

INTEGRATED PROJECT DELIVERY IMPLEMENTATION AMONG CONSTRUCTION SMES IN SRI LANKA: BARRIERS AND STRATEGIES

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ABSTRACT

Small and Medium-sized Enterprises (SMEs) are vital to Sri Lanka's economy, particularly in the construction sector, which largely relies on traditional procurement methods. This reliance results in persistent issues due to industry fragmentation. To address these challenges, it is vital to investigate the applicability of Integrated Project Delivery (IPD), a procurement method tailored to address the needs of construction SMEs. Despite its potential benefits, comprehension and implementation of IPD within the Sri Lankan construction industry remain limited due to the intricate nature of SMEs. Hence, the study aims to investigate the strategies to minimise barriers to IPD implementation within construction SMEs in Sri Lanka through a qualitative approach. A total of 15 semi-structured interviews with Sri Lankan construction industry experts were conducted. The literature review identified a range of barriers, including financial, technical, legal, and cultural challenges, which were further explored through these interviews. The research highlighted the lack of advanced strategies within Sri Lanka's construction SMEs to address these challenges effectively. Significant barriers to IPD implementation, such as narrow-mindedness, reluctance to change, and copyright issues, were validated and identified through the manual content analysis. The study proposes several strategies to facilitate IPD implementation, including introducing new guidelines from the Construction Industry Development Authority (CIDA), setting minimum parameters for team selection, implementing various versions of IPD rather than a pure IPD approach, and addressing conflict points early. The research offers valuable insights for both academia and industry practitioners, presenting strategies to enhance the efficiency, quality, and sustainability of construction SMEs through the adoption of IPD.

Keywords: *Barriers; Construction Small and Medium-sized Enterprises (SMEs); Integrated Project Delivery (IPD); Sri Lanka; Strategies.*

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1. INTRODUCTION

The construction industry is vital for moving the economy of the country forward and acts as a measure of development (Eze *et al.*, 2020; Uhanovita *et al.*, 2023). In most nations, the construction sector is divided into a limited number of large companies and a large number of small and medium enterprises (SMEs) (Ranadewa *et al.*, 2021; Tezel *et al.*, 2018). Hence, SMEs are significant for economic development as they are involved in creating jobs, reducing poverty, and helping large enterprises (Agwu & Emeti, 2014; Shelton *et al.*, 2016). According to Fulford and Standing (2014), large companies are not interested in having more employees and are used to subcontracting certain works to SMEs.

Various procurement techniques have been created throughout time in the industry to address the shortcomings of prior approaches. Common procurement procedures have a key flaw in that they do not guarantee the project's productivity level (Jayasena & Senevirathna, 2012). Further authors added that lower productivity is caused by failure to meet schedules and budgets, inadequate information in construction drawings, and material waste. Integrated Project Delivery (IPD) was created to address these issues.

IPD is a unique and creative approach to project management (Mei *et al.*, 2017). However, according to Sive (2009) and Ling *et al.* (2020), there is a lack of research elaborating on the present situation of IPD implementation in the construction industry and the causes of slow implementation of IPD. Kahvandi *et al.*, (2017) stated for the successful adoption of IPD, project stakeholders need to have familiarity, experience, and knowledge about the IPD as the role of stakeholders is different from traditional procurement methods and lack of familiarity prevents construction firms from using IPD. The absence of IPD training is considered one of the barrier factors to implementing IPD because it is a new concept to the construction industry (Durdyev *et al.*, 2019). According to Autodesk Whitepaper (2008), the Requirement of a new legal framework is a major reason for the slow adoption of IPD in construction (cited in Roy *et al.*, 2018). As IPD emphasises mutual trust between the parties and requires several agreements signed between parties, the adoption of IPD in construction is needed for new laws and regulations (Ghassemi & Becerik-Gerber, 2011; Ilozor, 2012).

As SMEs are prone to economic changes which leads the SMEs to unable to engage resources for innovation (Alves *et al.*, 2011) and lack of trust by large clients towards the SMEs (Briscoe *et al.*, 2001), reduce the use of IPD in construction SMEs. In developing countries adopting IPD in construction is not widely spread due to the lack of knowledge about eliminating barriers and the absence of interest (Rached *et al.*, 2014), especially where cost overrun, time delays, and low productivity are issues (Durdyev *et al.*, 2019). Therefore, it is vital to investigate those barriers and identify reasons for not materialising the adoption of IPD (Sommer *et al.*, 2014). In developed countries, IPD has been adopted already, yet its adoption in developing countries is still in the very early stages (Mei *et al.*, 2017). As a result, research is required to identify challenges related to IPD and determine the viability of IPD adoption in construction SMEs. Nevertheless, it is possible that issues faced by construction SMEs can be mitigated through the adoption of IPD. There is research available about the possibility of implementing IPD for construction companies but there is a lack of research discussing implementing IPD for construction SMEs. It is essential to research to investigate how to overcome the barriers to IPD implementation in construction SMEs in Sri Lanka through strategies to minimise barriers

to IPD implementation in construction SMEs in Sri Lanka. Therefore, the study aims to investigate the strategies to minimise barriers to IPD implementation within construction SMEs in Sri Lanka. The objectives of the study are to investigate the barriers to IPD implementation for construction SMEs in Sri Lanka and to propose strategies to minimise these barriers.

First, a comprehensive literature review on barriers to adopting IPD for construction SMEs and strategies to adopt IPD in construction SMEs is presented. Subsequently, the methodology employed in this research is delineated. Thereafter, the analysis of findings is provided, followed by a discussion and conclusion.

2. LITERATURE REVIEW

The study aims to explore strategies to overcome barriers to the implementation of IPD within construction SMEs in Sri Lanka through a Systematic Literature Review focused on formulating research problems and synthesising answers in a systematic process based on formulated data from previous research using databases such as Scopus, Web of Science, and Google Scholar.

