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ANALYSIS OF THE LEVEL OF ADOPTION OF LEAN PRACTICES IN THE CONSTRUCTION COMPANIES IN ALGERIA

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ABSTRACT

This article delves into the assessment of the alignment of Lean practices within Algerian construction companies when implementing improvement approaches. It aims to contribute to a deeper understanding of the issues at hand and the anticipated impacts on managerial behavior as a result of implementing Lean construction approaches. These methodologies are seen as pivotal in reducing costs and lead times. This research is a vital component of an analysis that investigates how the implementation of Lean principles aligns with different company types and explores the potential improvements and benefits it can bring. This analysis has become more important as companies increasingly adopt new strategies and managerial values, and enhance their production tools in pursuit of new growth opportunities. These measures are essential for adapting to the growing challenges and changes in today's socio-economic environment. In response to these challenges, we have initiated a study that examines the alignment of Lean practices. This study includes the creation of a questionnaire (133 questions) based on the fourteen Lean principles uses the IEMSE evaluation method. Its main purpose is to address the issue of varying levels of Lean practice implementation and to evaluate compatibility with the specific management systems employed within construction companies.

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1. INTRODUCTION.

This article delves into the assessment of the alignment of Lean practices within Algerian construction companies when implementing improvement approaches. It aims to contribute to a deeper understanding of the issues at hand and the anticipated impacts on managerial behavior as a result of implementing Lean construction approaches. These methodologies are seen as pivotal in reducing costs and lead times.

This research is a vital component of an analysis that investigates how the implementation of Lean principles aligns with different company types and explores the potential improvements and benefits it can bring. This analysis has become more important as companies increasingly adopt new strategies and managerial values, and enhance their production tools in pursuit of new growth opportunities. These measures are essential for adapting to the growing challenges and changes in today's socio-economic environment.

In response to these challenges, we have initiated a study that examines the alignment of Lean practices. This study includes the creation of a questionnaire (133 questions) based on the fourteen Lean principles uses the IEMSE evaluation method. Its main purpose is to address the issue of varying levels of Lean practice implementation and to evaluate compatibility with the specific management systems employed within construction companies.

2. LITERATURE REVIEW.

2.1. Lean Construction.

Has emerged as the benchmark for organizing work across various sectors, including industry, hydrocarbons, energy, transportation, and health, *the main goal of the lean management is to create value for the customer, by eliminating waste, Increasing values and reducing delays, supported by the adaptation of collaborative management tools, as part of a systematic and rigorous approach to continuous improvement* [9].

The Lean philosophy was born in Japan in the 1950s through the application of Toyota's production system, *The basic idea in Toyota's production system is the elimination of inventory and other waste through small batch production, reduced installation times, semi-autonomous machines, cooperation with suppliers and other techniques* [26, 31, 39, 40]).

After thirty (30) years later, The lean philosophy has finally been transferred to the building and construction sector, During the early 1990s by the work of L.KOSKELA, who demonstrated that the most suitable management method for the construction field is the «JUST IN TIME» accommodated TPS (Toyota production system), And that the application of the principles of Lean in the management of the contemporary construction project is very possible; And presented its model "(TFV: Transformation – Flow – Value)", which offers more flexibility in the planning and management of the project, This ambition is realized in 1992 with the launch of L.P.S (last planner system) by G.BALLARD[3].

These studies were presented in 1993 in Helsinki, Finland, during the first conference on the adaptation of the Lean in the field of construction, where the term «Lean constructions» was recognized by the scientific community, as a means of enhancing management and performance of enterprises and projects in the building and construction sector.

Due to this, the literature offers many definitions of Lean Construction depending on the degree of integration of the initiative into management systems and organizational specifics.

However, *the goal remains the same: reducing the non-value added* [25]. And one may bring up the definitions of the Institute of Lean Construction 2013, «*LC is a project delivery system focused on production management that emphasizes efficient & prompt value delivery*».

Lean Construction is a project delivery method focused on production management that emphasizes an efficient and timely value delivery. Marhani and others 2018, present a definition of LC as “*continuous improvement approach that aimed to reduce construction waste by reducing the cost & duration of a project while promising enhancing the contractor's project performance towards its growth & profitability*” [24].

2.2. Characteristics of the Lean Construction concept.

Exhausted in its roots, Lean Construction offers a new way of management for construction projects, Based on construction at the just-in-time and aims to improve the overall performance of staff, offering a competitive product in the minimum time possible, with maximum value and quality and at a lower/reasonable cost, by applying the principles of philosophy, and adapting lean practices to the specificities of the company and construction projects, characterized by more internal complexity, Technical and managerial, with more variety of tasks and activities, unforeseen and undesirable events, a high proportion of waste (working time, materials and use of materials), and an organizational configuration designed on a very strict division of labor into 'ilot.'. Additionally, external complexities, such as a multi-interaction between stakeholders with impassive contractual relationships; Lack of predictability, changes and not maturation of requirements.

