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La gestión económica en la entrega integrada de proyecto: la vision del project manager
Economic management in integrated project delivery: the project manager's vision

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Resumen-- **La gestión económica es una de las actividades más importantes en cualquier proyecto de construcción y Lean Integrated Project Delivery propone cambios significativos en comparación con el sistema tradicional en tres aspectos fundamentales: 1) la forma en la que se remunera a los agentes; 2) la gestión de los costes del proyecto y sus herramientas y 3) la forma en la que se gestionan los gastos. El presente artículo analiza las diferencias entre la gestión tradicional y la propuesta en Lean IPD. Para ello se analizó la literatura científica existente y se condujeron 28 entrevistas entre los representantes de las principales empresas de Project y Construction Management que operan en España con la intención de identificar potenciales barreras y palancas en la difusión de Lean Integrated Project Delivery en este país.**

Palabras clave— Target Value Delivery; Libros Abiertos; Lean Construction; Integrated Project Delivery.

Abstract— **Economic management is one of the most important activities in any construction project and Lean Integrated Project Delivery proposes significant changes compared to the traditional system in three fundamental aspects: 1) the way in which agents are remunerated; 2) the management of the costs of the project and its tools and 3) the way in which expenses are managed. This article analyzes the differences between traditional management and the proposed Lean IPD. To this end, the existing scientific literature was analyzed and 28 interviews were conducted between representatives of the main Project and Construction Management companies operating in Spain with the intention of identifying potential barriers and levers in the dissemination of Lean Integrated Project Delivery in this country.**

Index Terms— Target Value Delivery; Open book; Lean Construction; Integrated Project Delivery.

I. Introduction

THE way in which the economics of construction projects are managed conditions the behavior that can be expected from the project agents. The different delivery methods -*Design Bid Build* (DBB), *Construction Management* (CM), *Construction Management at Risk* (CM@R) or *Design and Build* (DB)- encourage or discourage certain behaviors (Franz et al., 2017) which can be beneficial in some projects or detrimental to others. *Lean Integrated Project Delivery,* also known as Lean Project Integrated Delivery, it articulates several economic mechanisms to promote a series of expected behaviours such as: putting the interests of the project above those of the agents, encouraging the achievement of the client's objectives – deadline, cost, sustainability, etc. – promoting a sense of team, reducing conflict or facilitating the governance and management of the project, among others.

The main mechanisms and tools used by *Lean IPD* to achieve the benefits mentioned above are: 1) the remuneration of the parties for Costs plus Fees with Incentives (Multipart), 2) the definition of project costs through the Target Value Method and 3) the use of Open Books.

The remuneration of agents by Costs plus Fees with Incentives (Multipart) favors that all agents pursue the achievement of the objectives of the project over individual interests since one agent cannot win without the others winning.

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This conditioning factor encourages a sense of team and the need to join forces to improve the results of the project.

Defining project costs through *Target Value Design* (TVD) or Design by Target Value puts cost definition at the forefront of all phases of the project. Compared to the traditional scheme, in which cost is a result of design, in *Lean IPD* projects cost is an *input* in decision-making. In addition, the assignment of economic objectives at the beginning of each phase (Validation, Design and Construction) highlights the desire for continuous improvement and puts cost at the centre of the attention of the design and construction team. The difference between Permissible Cost (defined at the end of the validation phase) and Actual Cost (resulting from the construction phase) is the benefit that will be shared by the parties and therefore improving the cost target is an important incentive for participants. The Design by Objective Value technique requires the early participation of agents and a collaborative dynamic in decision-making that allows the best to be obtained from the experience and know-how of each participant.

The third strategy, also necessary in *Lean IPD* projects, is the use of Open Books. Thanks to Open Books, agents can know the real costs of the project, overhead, fees and benefits of each agent. This system reduces mistrust and increases transparency between the different participants, which also increases the feeling of teamwork. With Open Books there is no risk that the construction company will try to reduce the scope or qualities with the intention of maintaining the same price. In addition, all disbursements are public and auditable, which leaves out of place the temptation to use the usual picaresque in the Fixed Price.