2.1 BARRIERS TO ADOPTING IPD FOR CONSTRUCTION SMEs

In the construction sector, the implementation of IPD faces various challenges (Teng et al., 2019). Project performance is notably affected by a limited comprehension of the obstacles to IPD adoption, particularly in developing nations (Rached et al., 2014). Therefore, there is a need for research to investigate these barriers (Sommer et al., 2014). Such obstacles encompass technical, legal, financial, and cultural factors (Kent & Becerik-Gerber, 2010). Moreover, there is a dearth of research focusing on IPD within construction SMEs. Thus, Table 1 below outlines the general barriers to adopting IPD in the construction industry.

Table 1: Barriers to adopting IPD

NO	Barriers to adopting IPD	References
Financial barriers		
1	Equitable distribution of opportunities for gain and potential for loss among stakeholders.	[2], [7], [14], [15], [16], [17]
2	Differences in the accounting of costs and profit among the client, consulting, and contracting firms.	[15]
Technical barriers		
3	Integration of information, and knowledge management systems	[15]
4	An early definition of target goals without a fully developed design	[15]
5	Un-established/unclear BIM standards and practices	[15]
6	consistency problems due to different organizations using various IT systems	[10]
7	ownership issues and liability issues in the integrated use of technology	[8]
Legal barriers		
8	Need for new legal framework	[1], [7], [15]
9	Criteria for selection of agencies value-based vs. cost-based	[14], [15]

NO	Barriers to adopting IPD	References
10	current contracts do not incorporate IPD parameters	[4], [8], [9], [13], [14]
11	New contract documents supporting IPD are not thoroughly tested	[8], [12]
12	Absence of proper risk or reward-sharing procedure	[3]
13	Need for a long time for changing rules needed for IPD implementation	[7], [5]
14	Problems related to insurance	[2], [11], [12], [16]
Cultural barriers		
15	Lack of mutual respect & trust	[15]
16	Inexperience with each other & IPD	[15]
17	Awareness and willingness about IPD among owners.	[15]
18	Reluctance to change	[5], [14]
19	unawareness of alternative procurement strategies	[6]
20	the rigid culture and high uncertainty avoidance	[6]
Other barriers		
21	Early involvement of subcontractors	[15]
22	Requirement of a competent and risk-tolerant client	[15]
23	Subjectivity in measuring quality	[15]

[1] Subaih, 2015 [2] Cohen, 2010 [3] Durdyev et al., 2019 [4] Fish, 2011 [5] Ghassemi & Becerik-Gerber, 2011 [6] Joseph & Jayasena, 2008 [7] Kahvandi et al., 2017 [8] Kent & Becerik-Gerber, 2010 [9] Ling et al., 2020 [10] Moses et al., 2008 [11] Mossman et al., 2013 [12] Naismith et al., 2016 [13] Pishdad-Bozorgi & Beliveau, 2016 [14] Rached et al., 2014 [15] Roy et al., 2018 [16] Tezel et al., 2018 [17] Haiyan & Hua, 2017

The equitable distribution of gains and losses among stakeholders emerges as a primary barrier to IPD adoption. The absence of contracts integrating IPD parameters is identified as a legal barrier by many researchers. Additionally, cultural barriers, such as reluctance to change, are highlighted by several authors. Thus, the barriers to IPD adoption for a general contractor necessitate empirical testing during research.

2.2 STRATEGIES TO ADOPT IPD IN CONSTRUCTION SMES

As there are lack of research focusing on IPD for construction SMEs. some researchers have indicated that similar to large contractors, construction SMEs also implement strategies to overcome barriers in the IPD implementation. Therefore, Table 2 presents the strategies that need to be adopted by construction SMEs.

Table 2: Strategies to adopt IPD in construction SMEs

No	Strategies	References
1	pay more attention while choosing the team and contract type.	[6]
2	Increasing integration between project teams	[5]
3	made aware of the relational contract practices and the possible advantages.	[3], [5]
4	Research and Development	[4]

No	Strategies	References
5	Eliminate the power of parties to sue one another.	[2], [7], [9]
6	Use Contractors All Risk Insurance policy with modifications.	[4], [8]
7	Using methods like Price estimation, Cost benchmarking and Target Criteria Amendment and Target Cost for risk	[1], [8]

[1] AIA, 2012 [2] Cohen, 2010 [3] Eze et al., 2020 [4] Fish, 2011 [5] Gunathilake & Jayasena, 2008 [6] Kahvandi et al., 2017 [7] Naismith et al., 2016 [8] Roy et al., 2018 [9] Sive, 2009

Table 2 outlines key strategies for implementing IPD in construction SMEs, emphasising aspects such as team selection, contract types, integration among project teams, awareness of relational contract practices, and investment in research and development. These strategies draw upon various references in the field, reflecting a growing recognition of the importance of tailored approaches for SMEs in the construction sector. Identifying barriers and strategies specific to construction SMEs is crucial for optimising their performance and competitiveness in the industry. By understanding the unique challenges they face such as limited resources and capabilities, stakeholders can devise targeted solutions to enhance IPD implementation, foster collaboration, and drive sustainable growth within the SME segment of the construction sector.

3. METHODOLOGY

A comprehensive literature review was conducted to collect barriers to adopting IPD for construction SMEs and strategies to overcome the barriers and successfully adopt IPD in construction SMEs. The qualitative approach is used to achieve the aim of the study. Qualitative research allows the researcher to gain detailed knowledge as it is deeply involved in the actual experiences (Creswell, 2009). Accordingly, the data was collected through semi-structured interviews. Semi-structured expert interviews were conducted to identify the barriers to adopting IPD for construction SMEs and to propose strategies to overcome the barriers to adopting IPD for construction SMEs in Sri Lanka. A 15 number of semi-structured interviews with industry practitioners, selected through a purposive sampling method were conducted to validate and expand the literature findings. The qualitative data was analysed through manual content analysis which is among the many qualitative techniques currently accessible for analysing data and interpreting its significance is qualitative content analysis. The details of the interviewees are listed in Table 3.