According to advances made by [17], the definition of Lean construction on the one hand, is to reduce: the activities with no added value, variability, cycle time, the number of steps, the number of finished products, and constituent parts, and on the other hand increase: the output value of the process, the output flexibility of the process, the transparency of the processes, and the improvement of the drawn flow.

Similar to the works of Womack and Jones and Bashir et al, which revolve around the principles of value specification, value chain identification, establishment of continuous flows and Pull flows, and pursuit of perfection and continuous improvement [6, 44].

Principles of the same nature with evolutionary visions by maturing implementation of lean construction, which led the (Lean Enterprise Institut (2009)) for Summarize the principles of Lean construction by: Identify the value, Map the value flow, Create the flow, Establish pull flow, Search for perfection.

According to the literature, that deals with the mechanisms of the implementation of Lean management, in companies in the building and construction sector, Focuses on the five fundamental principles of production management "at the just; neither too much nor not enough".

- Value: determine the precise value of each product designed and/or manufactured while taking the customer's perspective.
- Value Stream: defining the value chain associated with each product.
- Flows: Applying the "one piece flow" and creating continuous flow of value by eliminating unnecessary steps that add no value or cause value losses.
- Pull: The client's orders are used to pull the production.
- Perfection: ongoing organizational improvement for the highest-quality possible output.

2.3. Construction company management system and alignment with Lean practices.

The management system is a collection of interconnected components inside an organization, employed to establish the processes in to achieving objectives that are defined beforehand by the strategy or by the organization's policy.

The company's management system aims to integrate Lean practices into an integral, intrinsic, and proactive organization, based on reinforcing existing processes; an approach that must be characterized by the organization of operational activities and resources requires creating added value with a minimum of loss throughout the value chain [8].

The company's management system aims to integrate Lean practices into a comprehensive, intrinsic, and proactive organization,

This is why the implementation of an approach to structuring and improving the company's management system, based on return of experience, and the exploitation of existing standards (such as ISO standards, APMI regulations and even Lean), in order to achieve the intended objectives, involves measuring the company's own performance and confronting the requirements and guidelines of the standard adopted.

In this context, and in accordance with [23], the implementation of the Lean approach¹ presupposes the development of a management system to support the operational system and strengthen work process, the management system associated with the Lean approach consists of five

¹ A process reflects an approach. Every approach is based on values and philosophical principles. Its implementation involves methods. It constitutes a set of consistent theorized practices and models grounded in philosophical principles.

elements: *the organizational structure, the performance management system, the continuous improvement, The skills development process and management of operations support processes* [8]. These elements bring together the set of the Lean management principles.

In this regard, and according to Drew et al. and Lyonnet and Messaoudene [8, 23], the implementation of the Lean approach advocates the development of a management system consisting of five elements: the organizational structure, the performance management system, the infrastructure for continuous improvement, the skills development process, and the management of operations support processes. These elements encompass all Lean management practices. These practices can be broken down, according to [16, 25], into controlling the collective workforce and involving all stakeholders in continuous improvement, engaging employees, promoting multi-skills, teamwork, group problem-solving abilities, committing to long-term strategies, and fostering a more autonomous operational organization. *This enables the managerial structure to focus on strategic initiative development, allowing operational personnel to concentrate on the daily activities required to execute the strategic vision* [38].

In this perspective, the management systems existing within the building and public works sector companies are increasingly involved in formulating a managerial approach aimed at supporting their operations and enhancing their understanding of the internal and external environment, as well as their decision-making capacity and goal achievement.

This represents an initial step towards better aligning practices with the organizational approaches imposed by various management methodologies (such as Lean, quality, etc.). However, companies are obliged to make numerous changes (seen as pathways for improvement), particularly in terms of functional decompartmentalization¹, considered essential in the current configuration of companies characterized by employer dominance within the building and public works sector in Algeria. This sector is primarily composed of small enterprises, leading to a distinct separation between power and responsibilities.

3. RESEARCH METHODS.

3.1. Selecting the results analysis techniques.

- The following questions are addressed by the approach of results analysis in this study:
 - Does Lean application exist at different levels and different fields of practice? If yes By enterprises type or classification?
 - Are there different profiles of Lean integration according to the typologies of the companies?
 - Are there correlations between Lean practices?
 - Are there implementation dependencies between Lean practices?
- Is there a correlation between the maturity of the management system and the implementation of Lean practices?

3.3. Analysis approach.

To evaluate the integration of Lean practices in the managerial system of construction companies in Algeria, we conducted a questionnaire survey based on a sample of 28 companies distributed between the construction and public works sector (Category A: twenty-four (24) companies) and the industrial sector (Category B: four (04) companies).