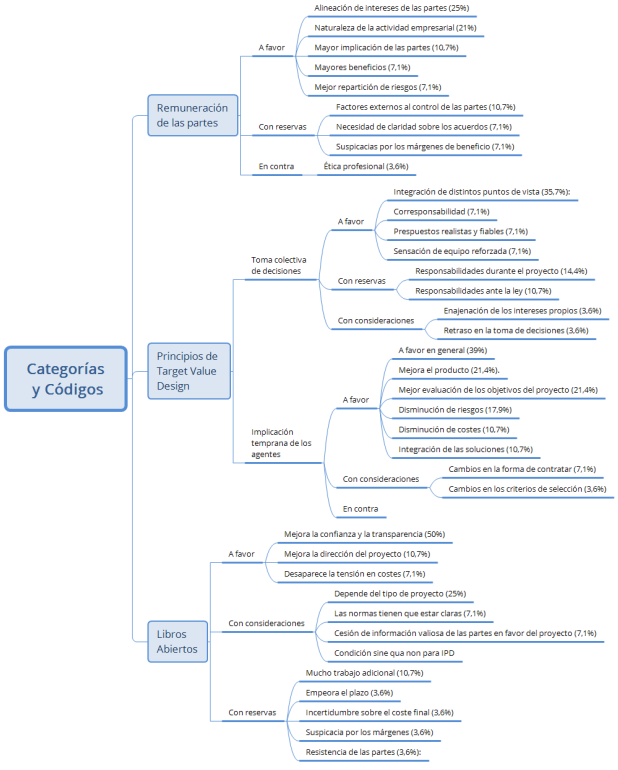

Fig. 1. Categories and Codes used to analyze the perception of Project Managers about Economic Management in Lean IPD. (Source: Own elaboration on Van den Bosch, 1979; CCPS, 2000; Casal et al., 1999, 2023)

II. Methods

This study is a qualitative research in which the importance of making visible diverse opinions, ideas and reflections prevails, as opposed to the search for a quantifiable universal truth (Creswell & Creswell, 2018). The experimental device included 28 interviews by videoconference. These interviews, of a semi-structured nature, focused on exploring the participants' perception of the fundamental principles of Integrated Project Delivery, the current situation of the sector and the future of this development system in our country. For the realization of this article, the set of data collected in this study was taken (Gil Sebastián & Soler Severino, 2024) and all the results related to the economic management of the project were isolated. It will be this last aspect that we will deal with in depth in this research.

To analyze our interviewees' perception of economic management in *Lean IPD* , we analyzed responses that mentioned the Project Managers' Perspective on Remuneration of IPD parties, the perception of early participation, collective decision-making, and the use of Open Books. In line with the principles of the grounded theory, key concepts were identified, grouped into categories, their interrelationships were analyzed, and conclusions were derived. The processing phase of the 28 interviews began with the use of YouTube's subtitle tool and then individual transcripts were carried out. These textual transcriptions were subjected to a qualitative analysis with *QMinerLite*, a specialized software in which 143 codes were applied and consolidated into 13 different categories. To analyze the perception of economic management in IPD, 37 of these codes were used and grouped into 4 thematic categories.

The study was based on the opinions and experiences of 28 professionals from leading Construction Project Management and Management companies in Spain. Of this group, 61% are men and 39% women. In addition, 71.4% hold leadership roles such as presidents, owners, partners or executives. In terms of experience, 67.8% have more than 20 years in the field, while

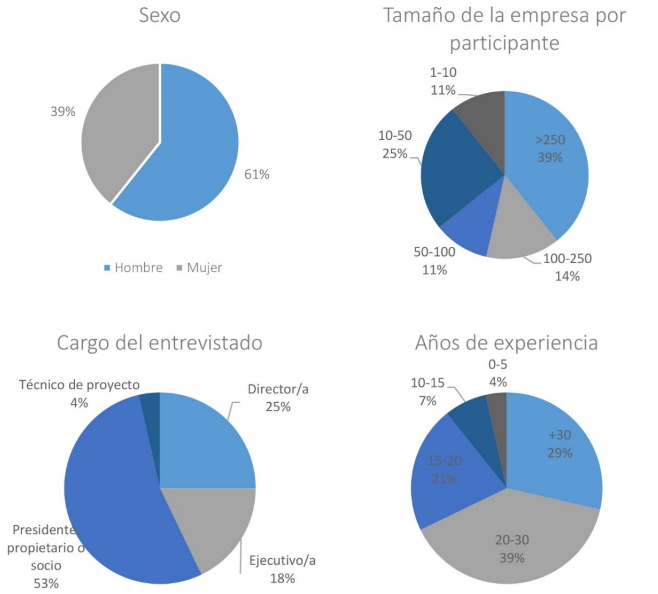

Fig. 2. Characterization of the sample.

21% are between 15 and 20 years old. In relation to the size of the companies, 53.6% of the participants work in organizations with more than 100 employees, and 25% in companies with 1 to 10 employees. Although most of the interviewees have experience in the building sector, some have also worked in infrastructure development and in other sectors such as industry and energy.

III. Results

A. Cost management in the IPD contract

Three of the fundamental aspects in the economic management of contracts are: 1) how the different agents receive compensation for the services they provide, 2) how the cost of material execution of the project is defined and 3) how it is operational during the different phases of the project.

1) Compensation of the parties

From the point of view of agent compensation, the most recognized contractual models in IPD (NEC-3, NEC-4, PPC2000, FAC-1, TAC-1, Alliance Contracts, Hanson Bridget, ConsensusDocs 300; AIA Document C191-2008, AIA Document C195.-2008, CCDC-30). They are based on the Cost *plus Fees with Incentives modality.*These fees can usually have a fixed part and a variable part.

In the Cost plus Fees contract, the cost of the work – in any of the phases of the project – is decoupled from industrial benefits and contingencies. Each certification pays for the work performed and the proportional part of the fees, overhead and other reimbursable expenses minus the relevant retention. To this end, it is necessary to develop a Disaggregated Cost Structure in which it is identified which costs are reimbursable and which are not.