Table 3: Details of the interviewees

Respondent	Designation	Educational Qualification	Industry experience	Awareness of the IPD concept	Experience in SMEs
R1	Quantity Surveyor	PhD	3 years	Well aware	Yes
R2	Contract Administrator	MSc	35 years	Aware	Yes
R3	Quantity Surveyor	BSc	4 years	Well aware	Yes
R4	Quantity Surveyor	BSc	3 years	Well aware	Yes
R5	Quantity Surveyor	MSc	7 years	Well aware	Yes
R6	Senior Lecturer	BSc	10 years	Well aware	Yes

Respondent	Designation	Educational Qualification	Industry experience	Awareness of the IPD concept	Experience in SMEs
R7	Director	BSc, MBA	30 years	Well aware	Yes
R8	Chief Quantity Surveyor	BSc	15 years	Aware	Yes
R9	Senior Cost Manager	MSc	9 years	Well aware	Yes
R10	Senior Cost Manager	MSc	11 years	Well aware	Yes
R11	Senior Lecturer	BSc	10 years	Well aware	Yes
R12	Director	BSc, MBA	27 years	Well aware	Yes
R13	Chief Quantity Surveyor	BSc	16 years	Aware	Yes
R14	Quantity Surveyor	BSc	5 years	Well aware	Yes
R15	Quantity Surveyor	BSc	4 years	Well aware	Yes

The interview guidelines consisted of three sections. The first section focuses on the general details of the experts, the second section focuses on barriers to implementing IPD in construction SMEs, and the third section concentrates on strategies for adopting IPD in these SMEs.

4. DATA ANALYSIS AND FINDINGS

4.1 IPD

IPD is a project delivery approach that integrates all the participants to improve project results by giving priority to project goals instead of their own goals (Durdyev et al., 2020). Respondents were asked about their ideas regarding IPD as the first question of the interview. According to R1, “IPD can be classified as a contractual arrangement to overcome the challenges of trust and collaboration issues and cost overrun in projects by creating a common set of terms, expectations, and project goals”. Terms used by the respondents to explain IPD are presented in Figure 1.

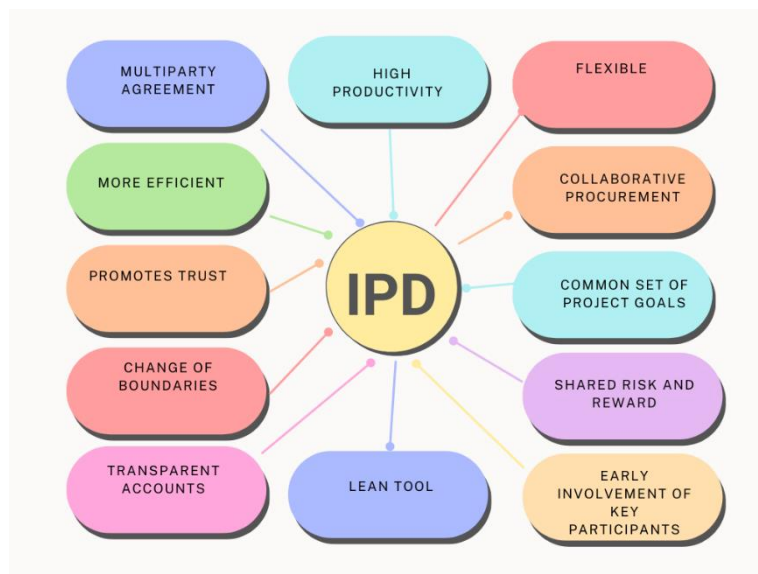


Figure 1: Terms used to define IPD

To illustrate IPD, Figure 1 illustrates the most often used terminologies to define IPD.

4.2 BARRIERS TO IMPLEMENTING IPD IN CONSTRUCTION SMES

Investigating the barriers to IPD implementation for construction SMEs in Sri Lanka is one of the research objectives. Experts were asked to discuss the barriers to IPD implementation for construction SMEs in Sri Lanka. The identified barriers from the literature were used to aid the interview process.

4.2.1 Financial Barriers

Except for **R1** and **R5**, all other experts identified the equitable distribution of opportunities for gain and potential for loss among stakeholders as barriers. **R3** stated that there is no recognised formula to distribute the gain and loss among the stakeholders. It is the challenge of selecting compensation and incentive structures corresponding to the unique project's characteristics and its participants (Cohen, 2010). However, **R1** claimed that *'just like the agreements in joint venture projects, stakeholders can identify in the multi-party agreement about the proportion of gain and loss'*. Moreover, **R5** noted that reaching an agreement about the proportion of gain and loss may be time-consuming and slow the progress but it cannot be considered a barrier. **R1, R2, R8, and R9** considered Differences in the accounting of costs and profit among the client, consulting, and contracting firms as a barrier. **R4** claimed that *"even though different parties have different accounting practices, IPD itself promotes transparency which could eliminate the problem of different accounting practices"*. Stakeholders can check the accounts of others and confirm the cost and profits.