Initially, a pilot study was conducted within an ISO 9001:2015 certified company committed to waste reduction to refine the questionnaire and ensure the objectivity and reliability of the survey.

Following the data collection, a factor analysis is used to evaluate the alignment of Lean practices. The results of this analysis can reveal crucial information about the levels of adoption and integration of Lean practices.

The companies in each category are classified according to their management systems;

- Class 01: an enterprise with an impulsive management² system without formulation.
- Class 02: company with a management system guided by a quality assurance¹ approach.

¹The compartmentalization is necessary to allow the required level of specialization, but if it is associated with a lack of communication, it leads to inefficiency and errors in agile management. When the implementation of agile management fails, it is often due to the lack of alignment between agile management personnel and leadership.

²Impulsive management directly depends on the manager's directives.

• Class 03: company with a quality management system and managed by a waste reduction approach.

This classification has to admit relevant comparisons on their level of maturity of Lean practices, while presenting a variety in terms of characteristics and managerial capacity as in terms of productivity and performance.

Table 1. Distribution of companies by categories and classes.

Category A Building and Construction Enterprises		Category B Industrial enterprises	
Classe 1	11 entreprises	Classe 1	01 entreprise
Classe 2	08 entreprises	Classe 2	02entreprises
Classe 3	05 entreprises	Classe 3	01 entreprise
Total	24 entreprises	Total	04 entreprises

We interviewed them by submitting the questionnaire composed of 133 questions, organized around the fourteen (14) practices of Lean; that constitute the foundations of LEAN thinking [19].

The practices of these principles are expressed by a set of questions, formulated to be best adapted to the activities of the construction companies (especially the operational ones) and asked the interlocutors and representatives of the companies.

The responses obtained were the subject of a study to assess their level of integration of the Lean approach in existing management systems, from the Lean maturity profile and degree of alignment of the management system to practices.

The evaluation of the questionnaire data is based on the IEMSE method which consists for each question to be answered by:

I: inexistent – principle not practiced within the company (00%);

E: Existing – there is a consideration of the principle (25%);

M: Method – the principle is treated with a procedure (50%);

S: Systematic - the field application of the procedure is effective and systematic (75%);

E: Exemplary – the results of the procedure are assessed satisfactorily (100%).

The closer the estimate is to 100%, the more the company adopts a managerial attitude similar to the practices required by Lean construction.

An average of the rating set (from 0 to 100%) of the question answers by principle is calculated.

With the application of this rating scale, we have therefore established an analytical grid for a hierarchical ranking² of the behavior of companies by class and category of companies.

A statistical analysis will allow us to compare averages by practice in order to identify the most and least applied by businesses.

The presentation of radar scoring results obtained at the end of the evaluation allows us to position ourselves on each of the axes of Data Management (Continuous improvement and sustainability, Process Management Tools and Technical Stakeholders, Leadership, Project Support to Transformation) and identify areas for improvement.

3.4. Limitation of the study.

It is useful to note that this method of assessing the maturity profile and the degree of alignment of Lean practices remains subjective because:

1. The choice of the management system assessment tool, is focused on the processing of maturation level data according to the criteria of the Lean approach brought by the monitoring of multidisciplinary practices throughout the managerial process and not on the organizational quality of companies, this gap is mainly due to the classification of the companies studied.

2. According to the company’s commitment to implementing the various Lean practices, and that the company’s strategy was not always clearly defined and that it was often short-term oriented [23].

¹ ISO 9001 V2015.

² Hierarchical ranking is particularly useful in the context of exploratory investigations to identify general trends within the data and suggest directions for future analyses.

This led us to cross lines of determination within the criteria of the Lean approach, which allow us to estimate the consistency and compatibility of the management system to the Lean at the same time as the maturity of the deployment of practices, This allowed us to take advantage of the ranking by the multi-differential comparison of Lean behavior, by each group (reference group and tested group).

In addition, the responses obtained through the survey represent the views of the participants, and there may be, on the one hand, a range of opinions about the different stakeholders in the management systems, and on the other hand a poor understanding¹ of Lean practices by interlocutors, A limitation overcome by the strengthening of the questionnaire by workshops, and to ensure that answers come from the collaborative reflections of the different staff within the same company.

4. RESULTS AND DISCUSSIONS.

Our evaluation questionnaire allowed us, first of all, to identify the profile of the management system by company and the averages of the level of alignment of Lean practices by categories and by classes of companies (presented in histogram 01).