In IPD contracts, the parties are rewarded when they are able to produce savings in the execution of the projects and are penalized when they exceed the admissible cost. The distribution of these deviations from the target cost is usually in accordance with the financial capacity of the agents, their ability to face the risks and is usually agreed as a percentage of the savings or cost overruns. In most collaborative contract models, the bonus and the maximum penalty to which the parties are exposed are limited to avoid transfers of risks from one party to another, which could poison the collaboration dynamic. In this sense, IPD differs from a Maximum Guaranteed Price (PMG) contract in that in a PMG the transfer of risks from the developer to the construction company is total from a certain pain threshold, while in IPD the construction company has limited its losses from the beginning. In a PMG, it is foreseeable that the construction company will seek to subvert the collaborative order as it enters the loss zone, while in IPD the construction company knows the worst scenario from the beginning and has limited its responsibility in the developer's business.

The architecture of the remuneration system conditions the functioning of agents and encourages or discourages certain

TABLE I
ADVANTAGES AND CONSTRAINTS OF USING FIXED PRICE. OWN ELABORATION

FIXED PRICE	
Advantages	**Constraints**
7. Contract well known to all agents (incl. banks, insurance companies, lawyers, etc.)	10. Price is the most important criterion in the selection of the contractor.
8. Requires little management by the *Project Manager* or property	11. There are no incentives from the contractor to improve safety
9. It encourages the reduction of the term.	12. There are no incentives on the part of the contractor to improve quality.
10. Suitable for simple projects, with clear scopes and little uncertainty.	13. Very strong incentive to reduce costs (only for the construction company).
11. Transfer of risk to the construction company.	14. Change orders can be a source of disputes.
12. Competitive selection of contractors.	15. The builder does not participate in the design.
	16. It is not good in projects with high complexity and imprecise scopes.
	17. It encourages information asymmetry.
	18. Hidden contingency reserves are included for each item.
References	
(Berends, 2000; Calderón, 2017; Chen et al., 2016; Fischer et al., 2017; Rashid, 2024)	

TABLE II
ADVANTAGES AND CONSTRAINTS OF THE APPLICATION OF COST WITH FEES PLUS INCENTIVES; MULTIPART. OWN ELABORATION.

IPD CONTRACTS (Cost plus fees with incentives; multipart)	
Advantages	**Disadvantages**
1. Align the interests of the parties with those of the project.	1. Unknown contract (for the sector and for the agents).
2. It discourages the contractor from achieving savings that may compromise the quality of the work because it does not increase their profit.	2. Open book management comes with a higher administrative burden.
3. It discourages picaresca.	3. Low cost/efficiency in small projects or with simple and very limited scopes.
4. It encourages collaboration between agents.	4. The selection of the construction company is made through a multi-criteria analysis (risk of bias or favoritism).
5. Flexible to changes in scope.	5. The contractor may be tempted to put his best staff on fixed-price projects, from which he can make the most profit.
6. The allocation of risks is made to the party that can best respond to them and to the one that corresponds to them.	6. The developer does not know the final cost of the work until the last package is closed.
7. Minimizes information asymmetry.	7. The developer is exposed to risks that would theoretically be covered in a Fixed Price (soil conditions, weather, strikes, etc.)
8. Leverage the knowledge of all agents.	
References	
(Ashcraft et al., 2010; Calderón, 2017; Fischer et al., 2017; Fuller, 1920)	

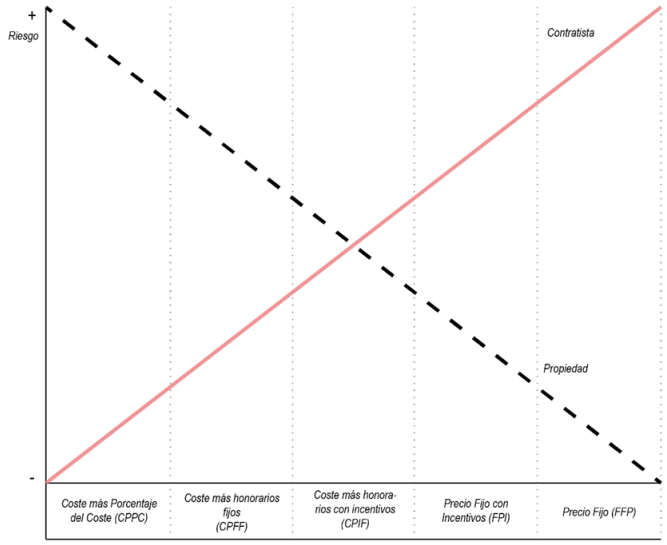

Fig. 3. Exposure to property and contractor risk according to the type of contract. Prepared by the author based on Al-Harbi, K. M. A.-S. (1998). Sharing fractions in cost-plus- incentive-fee contracts. (Al-Subhi Al-Harbi, 1998).

behaviours. The existing scientific literature on this subject is abundant and conclusive. Here are some of its advantages and disadvantages from the perspective of the *Project Manager*.

Unlike the Design-Bid-Build delivery method, where each phase has different agents and contracts are entered into between 2 parties, in Integrated Project Delivery, contracts are entered into between three or more parties.