4.2.2 Technical Barriers

Out of the technical barriers identified in the literature review, no experts select integration of information, and knowledge management systems and un-established/unclear BIM standards and practices as barriers for implementing IPD in construction SMEs. **R7** stated that with the technology and information tools available sharing information and knowledge management cannot be considered as a barrier. Moreover, **R11** added that *'since IPD can be practised without BIM, Un-established/unclear BIM standards and practices cannot be considered as a barrier'*. **R5** claimed that the information can be shared more efficiently with the help of BIM. However, it cannot act as a barrier to implementing IPD in construction SMEs. However, in the literature findings, Rached et al. (2014) reveal that BIM integrates all the trades and design aspects and supports the scope of work and the construction method to be used. However, the use of BIM might cause problems when small entities do not have enough expertise with such a technology.

Roy et al. (2018) claimed that the early setting of target goals without a fully developed design is the most important technical barrier. Similar to that **R2** claimed that *'Without defining the design, stakeholders may find it extremely difficult to set clear cost, time, and quality goals'*. However, **R13** claimed that if it is completely a new project and nobody has done it yet, it can be a barrier, yet generally, the other projects can be benchmarked at the feasibility stage. Therefore, target goals can be set without a fully developed design.

4.2.3 Legal Barriers

Except need for a new legal framework, all other barriers identified in the literature review were considered as barriers by the 15 experts. **R3, R5, and R7** identified the absence of a legal framework for implementing IPD as a barrier. Similarly, Roy et al.

(2018) added that a new legal framework is a prerequisite for the successful implementation of IPD. However, **R1** claimed that instead of the new legal framework, it is advisable to have new guidelines for implementing IPD. Furthermore, **R14** added that before moving into the legal context, the contractual context needs to be given priority. Because professionals in the construction industry are not intervening in legal matters at very early stages. Because they always trying to resolve or minimise the issues contractually.

4.2.4 Cultural Barriers

During the literature review, six cultural barriers were identified. All the experts selected all identified barriers as factors that hinder the implementation of IPD in construction SMEs. Ghassemi and Becerik-Gerber (2011) trust between the different stakeholders is key to the success of an IPD project. According to **R5**, ‘*as a result of prior experiences, it has been noted that there is a great deal of mistrust amongst the participants in the Sri Lankan construction sector*’. **R9** claimed that some of the barriers are interrelated. For example, due to the rigid culture and high uncertainty avoidance, owners are reluctant to change from traditional procurement methods to alternative procurement methods.

4.2.5 Other Barriers

R1, R2, R3, R5, and R6 selected Early involvement of subcontractors as a barrier. **R1** believed that the IPD goals could never be achieved without including major subcontractors at the very early stage of the project. In contrast to that **R12** claimed that ‘*the subcontractors in the Sri Lankan construction industry are not knowledgeable enough to add anything to the IPD process*’. Furthermore, Subcontractors engaged in specialised services including MEP works, Steelworks, etc. are the only exceptions. Figure 2 summarises the barriers selected by the 15 experts.

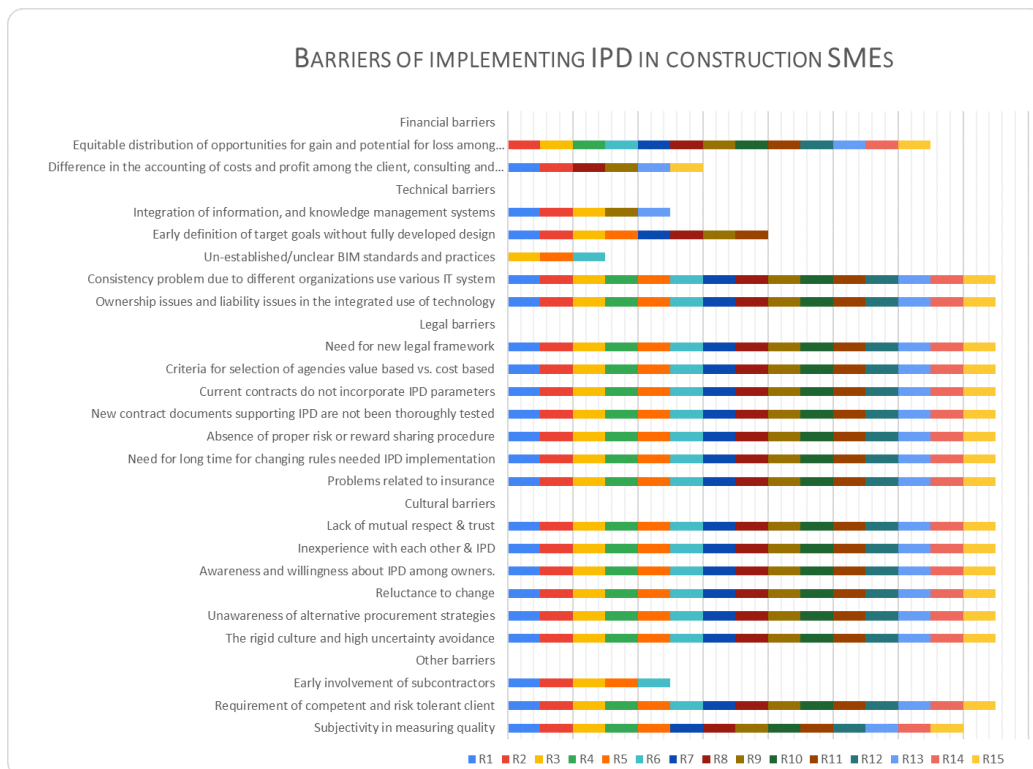


Figure 2: Barriers to adopting IPD

In addition to the barriers identified in the literature review, respondents in the construction industry identified several challenges that hinder the effective implementation of IPD. These barriers include limited access, a narrow focus on profit maximisation, tendency to shift risk -As well as organisational structure, issues such as problem-solving techniques, frequent abusive behaviour, and undesirable or hostile work environment, the lack of an established framework further complicates the adoption of IPD in addition to resistance to considering new ideas, the desire to push one's ideas alone. Obstacles that arise Reluctance or fear of customers and the challenges of discussing the benefits of IPD implementation further highlights the multifaceted barriers facing construction SMEs in adopting collaborative approaches. Overcoming these barriers requires comprehensive strategies that encourage cultural exchange, improve communication, and create an enabling environment for entrepreneurship and innovation among SMEs in manufacturing.

