terms of the level two, namely enhanced, the IPD application runs deeper than the previous level, where aspects such as early participation of key stakeholders, BIM software and shared profit or loss, should be applied. However, aspects such as contract and procurement types can remain the same as those applied in the level one. When it comes to level three, namely required, the requirements are considered as pure IPD application, where all principles must be put into action. For example, the contract type should apply the multi or poly-party type, open-book, cost-plus without a GMP as well as a shared financial risk and reward policy. In this regard, Table 1 Illustrates and describes the details of AIA California Council (2007) levels of collaboration.

When it comes to decision making, it is important to mention that all key stakeholders should be able to decide what level of collaboration it is possible to apply to a specific project; however, the owner will always have the final call (Viana et al., 2020; AIA California Council, 2007; Fischer et al., 2017). This decision should be made properly and with care, as the collaboration level will decide project course and actions. In this regard, the characteristics level influence can be present even before the project started as well as affecting the first until the last phase of the project (Kahvandi et al., 2019; Fischer et al., 2017). For example, the influence presence before the project start affects decisions such as the stakeholder's early participation, team communication processes, software technology, risk/reward structure, contract negotiation, protocols, and responsibilities assignment (Fischer et al., 2017). In this regard, in the first phase, the influence will be from scope, schedule, cost and team member's size, while in the second phase affects the drawings, quality level, and decision goals. In the third phase, it affects the final drawings and decision making, while in the fourth phase the legal requirements, such as the procurement, testing, and commissioning. In the fifth, sixth, seventh and eighth phases are impacted and influenced by the results of all previous phase's decisions and actions (Viana et al., 2020; AIA California Council, 2007; Fischer et al., 2017). Thus, the proper level application should be made aiming to guarantee the project overall success, as those could affect the overall project life-cycle (AIA California Council, 2007; Fischer et al., 2017). However, it is important to mention that a project can mix the collaboration levels characteristics. For example, in one project could be applied some characteristics of

phases one and two, thus the level applied in the project could be difficult and complex to classify. The current research reviews the IPD principles, benefits, and challenges, and creates a proposed framework that applies a percentage ratio with mathematical weight calculation to classify and identify the IPD collaboration level present in a construction project.

Table 1 IPD framework collaboration level

	Level one 'typical' collaboration	*Level two 'enhanced' collaboration*	*Level three 'required' collaboration*
Level of collaboration	Lower	⟷	Higher
Philosophy or delivery method?	IPD as a philosophy	IPD as a philosophy	IPD as a delivery method
Also known as …	N/A	IPD-ish; IPD lite; non-multi-party IPD; technology enhanced collaboration; hybrid IPD; integrated practice	Multi-party contracting; 'pure' IPD; relational contracting; alliancing; lean project delivery system™
Delivery approaches	CM at-risk or design-build	CM at-risk or design-build	Integrated project delivery
Typical selection process	Qualifications-based selection of all team members or best value proposal	Qualifications-based selection of all team members	Qualifications-based selection of all team members
Nature of agreement	Transactional	Transactional	Relational
Key characteristics	No contract language requiring collaboration limited team risk sharing CM or DB share in savings	Contract language requiring collaboration some team risk sharing co-location of team	Owner-designer-contractor (and possibly other key team members IPD subs) all signs one contract that contracts collaboration Team risk-sharing-incl. A/E team decision-making optimising the whole pain/gain sharing limits on litigation co-location of the team
Typical basis of reimbursement	GMP	GMP	GMP or no GMP (some costs guaranteed)

Source: AIA California Council (2007)

3 Research methodology

The present study has a research methodology through a descriptive study, where was reviewed the IPD principles, benefits and challenges as well as proposed a new framework that applies a percentage ratio with mathematical weight calculation aiming to classify and identify the IPD collaboration level present in a project. In terms of data validation, a case study was made, where the information of WWWTP project was inserted into the new proposed framework. It is important to mention that the WWWTP

project was selected according to the following characteristics as size and contribution to Vietnam; author field visit; and data collection as part of a master thesis from one of the authors, where additional discoveries was published in Viana et al. (2020). In this regard, the Table 2 illustrates the new IPD proposed framework with the categories distributed orderly in columns with their respective percentage weight, with a total sum of 100%. The 100% weight is further subdivided into four levels of IPD collaboration accordingly with the final percentage weight result.