This fact has a significant importance in the way in which the allocation of risks and responsibilities that the parties have for the project occurs and determines to a large extent the compensation of each agent. As the contract concerns a group of agents, the transfer of property risks is shared between the contractor, the architect and the installers, each of these agents assuming the risks and responsibilities that they can assume.

B. PMs' perspective on the remuneration of the parties according to IPD.

References in favor: 71%

- *Alignment of interests of the parties (25%)***.** A quarter of the references celebrate the fact that the remuneration model of the parties pushes the agents towards collaboration and helps to put the project at the centre in front of their particular interests.
- *Nature of the business activity (21%).* Almost a fifth of the references mentioned as positive that this remuneration scheme is aligned with the nature of the business activity, with the *win-win philosophy*, and with the notion that remuneration should be proportional to the result.
- *Greater involvement of the parties (10.7%).* The nature of incentives, say the interviewees, makes the team work harder and get more involved in the outcome.
- *Higher profits (7.1%).* The greater involvement of the parties and the alignment of interests, mentioned in the previous points, would achieve a greater benefit to be distributed among the agents.
- *Better risk sharing (7.1%).* IPD limits the transfer of property risks to construction companies, which stop assuming 100% of the punishment, when projects are diverted for whatever reason. The ownership regains responsibility for its investment in exchange for transparency and fair rules of the game in which the ability of other agents to increase their profit legitimately is recognized.

References with reservations: 25%

- *Factors external to the control of the parties (10.7%).* 10.7% of references mention the complexity of the context in which the projects are developed and question the single cause relationship between the performance of the parties and the outcome of the projects. They point out that there are circumstantial factors such as strikes, price rises or labour shortages that can harm the result of the projects and that it would be really complex to reflect all the casuistry in a contract.
- *Need for clarity on the agreements (7.1%):* The interviewees say that for this system to work, it would be necessary to express with total transparency the relationship of the incentives with the different objectives of the project. In other words, how the degree of achievement of the different objectives (cost, deadline, quality, level of sustainability, etc.) translates into an economic incentive.
- *Suspicions about profit margins (7.1%):* Two interviewees say that some agents may feel annoyed by experiencing differences in profit margins between parties.

Disavowable references: 3.6%

- *Professional ethics (3.6%):* For a participant, higher remuneration should not be an incentive for the parties, as agents should always pursue the highest level of ethical and professional excellence regardless of their remuneration. The mere suggestion that, for example, a cardiologist could do his job better if he were paid more would be insulting in an area such as health, but it is surprisingly natural in our industry.

1) Definition of Project Execution Costs

In the traditional delivery method (DBB), the project cost definition is refined during the project phase and consummated during the bidding phase.

In the project phase, the architect, with or without the help of consultants, has among his deliverables the preparation of the Material Execution Budget. This exercise is usually done at the end of the preliminary project, the basic project and the execution project. In the preliminary project, estimates by analogy are usually used, that is, to compare the new design with projects already executed with similar characteristics of building type, qualities, surfaces, location, etc. During the basic project, parametric estimates are usually used, i.e. cost data is usually used for large units of work structured in chapters such as architecture, structures, facilities, etc. With the delivery of

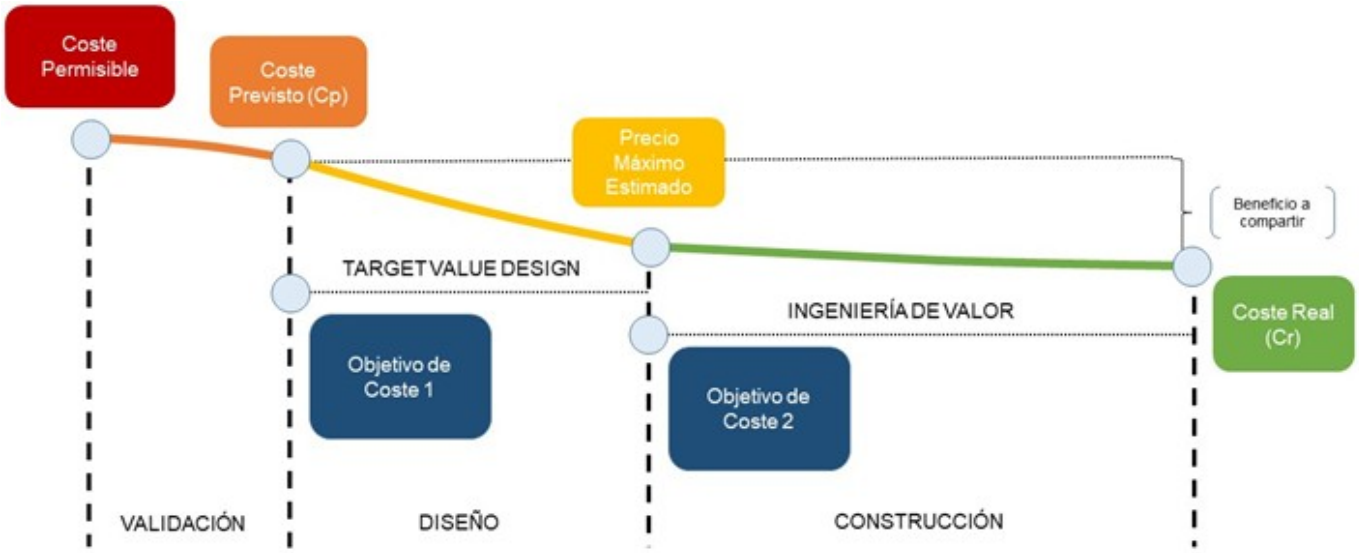

Fig. 4. Evolution of costs and cost objectives during an IPD project. Own elaboration based on Júdez, P. (2023). Leonardo Contract IPD_v1.4.1. (Júdez, 2023).