4.3 STRATEGIES TO IMPLEMENT IPD IN CONSTRUCTION SMEs

All the respondents identified paying more attention while choosing the team as a strategy. **R1** stated that the success of IPD projects hugely depends on the parties involved and how parties work in a collaborative environment for a common goal by sharing the risks involved in the project. Therefore, high attention should be given to selecting the parties for the IPD team. *“Minimum parameters should be set to select the parties”*. For example, select the parties who have already worked with each other. It will increase the integration between the teams and select the parties who have a good reputation in the field. In addition to that **R3** suggested that the Project team should select based on their ability to handle different parties at the same time and ability to communicate. **R6** suggested that *“when selecting contractors for the projects based on IPD, it is a better option to go for a selective group of contractors and negotiate with them rather than open selection”*. It will enhance the trust between the involved parties. It allows the client to work with the contractor with whom they may worked for a long time collaboratively. For example, design consultants and contractors are working on a design and build project. In such a scenario as they are already in a collaborative mindset, it can be used as a strategy to implement IPD in construction SMEs.

Moreover, **R1** claimed that parties involved in the construction sector were unaware of new procurement methods such as IPD in Sri Lanka. Therefore, it is recommended to introduce Continuous Professional Development (CPD) courses to educate. **R7** added that *“Research and development related to IPD can be used to show the client the advantages of IPD implementation and how IPD can be used to gain considerable benefits in the construction”*. With more and more research about IPD, familiarity and awareness about IPD as a procurement method will be increased. Furthermore, **R1** suggested that CIDA should come up with a new guideline for IPD contracts. As current contracts commonly used in Sri Lanka do not incorporate parameters for IPD, it is highly appreciable and will allow the implementation of IPD soon. *“Most of the legal and contractual problems can be eliminated with the help of a guideline or a standard document”*.

R1 emphasised that proper communication channels should be established to implement IPD successfully by stating; *“It is better to establish a portal to share information, questions, and progress in real-time”*. It will allow all the parties to get updates about the project immediately. For example, if an architect asks an information from the client related to the project, all other parties could be aware at the same time through the

common portal. As IPD is to achieve the common goal, it should be visible to every party. Even though online platforms are available to share information with the team, **R8** claimed parties in Sri Lanka wish to work in a physical environment most of the time. Therefore, it is better to have weekly meetings, and progress meetings which allow parties to know each other. With regular meetings, integration between the teams can be achieved.

Additionally, **R12** claimed that conflict points should identified and identified conflict points should addressed during the pre-contract stage. It leads to work smoothly as it is agreed between the parties involved. For example, copyright issues can be solved by including the rights of each party over the documents in the contract. Moreover, **R9** stated that ‘*before the multiparty contract, a very thorough analysis should be conducted to ascertain the risks that each party would face in the project. This will ensure that the shared profit and loss are distributed fairly*’. If the incentive program was not preferred by the parties involved, it might have a substantial negative impact on the teams' morale and consequently their production. In addition, **R7** stated that the method of distributing gain and loss among parties is essential for implementing IPD. It should be decided at a very early stage of the project. However, the definition of target goals without a fully developed design is difficult. Cost benchmarking can be used to overcome this situation. It allows the parties to set a target goal based on a similar project even at the feasibility stage.

R2 and **R3** emphasised that proper documentation needs to be incorporated into IPD projects. **R14** suggested that the responsibilities of each party in every stage of the procurement process from feasibility to completion and liability period need to be identified and defined properly. “*Responsibilities should be properly documented to avoid confusion*”. The pre-contract stage is very vital for the implementation of IPD. Therefore, proper attention and more efforts should be allocated to the pre-contract stage. Furthermore, **R15** added that the implementation of IPD needs high transparency between the parties about the financial transactions. Therefore, open-book accounting is followed in IPD contracts. However, different account practices followed by different parties may bring trouble. Therefore, it is recommended to have standard accounting practices agreed upon by parties to the contract.

All the respondents disagree with the elimination of parties’ power to sue one another as a strategy to adopt IPD for construction SMEs in Sri Lanka. According to **R5**, “*Elimination of the power of parties to sue one another might lead to some problems as well. Absence of the power to sue might be misused by the parties which are not familiar with the contractual conditions*”. All the respondents agreed that the Contractor's All-Risk (CAR) insurance policy can be used with some modifications due to the absence of an insurance policy for IPD. **R10** added that risks in IPD contracts are shared between the parties. Normal CAR insurance is not going to be applicable as some of the risks will be shared with the client. Therefore, the CAR policy can be used as insurance with some modifications.

R8 claimed that Government projects should start adopting IPD. It will create confidence in the IPD as a procurement method. It will motivate the private sector to engage in IPD-based projects. Investors could gain confidence through government initiatives, and it can be the starting point of the adoption of IPD among construction SMEs in Sri Lanka. In addition to that **R9** added “*different versions of IPD can be implemented rather than*

going for a pure IPD”. It will allow a partnership between the client and the contractor to have partial arrangements before going to the pure IPD.

Figure 3 summarises all the strategies identified in the literature review and new strategies revealed by experts in the interview in a structured way.