Table 2 Proposed IPD collaboration framework

Number	*Category*	*IPD%*	*Project X*
01	Early involvement of key participants	20%	
	Design consultant	*5*	
	Contractor	*5*	
	Trade contractor	*5*	
	Agency	*5*	
02	Shared risk and reward	20%	
	Risk	*10*	
	Reward	*10*	
03	Contract	20%	
	Multi or poly-party	*20*	
04	Building information modelling	10%	
	Single 3D virtual model	*5*	
	Built-in estimating features	*5*	
05	Legal	10%	
	Liability waivers	*10*	
06	Team	10%	
	Mutual focus and goal	*5*	
	No individualism	*5*	
07	Communication	10%	
	Open information exchange	*10*	
	Total	100%	
Level	*Description*		
L0	None	0–25%	
L1	Low	25–50%	
L2	Medium	50–75%	
L3	High	75–100%	

Source: Viana et al. (2020)

In this regard, the percentage weights selected to each category was based on the author's creation of 0 to 100 points aiming a clear and simple mathematical calculation. After identifying the constitutive concepts, some domain experts draw the aforementioned relationship among the concepts. Afterward, they estimate the strength of them (e.g., Fischer et al., 2017). Meanwhile, all the suggested values by experts are considered as variables, and the overall weight is obtained. In this regard, when it comes to the

categories analysed, the current study chose the following ones, namely as early involvement of key participants (20%), shared risk and reward (20%), contract (20%), BIM (10%), legal (10%), team (10%) and lastly, communication (10%). It is important to mention that the categories were weighted according to the author's opinion regarding their significance in the IPD method. When it comes to the first category, early involvement of key participants, the characteristics such as the design consultant, contractor, trade contractor, and agency were selected. This selection was made due to some authors (e.g., Fischer et al., 2017; Leicht and Harty, 2017; AIA California Council, 2014; Ashcraft, 2010) considered as the most critical and vital elements, as influence in the reworks and risks during the construction phase, thus impacting the project overall success. In the risk and reward category, shared risk and shared reward characteristics were selected due to some authors (e.g., Fischer et al., 2017; AIA California Council, 2014) statement that such characteristics align the parties to achieve the project objective, where the profit or loss would be a result of the shared risk and/or reward characteristic.

In terms of the third category, contract, the multi or poly-party characteristics were selected due to some authors (e.g., Fischer et al., 2017; AIA California Council, 2014; Ashcraft, 2010) declarations that as the parties are bound together by a single agreement the processes are tailored to support the team environment as well as the compensations are tied to the project, not individual success. In terms of the fourth category, BIM, the characteristics single 3D virtual model and built-in estimating features were selected due to some authors (e.g., Azhar et al., 2014; Ilozor and Kelly, 2011; Ashcraft, 2008) opinions that the software can join all areas and systems into a single virtual model, allowing all project members to develop an accurate and efficient project through collaboration.

In terms of the fifth category, legal, the characteristic liability waiver was selected due to some authors (e.g., Fischer et al., 2017; Leicht and Harty, 2017; AIA California Council, 2014; Ashcraft, 2010) opinion that such characteristic can enforce the parties to assume the project responsibilities instead of blaming others for overall mistakes and miscommunications, inducing creativity as well as reducing unnecessary contingencies in claim laws. In terms of the sixth category, team, the characteristics such as the mutual focus and goal, in addition tono individualism were selected due to some authors (e.g., Fischer et al., 2017) opinion that such characteristics could combine individual strengths with collaboration and trust, committing to achieve common goals, process, and outcomes with mutual accountability. In terms of the seventh and last category, communication, the characteristic open information exchange was selected due to some authors (e.g., Yukl, 2012; Morgeson et al., 2010) opinion that such characteristic can promote integration, effectiveness and faster problem solving as well as a decrease of missing information, misunderstanding and confusion related with responsibility distribution.

In terms of the new proposed framework. The four levels created can be subdivided into the following levels, namely as 'level 0' or 'L0', 'level 1' or 'L1', 'level 2' or 'L2', and 'level 3' or L3'. In the first level, namely level 0, the proposed framework considered with none IPD collaboration projects that have a total percentage sum between 0 to 25%. In the second level, namely level 1, the proposed framework considered with low IPD collaboration projects that have a total percentage sum between 25 to 50%. In the third

level, namely level 2, the proposed framework considered with medium IPD collaboration projects that have a total percentage sum between 50 to 75%. In the fourth and last level, namely level 3, the proposed framework considered with high IPD collaboration projects that have a total percentage sum between 75 to 100%. In addition, for the data insertion, the authors suggested that in the case of the framework be scored before the project starts, to be made by the owner and after the project is concluded, it could be made by any party, allowing the knowledge of the IPD collaboration percentage and level that is applied in the project in question. It is important to mention that the percentage weight on each category was proposed using the authors' judgment and experience on the subject (not supported by any previous research or theory).