the execution project, the different specialists, usually architects, installation engineers and structural engineers, make measurements at the component level. To do this, a mixture of prices of components used in previous projects and others that come from standard price bases is usually done.

The prices given by designers are at best indicative and have high margins of error because, in general, they are unaware of the variations in the prices of materials, labour and availability of the vast majority of the solutions they prescribe. However, these prices are valued by the developers who use them, whether they believe them or not, as verified information in their business plans.

On some occasions, although still unusual, the owner hires a *Project Manager* or a cost consultant so that during the development of the execution project they get market prices from potential installers, which allows them to achieve prices much closer to reality.

In the bidding phase, the construction companies' research departments take the execution project, make their own measurements and make a mix between market prices from external installers and their own database. It is assumed that the projects are well defined and the different disciplines coordinated. In this competitive pricing model, the objective of the research department is to offer the lowest price and the shortest possible time to get the contract.

The definition of project costs in IPD is completely different from that of DBB since here you have to take into account the costs of design, meeting hours, consulting, etc. of the parties as well.

To begin with, it does not start with the design, but rather starts from a previous phase, known as the Validation phase. In the *Lean IPD project* , the first thing that is needed is the information of the promoter's business case, then a team is formed, the collaborative contract is signed and the Validation phase begins. During the Validation phase, the agents ratify whether the assumptions from which the property is based in the business case are correct and whether the project is viable for a given scope.

The Validation phase begins with an Allowable Cost that comes from the owner's business plan and ends with an Expected Cost, which after an initial value engineering work of the equipment should be lower than that estimated by the property. In addition, at the end of the Validation phase, a first Cost Objective is established that will guide the work process during the design process. The deliverable of the Validation phase is the Validation Report, in which the genetic information of the project is collected. Among other considerations, the Validation Report should include aspects related to the costs and finances of the project such as those mentioned below:

- Forecast of Reimbursable Costs
- Forecasted Cost and Cost Target 1
- Contingency Buffer
- Project Cash Flow
- Project Risk Sharing Fund
- Payment Plan

Júdez, P. (2023). *Leonardo Contract IPD_v1.4.1*.

In IPD projects, the use of *Target Value Design is particularly important*.

Target Value Design or Design by Objective Value is the name given by Macomber (Macomber & Barberio, 2007) to the adaptation to the construction sector of Target Costing techniques used in the industrial sector for decades (Ansari et al., 2006). The purpose of Design by Target Value is for cost to be a driver of design and not an outcome of it. In other words, in contrast to the traditional dynamic in which the cost is designed and then estimated, in Design by Objective Value it is the cost itself that motivates design decisions.

During the design phase, small groups of multidisciplinary specialists (architects, engineers, builders, etc.) are organized who, grouped by discipline (structure, installations, facades, interiors, etc.) propose recommendations to improve scope and cost. This continuous, iterative and intentional review that is based on the principle of *Kaizen* means that at the end of the design phase an Estimated Maximum Price can be established, which would be between the Expected Cost and the Cost Objective 1 of the Validation phase and that would serve as a

Cost Baseline to start the works.

During the construction phase, collective decision-making is maintained and techniques such as the use of A3 Reports are used with the aim of improving the functionality/cost ratio. A3 Reports are a tool to facilitate decision-making between design alternatives. In each A3 size card, a specific design alternative is characterized from all possible angles. Costs, deadlines, possible effects, risks, restrictions, stakeholders, quality, sustainability, etc. are analysed and with the visible information of various alternatives, the best decision for the project is made collaboratively.

In this collaborative process that extends from the validation phase to the end of construction, there are two principles that stand out above the others:

Early participation of agents and collective decision-making.