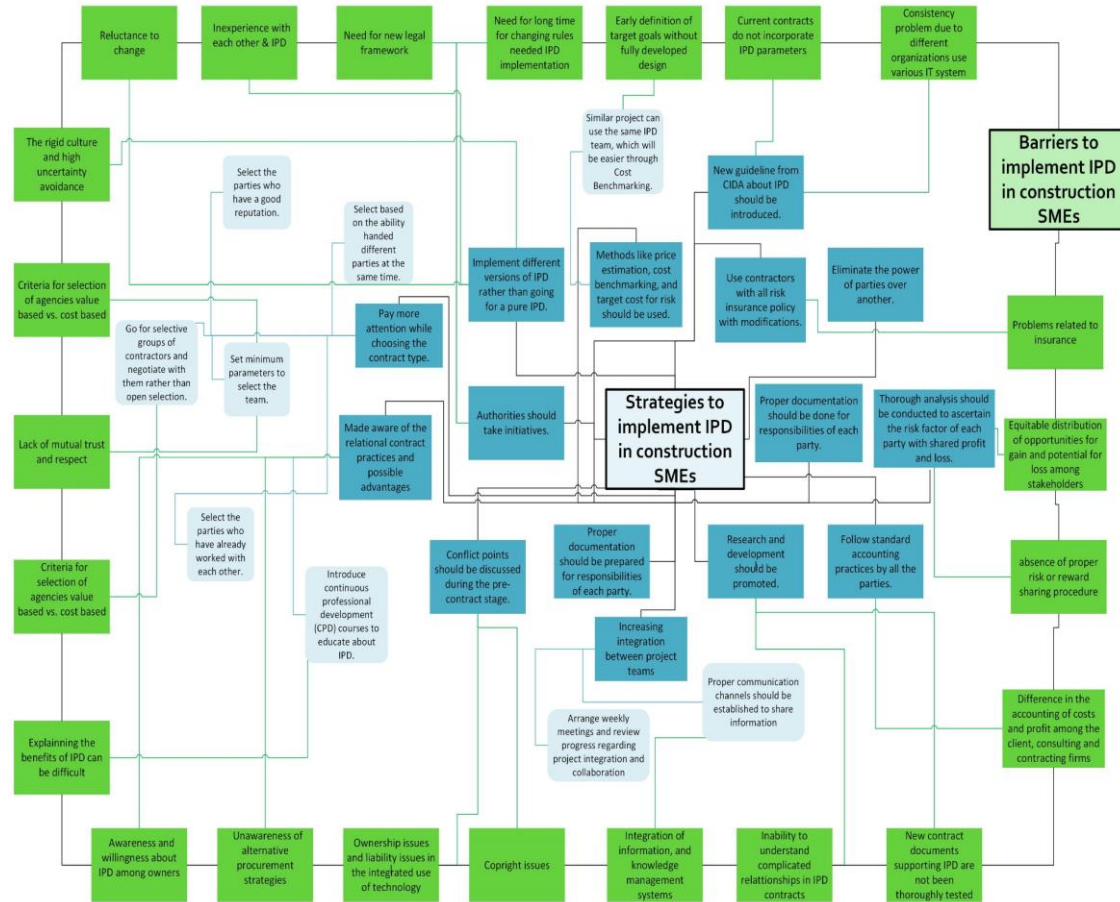


Figure 3: Strategies to implement IPD

5. DISCUSSION

The literature highlights several key barriers to the adoption of IPD, particularly within SMEs. Alves et al. (2011) note that SMEs, due to their vulnerability to economic changes, often struggle to allocate resources for innovation. Additionally, Briscoe et al. (2001) point out that a lack of trust from larger clients towards SMEs further hinders the utilisation of lean construction deployments in this sector. Building upon this, Ogunbiyi et al. (2014) proposed a strategic shift towards IPD within the overall project delivery framework, positioning it as the final tier under lean construction deployments. However, the study identifies a significant barrier to IPD adoption among SMEs: the absence of a recognised formula for the equitable distribution of gains and losses among stakeholders, echoing the concerns raised by Cohen (2010). Furthermore, Roy et al. (2018) identified early goal setting without fully developed designs as a critical technical barrier to IPD implementation. The authors emphasise the need for a new legal framework to support successful IPD implementation, a sentiment echoed by experts in the field. To overcome these barriers and ensure industry-wide adoption of IPD, Fish (2011) suggests prioritising education initiatives to enhance stakeholder understanding of the concept's importance.

Additionally, Joseph and Jayasena (2008) advocate for increased Research and Development (R&D) investment in the construction industry, particularly in regions such as Sri Lanka where R&D practices are relatively underutilised. Regarding insurance practices in IPD approaches, Fish (2011) notes the reliance on traditional insurance policies despite the lack of specific policies tailored to IPD. This underscores the need for customised insurance solutions for IPD projects, incorporating various policies to address project-specific concerns. In terms of risk management and profit-sharing in IPD contracts, AIA (2023) and Roy et al. (2018) advocate for thorough research and agreement among parties on risk allocation and benefit sharing based on their respective levels of engagement. Rached et al. (2014) further emphasised the importance of conducting comprehensive research before signing multiparty contracts to ensure fair distribution of shared savings and earnings. Finally, both the study and Fish (2011) highlight the effectiveness of multiparty agreements as a solution to IPD contracting challenges, emphasising their holistic approach compared to standard contracts, which typically focus on individual parties rather than the project as a whole.

6. CONCLUSIONS

SMEs play a pivotal role in Sri Lanka's economy, yet competitive pressures and various barriers have compelled construction SMEs to seek innovative strategies for overcoming challenges. IPD stands out as a procurement method characterised by principles such as early involvement of key stakeholders, shared risk and reward, collaborative behaviour, and open communication, prioritising project objectives over individual gains. While IPD is not currently practised in the Sri Lankan construction industry, it has gained popularity in developed countries due to its considerable benefits. This study, conducted through a cumulative process involving literature review and semi-structured interviews, aimed to identify barriers to IPD implementation in construction SMEs. The literature review pinpointed financial, technical, legal, cultural, and other barriers, which were further explored in semi-structured interviews. Similarly, strategies for implementing IPD were identified through a literature review and assessed for their applicability in Sri Lankan construction SMEs.