3.1 Case study

Over the last decades, the human population had exponentially increased bringing detrimental effects towards individuals as well as society. These detrimental effects, according to World Bank (2011), impact with additional strength the developing countries, such as Vietnam. In this sense, Vietnam is currently facing flooding and water pollution issues in canals and rivers, creating an unsanitary and unhealthy environment due to rapid urbanisation. To bring a solution such issue, the country is concentrating its main effort in developing an improved urban infrastructure project for drainage and sewerage systems, called WWWTP project. In terms of characteristics, the project applied separated contracts between the stakeholders through lump sum fee; QBS procurement, transactional nature of agreement, BIM software, team member's assignments, open communication, and among others.

The traditional method or design-bid-building is the construction method applied in the WWWTP project for delivery, and due to that several issues could result in a lower quality performance. Although these methods are applied for decades, a wide range of professionals are dissatisfied with the project outcomes and argue that projects under those methods often suffers with low quality, time and cost overruns (Sive, 2009). To overcome and improve these deficiencies, IPD immerges as a new construction method, where increases the project performance success through highly collaborative process (DeBernard, 2008). The IPD method seeks to improve the triple constraint (cost, time and quality) outcomes by aligning the project team incentives, goals, shared risk and reward, early involvement of all parties and a multiparty agreement (Sive, 2009).

IPD is a new project implementation system in Vietnam, and one of the projects under construction in Vietnam, which had the closest conditions based on the IPD principles, was WWWTP project. The data received from this project is the basis for more thorough research into the benefits of IPD As a result, it has been studied that project.

4 Data analysis

In the proposed framework, the information related to WWWTP project is inserted into the categories. In this regard, the project case study scored in just three of the seven categories present in the new framework, being then the BIM, team, and communication.

Table 3 Proposed IPD collaboration framework – WWWTP case study

Number	*Category*	*IPD%*	*WWWTP*
01	Early involvement of key participants	20%	0%
	Design consultant	*5*	*0*
	Contractor	*5*	*0*
	Trade contractor	*5*	*0*
	Agency	*5*	*0*
02	Shared risk and reward	20%	0%
	Risk	*10*	*0*
	Reward	*10*	*0*
03	Contract	20%	0%
	Multi or poly-party	*20*	*0*
04	Building information modelling	10%	10%
	Single 3D virtual model	*5*	*5*
	Built-in estimating features	*5*	*5*
05	Legal	10%	0%
	Liability waivers	*10*	*0*
06	Team	10%	10%
	Mutual focus and goal	*5*	*5*
	No individualism	*5*	*5*
07	Communication	10%	10%
	Open information exchange	*10*	*10*
	Total	100%	30%
Level	*Description*		
L0	None	0–25%	
L1	Low	25–50%	30%
L2	Medium	50–75%	
L3	High	75–100%	

4.1 Propose framework

The propose framework with results of the case study can be seen in Table 3. In this sense, the scoring percentage was inserted by the authors using the information regarding the project available at the internet. In the propose framework, the authors recommend that managers or supervisors to perform the data insertion as a result of their experience in the field. In addition, the percentage weight can be allocated accordantly to the manager or supervisor judgement based on the project information. Moreover, the authors recommend the manager or supervisor to score the category only if the project fully fulfil the characteristic. In example, the first category, early involvement of key participants, where in the subclassification has design consultant, contractors, trade contractor and agency, only score the five points of this characteristic if such presence is since the actual early phase of the project, as oppose to the traditional method. Such

complete fulfil of the characteristic can facilitate and clarify on how to score the framework.

In this regard, in the first category, namely early involvement of key participants, the project did not receive any score. That is a result of the current traditional delivery system being applied, where the stakeholders, such as the design consultant, contractor, trade contract and agency have no early involvement in the project. In terms of the second category, shared risk and reward category, the project did not receive any score. That is a result of the traditional risk and reward being applied to just one party, namely the owner. In the third category, contract category, the project did not receive any score. That is a result of the traditional or standard contract model application, where the owner have a separate contract between the consultant and the contractor. In the fourth category, BIM category, the project scored in both characteristics, earning a 10% mark. In the fifth category, legal category, the project did not receive any score. That is a result of the traditional or standard contract model, where all parties are open to sue one another, if the case. In the sixth category, team category, the project scored both characteristics, earning a plus 10% mark. Lastly, in the seventh category, communication category, the project scored the characteristic open information exchange, earning a plus 10% mark.

In this regard, after the final sum, the case study presented in this research scored a total of 30% mark. When it comes to level classification, as the total sum is between 25 to 50%, the case study was classified in the new proposed framework as having a low IPD collaboration presence in the project.