C. *PM perspective on early agent involvement.*

Favourable references: 143%

- *In favor overall (39%).* Almost 40% of the references are in favor in general terms.
- *Improves the product (21.4%)*. More than a fifth of those interviewed say that early involvement of agents improves the product. They argue that the sum of the knowledge and know-how of the agents in the initial phases of the project has a very important effect on the understanding of the objectives and consequently on the costs and the definitive solutions. They explain that early participation leads to better, more practical, more easily executable solutions at a lower cost.
- *Better evaluation of the project's objectives (21.4%)*: the participation of the owner, together with the construction company and the architecture studio from the validation phase allows agents to better understand what result the property expects to achieve in a given project and its aspirations beyond the construction process. In addition, it allows you to know from the outset how the different solutions can affect the objectives of the project.
- *Risk reduction (17.9%):* Risks are detected much earlier, and the parties have more time and better quality information to study them and give them the best possible response.
- *Cost reduction (10.7%):* The ability to make consensual and relevant decisions at a very low cost during the pre-construction phase allows the final cost to be greatly reduced during construction. Some interviewees refer to the MacLeamy curve (2010) in which it is described that the cost of changes and decisions increases exponentially as the moment in which the decision is made progresses.
- *Integration of solutions (10.7%):* Early involvement of agents and collaborative work makes the study of alternatives in the design phase more complete and faster. It also blurs the boundaries between disciplines, understanding the project and its systems as an indissoluble, coordinated whole.

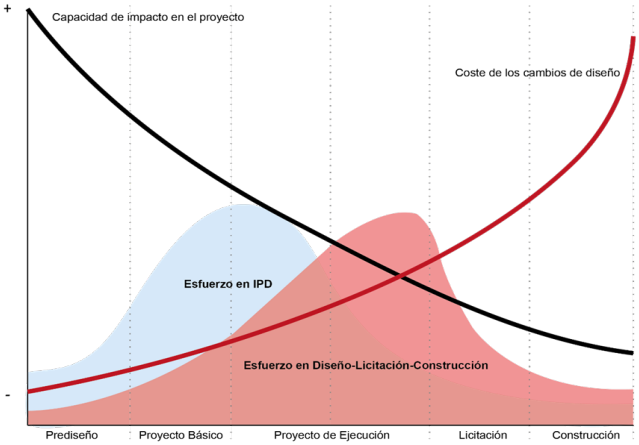

Fig. 5. MacLeamy curve on Design-Bid-Construction phases. Authors' elaboration based on Davis, D. (2013). Modelled on software engineering: Flexible parametric models in the practice of architecture [RMIT University]. (Davis, 2013)

References with considerations: 11%

- *Changes in the way of contracting (7.1%*): The implementation of Lean IPD implies changes in the way of working and therefore of structuring contracts and the requirements of the parties. Some interviewees clarify that both the phases and the tasks of the agents during each of them must be included in the contracts. In addition, the contracts, they point out, no longer go from the property to each of the parties (architect, construction company or other participants) but encompass the interested parties at the same time.
- *Changes in the selection criteria (3.6%*): The interviewees also drew attention to the construction company's selection method, which is usually based on the economic offer, and which in this case would become a secondary aspect. In Lean IPD projects, experience, curriculum and alignment with the client's values are prioritized over the economic offer.

Disavowable references: 0%

- It is striking that not a single reference was contrary to the early involvement of the agents. It is foreseeable that if Developers or Construction Companies had been interviewed, additional concerns would have arisen regarding, for example, the way to remunerate the construction company during pre-construction or the need for the same personnel to be involved during all phases of the project.

D. *PMs' perspective on collective decision-making*

At present, decision-making is closely related to the responsibilities described in the Building Regulation Law (LOE) because each of the agents has very delimited areas for which they have responsibility. This vision of professionals working in watertight compartments is also reinforced by the fractionation in the phases of the project in Design-Bidding-Construction.

There are many academics and professionals who affirm that the LOE has become obsolete because it has not been able to adapt to new figures and ways of working that transcend the

traditional Design-Tender-Construction(Álvarez Pérez, 2020; Brioso Lescano, 2015; Soler Severino, 2012). The LOE was not designed to collaborate but to delimit very clearly the responsibilities of each agent. The truth is that this way of working has become too small. Whose responsibility is it for an error in a BIM model in which different people and companies have worked? Focusing on trying to delimit the responsibility of the agent above that of the team hinders collaboration and therefore innovation in the sector.

The collaborative work system seeks to break down these barriers to put all the knowledge of the agents in favor of the project from the beginning. A builder may have good ideas about the design or an architect may propose solutions or construction processes that are good during the work. The fact that there is legal responsibility for the different jobs does not mean that the rest of the agents can participate in decision-making.

In collaborative projects, decision-making is collective, and unanimity is sought, that is, choosing what everyone thinks is best for the project.

References in favor: 57%

- *Integration of different points of view (35.7%):* collective decision-making requires all team members to understand why some decisions are made and not others. Faced with the different alternatives that are proposed derived from *Target Value Design techniques* , the team chooses the one that best suits the objectives of the project. Therefore, by integrating the different points of view, an agent cannot make a decision that benefits his own interests to the detriment of those of the project.
- *Co-responsibility (7.1%)*: collective decision-making makes all agents co-responsible for the decisions taken during the project. Having been involved in decision-making during all phases, the parties can no longer blame each other for any problems that arise as they have all been jointly and severally responsible.
- *Realistic and reliable budgeting (7.1%):* Collaborative decision-making powered by *Target Value Design* promotes that every design decision is reviewed by many eyes and from many points of view. This results in a better cost study of the solutions adopted.
- *Reinforced sense of team (7.1%):* Co-responsibility, together with a sense of common purpose, reinforces the sense of team. The parties are no longer seen as antagonistic agents but as true collaborators.