The research highlighted the absence of advanced strategies within Sri Lanka's construction SMEs to address their challenges. To address these barriers and ensure market survival, the study advocates for IPD as a procurement method. The research provides insights into how IPD can be adopted in construction SMEs in Sri Lanka, presenting barriers, and strategies associated with IPD adoption as key contributions. By examining the barriers to IPD implementation among construction SMEs in Sri Lanka, this paper provides valuable insights into the challenges faced by industry practitioners. This identification of barriers enables stakeholders to anticipate and address potential obstacles in their own IPD adoption efforts. Further, through the exploration of strategies to overcome these barriers, this paper offers practical guidance to construction SMEs in Sri Lanka and similar contexts. By implementing these strategies, organisations can enhance their ability to adopt and implement IPD effectively, leading to improved project outcomes and organisational performance. This paper contributes to the theory by empirically validating the barriers to IPD adoption identified in the existing literature. However, the research faced limitations due to the limited awareness of both SMEs and IPD among professionals and the extensive amount of data to analyse. Nevertheless, the

data collection and analysis revealed that the implementation of IPD has the potential to resolve a significant number of problems faced by construction SMEs.

7. REFERENCES

- Agwu, M.O. & Emeti, C.I., 2014. Issues, Challenges, and Prospects of Small and Medium Scale Enterprises (SMEs) in Port-Harcourt City, *European Journal of Sustainable Development*, 3(1), 101–114. <https://doi.org/10.14207/ejsd.2014.v3n1p101>
- AIA. (2012, March). *IPD Case Study*. AIA Minnesota, School of Architecture –University of Minnesota.
- AIA. (2023, November 23). *Understanding & implementing IPD*. Integrated Project Delivery: A Guide.
- Alves, T., Barros Neto, J., Heineck, L., Kemmer, S., & Pereira, P. (2011). Incentives and innovation to sustain lean construction implementation. *17th Annual Conference of the International Group for Lean Construction* (pp. 583-592), Taipei, Taiwan. Retrieved from https://www.researchgate.net/publication/282338935_Incentives_and_innovation_to_sustain_lean_construction_implementation
- Autodesk Whitepaper. (2008). *Improving building industry results through integrated project delivery and building information modeling*. Autodesk, In.
- Briscoe, G., Dainty, A. R. J., & Millett, S. (2001). Construction supply chain partnerships: skills, knowledge and attitudinal requirements. *European Journal of Purchasing & Supply Management*, 7(4), 243–255. [https://doi.org/https://doi.org/10.1016/S0969-7012\(01\)00005-3](https://doi.org/https://doi.org/10.1016/S0969-7012(01)00005-3)
- Cohen, J. (2010). *Integrated Project Delivery: Case Studies*. American Institute of Architects.
- Creswell, J. (2009). *Research design: Qualitative, quantitative and mixed methods approaches* (3rd ed.). Thousand Oaks, CA: SAGE Publications.
- Durdyev, S., Hosseini, M. R., Martek, I., Ismail, S., & Arashpour, M. (2019). Barriers to the use of integrated project delivery (IPD): a quantified model for Malaysia. *Engineering, Construction and Architectural Management*, 27(1), 186–204. <https://doi.org/10.1108/ECAM-12-2018-0535>
- Eze, C. E., Awodele, I. A., Adegboyega, A. A., Onyeagam, O. P., & Guto, J. A. (2020). Assessment of the triggers of inefficient materials management practices by construction SMEs in Nigeria. *International Journal of Real Estate Studies*, 14(1), 38–56. <https://intrest.utm.my/index.php/intrest/article/view/134>
- Fish, A. (2011). *Integrated project delivery: The obstacles of implementation*. [Masters of Science, Kansas State University]. K-State Electronic Theses, Dissertations, and Reports <http://hdl.handle.net/2097/8554>.
- Fulford, R., & Standing, C. (2014). Construction industry productivity and the potential for collaborative practice. *International Journal of Project Management*, 32(2), 315–326. <https://doi.org/https://doi.org/10.1016/j.ijproman.2013.05.007>
- Ghassemi, R., & Becerik-Gerber, B. (2011). Transitioning to Integrated Project Delivery: Potential barriers and lessons learned. *Lean Construction Journal*, 2011, 32-52. https://leanconstruction.org/wp-content/uploads/2022/08/LCJ_11_sp3.pdf
- Gunathilake, S., & Jayasena, S. H. (2008). Developing relational approaches to contracting: The Sri Lankan context. In R. Haigh & D. Amaratunga (Eds.), *International Conference on Building Education and Research* (pp. 1528–1541).
- Haiyan, X., & Hua, L. (2017). Studying contract provisions of shared responsibilities for integrated project delivery under national and international standard forms. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, 9(3), 04517009. [https://doi.org/10.1061/\(ASCE\)LA.1943-4170.0000220](https://doi.org/10.1061/(ASCE)LA.1943-4170.0000220)
- Ilozor, D. (2012). Building information modelling and integrated project delivery in the commercial construction industry: A conceptual study. *Journal of Engineering, Project, and Production Management*, 2(1), 23-36. <https://doi.org/10.32738/JEPPM.201201.0004>
- Jayasena, H., & Senevirathna, N. (2012). Adaptability of Integrated Project Delivery in a Construction Industry. *World Construction Conference 2012 – Global Challenges in Construction Industry*, Colombo, Sri Lanka.