5 Discussion

The characteristics analysed in the project illustrated the essential IPD principles for a successful project implementation. In this sense, the early involvement of key participants, the first category in the proposed framework, is considered a critical and essential element in the IPD system, where all the key participants can input since the first phase, impacting the overall result (Viana et al., 2020; Ashcraft, 2010). In this characteristic, according to Leicht and Harty (2017), areas such as M&E and hydraulic could be heavily affected by their early input, were in the traditional method could generate reworks and material waste. When it comes to benefits, according to Fischer et al. (2017), such characteristics could bring several benefits for the project, such as accurate scope, feasible and constructible design as well as a team environment in the company (Fischer et al., 2017; AIA California Council, 2014). In terms of the second category analysed in the proposed framework, shared risk and reward, it is important to mention that according to Pishdad-Bozorgi and Srivastava (2018), such characteristic can foster creativity and loyalty within the team members, while maintaining the project within time, cost and quality, where such statement is supported by Xie and Liu (2017) in their research study. In terms of the third category, contract, the characteristics as the multi or poly-party contract, is considered by Fischer et al. (2017) as the most similar characteristic to the traditional method, where a single contract is made within the owner, architect, and contractor. In addition, according to AIA California Council (2014), benefits as a decrease in the mediation process, fast information exchange are fostered. In terms of the fourth category, BIM, several applications and benefits can be seen, where according to Maskil-Leitan and Reychav (2018) and Lesniewski and Berkebile (2018,

2012) some of them are a direct impact the concept, design, construction, operation, and maintenance as well as end-of-life IPD process.

In terms of the fifth category, legal category, the liability waivers characteristic is used to ensure that all parties of the project assume their responsibilities for eventual issues and mistakes during the project lifecycle (Viana et al., 2020; Fischer et al., 2017). This is due to prevent parties do suffer under law claims under the Restatement of Torts in Section 552, creating unnecessary and unforeseeable costs to the project (AIA California Council, 2014; Ashcraft, 2010). Thus, such characteristic aim to increase communication and trust, as well as reduce any unnecessary costs (AIA California Council, 2014; Fischer et al., 2017). When it comes to the sixth category, team category, recent researches (e.g., Guan, 2018; Garcia et al., 2016) illustrated that the team collaboration has a direct impact in the workplace, as well as the goal alignment fosters the team creation and productive connection (Guan, 2018; Garcia et al., 2016). Moreover, according to AIA California Council (2014), "the team structure and decision-making process were setup to be collaborative and transparent between the primary project participants, which provided a great deal of flexibility while working towards the best decisions for the project." In the last category, communication category, according to Yukl (2012), open information between departments can increase the effectiveness due to the rapid exchange of information among the members. In addition, according to Morgeson et al. (2010), as the fast communication occurs, the team can have a trust and respect improvement due to all receive the same information. When it comes to transition from the traditional method to the integrated one, the categories present in the proposed framework should be applied for a clear and easy transition. Finally, the proposed framework can support the industry and the research area to implement and identify IPD levels in projects for a smooth and easy transition.

6 Conclusions

The current research performed a descriptive study and proposed a new framework that applies a percentage ratio with mathematical weight calculation aiming to classify and identify the IPD collaboration level present in a project. For the data validation and illustration of the results, a case study was analysed, where the information of WWWTP project was inserted into the new proposed framework. In this regard, in the first category, early involvement of key participants' category, the project did not receive any score as well as the shared risk and reward, contract and legal category. On the positive side, WWWTP project received a 10% score in BIM, team and communication categories. In this regard, after the final sum, the case study scored a total of 30%. In addition, as the total sum is between 25 to 50%, the case study is classified in the proposed framework as having a low IPD collaboration presence in the project. Moreover, this study has illustrated the necessity of further IPD application in the construction industry, particularly in the early involvement of key participants, risk and reward, contract and legal category, where the case study analysed did not receive any scores in such characteristics. Moreover, the limitations of this research are the resources used in the literature with restricted areas where IPD is currently being implemented, such as the United States. However, it is important to mention that IPD has not been completely implemented in determining countries. The significance of this study is that it helps project stakeholders in the construction industry to develop and adopt innovation.

Moreover, they should understand the important factors that lead to IPD adoption. Finally, the researchers have not accessed all the information on the case study project.

7 Recommendations

For future studies, the authors recommended that IPD projects be analysed and used according to the needs of different communities. On the other hand, they can analyse the results of this research and use them to evaluate the IPD level present in a project. In fact, according to the needs of each country, the authors recommend an additional attention to improve the framework and if necessary adjust to their reality. Moreover, it is important to mention that IPD has a different implementation process according to each country condition, thus previous any application, the authors recommend a proper research approach.

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