References with reservations: 25%

- Responsibilities during the project (14.4%): Some interviewees believe that, although the dialogue and the search for solutions is collaborative, the final decision in the adoption of some options over others should fall on the specialist of the subject being discussed.
- Responsibilities before the law (10.7%): Approximately 11% of the references mention that, despite the fact that decision-making is collaborative and that, despite the fact that responsibilities are diluted, the 1997 Building Regulation Law (LOE) attributes clear responsibilities to each of the agents regardless of the contractual conditions. The interviewees argue that the LOE can be a brake on innovation, and that in general the civil law system inherited from the Napoleonic codes is less flexible to innovations than the *Common Law* of Anglo-Saxon countries in which the conditions agreed between the parties govern.

References with considerations: 3.6%

- *Alienation of self-interest (3.6%)*: by agreeing that decision-making must be collaborative, agents renounce imposing their own criteria. Decisions must be negotiated, and this implies a transfer of competences and responsibilities to the group. At the same time, it implies that agents lose the ability to make decisions that can only benefit them to the detriment of the project.
- *Delay in decision-making (3.6%):* the need for decisions to be made collaboratively can lead to them being analyzed or having to justify solutions that would be trivial in any other project. Similarly, making an important decision can divide the team by delaying decision-making.

1) Cost Management with Open Books

Open Books is a project management system through which stakeholders make public their reimbursable costs, profit margin and operating expenses in an exercise of transparency. The use of Open Books eliminates the economic tension between the parties because everyone knows what the jobs cost and what they expect to gain from the project by the rest of the stakeholders.

In the traditional system, construction companies obtain a percentage of profit from each item of the Material Execution Project (PEM). When a change order that increases the budget is approved, the construction company achieves an extra profit margin that was not foreseen at the beginning. In other words, the higher the budget, the greater the profit. This encourages construction companies to increase turnover by all available means. In addition, contradictory prices tend to be budgeted at prices higher than the prices of the original offer, which further incentivizes construction companies to exercise this type of practice with which many companies seek to recover profits from offers that were unusually low.

Open Books allows you to eliminate suspicion or mistrust between the parties. As the cost of the work is clear in advance and the benefits are not proportional to the PEM, the culture of the modified ceases to make sense and the system leads to greater co-responsibility for the project.

Authors such as Molenaar state that Project Delivery strategies that require cost transparency through open books generally result in more cohesive teams. The author showed that more cohesive teams achieve better scores from developers in fundamental metrics such as lower cost increases, satisfaction in building delivery and the quality of construction systems.(Molenaar et al., 2015)

E. PMs' Perspective on Open Book Management

References in favor: 71%

- *Improves trust and transparency (50%):* Achieving mutual trust between team members is not a matter of

voluntarism. Mechanisms and procedures must be put in place to encourage the emergence of these attitudes. Open Books promotes these attitudes by removing the uncertainty that parties may have about costs. Open Books also eliminates the temptation to use picaresque since all disbursements are public and auditable, which increases transparency and the feeling of teamwork.

- *Improved project management (10.7%):* improved trust and transparency result in less conflictive projects with better governance. In addition, the use of Open Books itself allows the few changes that may appear during the construction phase to be integrated in a natural way.
- *Cost tension disappears (7.1%)*: By reducing uncertainty about profits and conflicts to defend margins, agents are more aligned with the interests of the project and focus on putting the project at the center.

References with considerations: 46%

- *It depends on the type of project (25%):* Almost a quarter of the references emphasize that Open Books is neither better nor worse than other work systems. Each project and, above all, each client, they say, has a system that fits them like a glove. With this in mind, Open Books is especially useful for projects with poorly defined scopes or for projects that may be subject to many changes.
- *The rules have to be clear (7.1%):* for Open Books to work properly, it must be very clear before starting the project to which category each expense belongs and what criteria are going to be followed to assign it in one concept or another. What is a reimbursable cost and what is not? What is a general expense attributable to the project and what is not?
- *Transfer of valuable information from the parties in favour of the project (7.1%):* some references mention that in Open Books agents share valuable information about their companies (man-hour costs, industrial profits, etc.) in favour of the project and to achieve greater transparency and trust.
- *Sine qua non condition for IPD:* others mention that Open Books is a necessary condition for Lean IPD. It would be impossible to structure a system based on trust if each of the parties understands economic management as a zero-sum game. If one of the most important issues, such as economic management, escapes collaboration, a project cannot be truly collaborative.

References with reservations: 25%

- *A lot of additional work (10.7%):* Open Books involves an additional amount of office work that involves, among other activities, reviewing invoices and verifying that expenses, reimbursable or not, are made according to the rules that have been established in advance.
- *Worsens the term (3.6%):* When Open Books are used without applying the rest of the Lean IPD incentives, their use can eliminate the term incentives from the Fixed Price. This, added to the additional necessary work mentioned above, causes some references to mention that Open Books worsens the deadline.
- *Uncertainty about the final cost (3.6%):* In contrast to the Fixed Price, in which the work ideally costs what the construction company offers, with Open Books the final price of a work is unknown until the last work package is closed. This adds some uncertainty for the developer and can delay procedures such as the liquidation of work.
- *Suspicion of margins (3.6%):* Regardless of responsibility, size or overall costs, each of the companies involved in a construction project has a different profit margin than its project partners. The differences between one and the other and the comparisons between the different agents can be a barrier in the implementation of an Open Book system.