- https://www.researchgate.net/publication/338608014_Adaptability_of_Integrated_Project_Delivery_in_a_Construction_Industry
- Joseph, L. A., & Jayasena, H. S. (2008). Impediments to the Development of Design and Build Procurement System in Sri Lanka. In R. Haigh & D. Amaratunga (Eds.), *International Conference on Building Education and Research* (pp. 1566–1575).
- Kahvandi, Z., Saghatforoush, E., Alinezhad, M., & Nogholi, F. (2017). Integrated project delivery (IPD) research trends. *Journal of Engineering, Project, and Production Management*, 7(2), 99–114. <https://doi.org/10.32738/JEPPM.201707.0006>
- Kent, D., & Becerik-Gerber, B. (2010). Understanding construction industry experience and attitudes toward integrated project delivery. *Journal of Construction Engineering and Management*-136(8), [https://doi.org/10.1061/\(ASCE\)CO.1943-7862.0000188](https://doi.org/10.1061/(ASCE)CO.1943-7862.0000188)
- Ling, F. Y., Xin, T. P., Shan, L., Zhe, Z., & Qiuwen, M. (2020). Adoption of integrated project delivery practices for superior project performance. *Journal of Legal Affairs and Dispute Resolution in Engineering and Construction*, 12(4), 05020014. [https://doi.org/10.1061/\(ASCE\)LA.1943-4170.0000428](https://doi.org/10.1061/(ASCE)LA.1943-4170.0000428)
- Mei, T., Wang, Q., Xiao, Y., & Yang, M. (2017). Rent-seeking behavior of BIM- and IPD-based construction project in China. *Engineering, Construction and Architectural Management*, 24(3), 514–536. <https://doi.org/10.1108/ECAM-11-2015-0178>
- Moses, S., El-Hamalawi, A., & Hassan, T. M. (2008). The practicalities of transferring data between project collaboration systems used by the construction industry. *Automation in Construction*, 17(7), 824–830. <https://doi.org/https://doi.org/10.1016/j.autcon.2008.02.007>
- Mossman, A., Ballard, G., & Pasquire, C. (2013). Lean Project Delivery — innovation in integrated design & delivery. In J. Eynon (Eds.), *The Design Manager's Handbook* (1st ed., pp. 165–190). Wiley Blackwell. <https://doi.org/10.13140/2.1.2713.2804>
- Naismith, N., Tookey, J., Hoseini, A. G., & Kekreja, R. (2016). The adoption of integrated project delivery in public sector projects in New Zealand: the way forward. In Y. Sandanayake, G. Karunasena, & T. Ramachandra (Eds.), *Greening Environment, Eco-Innovations & Entrepreneurship* (pp. 507–516). Ceylon Institute of Builders.
- Ogunbiyi, O., Goulding, J. S., & Oladapo, A. (2014). An empirical study of the impact of lean construction techniques on sustainable construction in the UK. *Construction Innovation*, 14(1), 88–107. <https://doi.org/10.1108/CI-08-2012-0045>
- Pishdad-Bozorgi, P., & Beliveau, Y. J. (2016). Symbiotic relationships between integrated project delivery (IPD) and trust. *International Journal of Construction Education and Research*, 12(3), 179–192. <https://doi.org/10.1080/15578771.2015.1118170>
- Rached, F., Hraoui, Y., Karam, A., & Hamzeh, F. (2014). Implementation of IPD in the Middle East and its Challenges. Proceedings International Group for Lean Construction, (pp.293-304), Oslo, Norway. <https://doi.org/10.13140/RG.2.1.3348.6724/1>
- Ranadewa, K.A.T.O., Y.G. Sandanayake, Y.G.S. and Siriwardena, M. (2021). Enabling lean through human capacity building: an investigation of small and medium contractors, *Built Environment Project and Asset Management*, 11(4), 594-610. <https://doi.org/10.1108/BEPAM-03-2020-0045>
- Roy, D., Malsane, S., & Samanta, P. (2018). Identification of critical challenges for adoption of integrated project delivery (IPD). *Lean Construction Journal*, 01-15. https://leanconstruction.org/wp-content/uploads/2022/08/LCJ_17_007.pdf
- Shelton, J., Martek, I. & Chen, C., (2016). Implementation of innovative technologies in small-scale construction firms: Five Australian case studies. *Engineering, Construction and Architectural Management*, 23(2), 177-91. <http://dx.doi.org/10.1108/ECAM-01-2015-0006>
- Sive, T. (2009). Integrated project delivery: Reality and promise, a strategist's guide to understanding and marketing IPD. Society for Marketing Professional Services Foundation, 10-17. <https://www.scribd.com/document/504125811/Sive-White-Paper-IPD>
- Sommer, A. F., Dukovska-Popovska, I., & Steger-Jensen, K. (2014). Barriers towards integrated product development — Challenges from a holistic project management perspective. *International Journal of Project Management*, 32(6), 970–982. <https://doi.org/https://doi.org/10.1016/j.ijproman.2013.10.013>

- Subaih, A. (2015). Integrated Project Delivery: A paradigm shift for oil and gas projects in the UAE and the Middle East region. *Oil and Gas Facilities*, 4(4), 64–77. <https://doi.org/10.2118/171722-PA>
- Teng, Y., Li, X., Wu, P., & Wang, X. (2019). Using cooperative game theory to determine profit distribution in IPD projects. *International Journal of Construction Management*, 19(1), 32–45. <https://doi.org/10.1080/15623599.2017.1358075>
- Tezel, A., Koskela, L., & Aziz, Z. (2018). Current condition and future directions for lean construction in highways projects: A small and medium-sized enterprises (SMEs) perspective. *International Journal of Project Management*, 36(2), 267–286. <https://doi.org/https://doi.org/10.1016/j.ijproman.2017.10.004>
- Uhanovita A.C., N., K.A.T.O., R. and Parameswaran, A. (2023), Poka-Yoke to minimise variations: a framework for building projects, *Construction Innovation*. <https://doi.org/10.1108/CI-12-2022-0343>