Party resistance (3.6%)*:* some of the aspects described above in this section or others not mentioned by *Project Managers* may lead to agents not feeling comfortable using this system. Hence, one of the most important aspects of any Lean IPD project is the selection of the project team.

IV. CONCLUSIONS

The economic approaches of Lean IPD are widely shared by the *Project Managers* interviewed despite the reservations and considerations made in the different sections. In general, they agree that the economic structure proposed in IPD projects implies positive changes in the behavior that can be expected from the agents and in the return of the projects. Regarding the remuneration mechanism, the interviewees point out that it leads to greater alignment and involvement of agents and that it generates greater benefits and better risk sharing. From the early involvement of agents and collaborative decision-making – necessary for the Target Value Design process – they point out that it improves the product, favors the evaluation of project objectives and reduces costs or risks, among other benefits. Finally, they affirm that cost management with Open Books improves trust, transparency and governance of the project, even if it involves a greater workload.

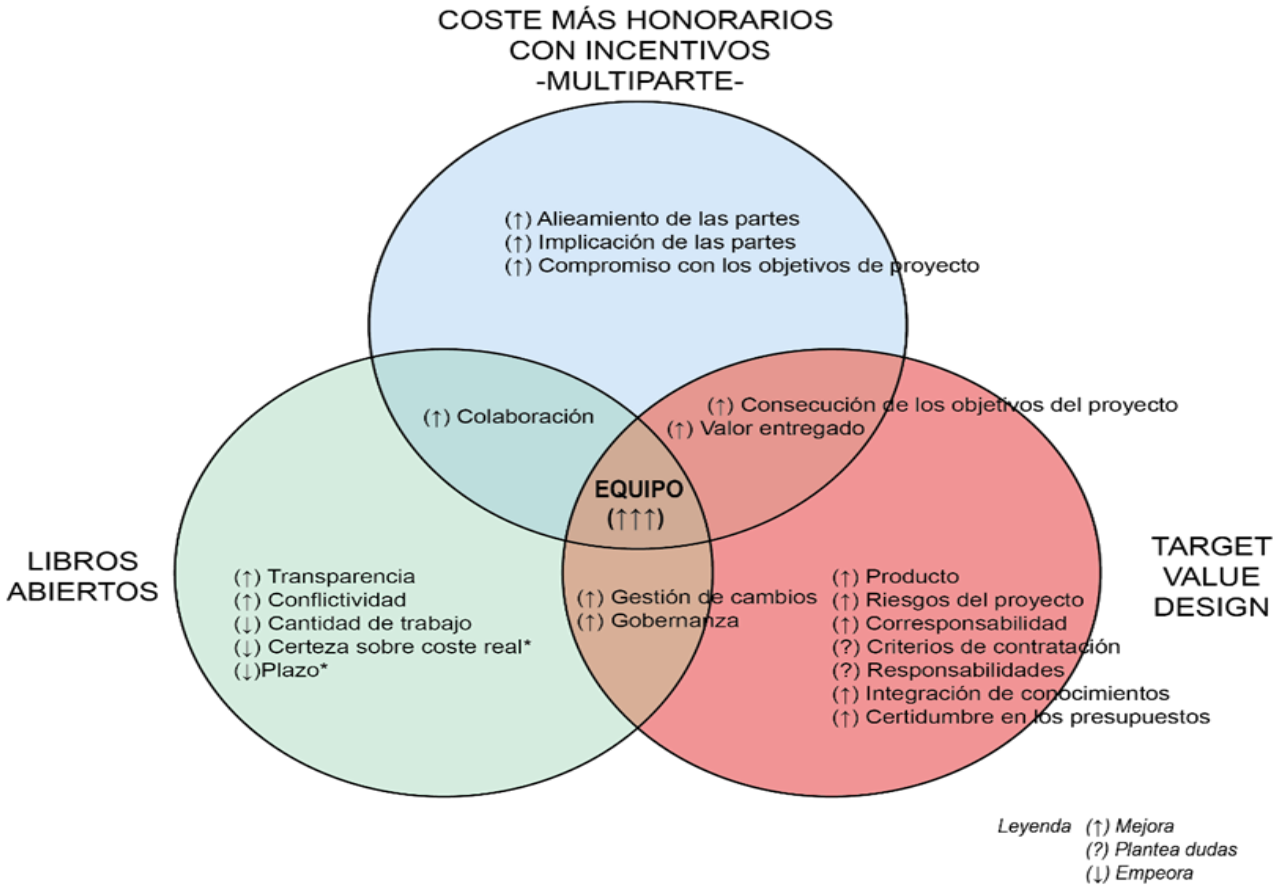

Fig. 6. Interrelationship between the main economic strategies of Lean IPD. Own elaboration.

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