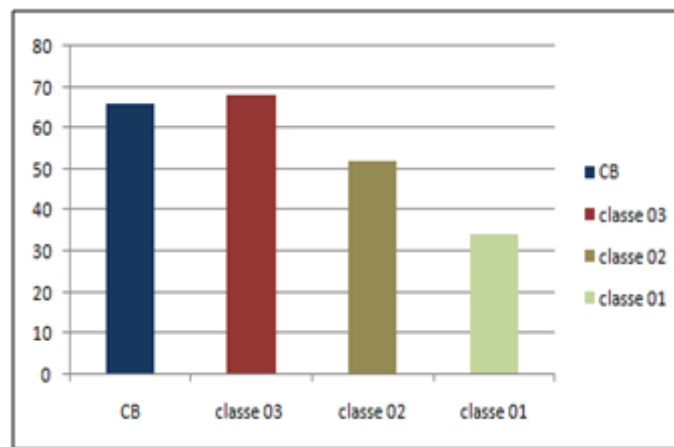


Fig. 1. Rate of integration of practices by categories and classes.

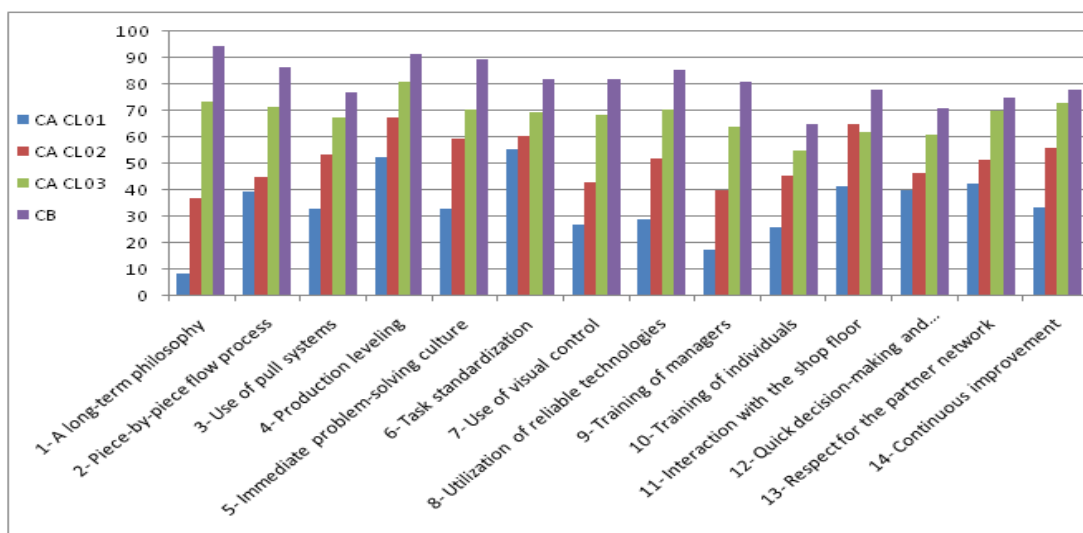


Fig. 2. Comparison of Lean practice integration (categories and classes).

Note that within the same category, there is a bias and disparity in the alignment of Lean principles. The simultaneous and uniform implication of all practices proves to be impossible due to

¹Most Lean experts assume a misunderstanding of Lean practices by companies.

the typology of the company. The choice of implementation practices depends on the specifics of management systems and managerial initiative

Despite the fact that our choice of industrial companies in category B brings closer the maximum production system of enterprises in the building and construction sector (category A), characterized by unit production instead of mass production, this category has a better integration of Lean practices, the effect that the alignment rate exceeds 80% in 8/14 and 60% in all principles, because the standardization of products and the application of management system practices have been able to impose managerial rigor, its culture and its practices,

Another finding concerning satisfactory levels of maturity for operational practices and those directly related to customer satisfaction, such as interaction with the field, smoothing of production, standardization of tasks, Respect for the network of partners, and Immediate problem solving.

On the other hand, the least aligned practices are the long-term philosophy, Training of managers and individuals.

In order to understand, the specification of the implementation of Lean Construction in the Algerian company of the building and construction sector, comparisons of the level of alignment of Lean practices by category and class are carried out according to different specification indicators;

To compare the alignment levels of Lean practices, we calculated the overall average for all companies by Lean practices.

4.1. Comparison Category “B” (industrial) / Category “A” (construction).

Based on practice alignment averages, radars in both categories look the same, with lower levels for Category “A” (construction firms).

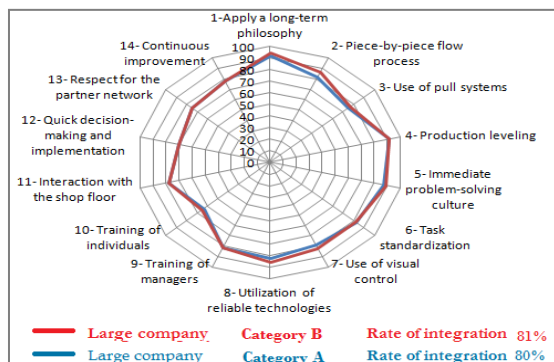


Fig. 3. Comparison between Category B and Category A (large companies) - Spider Web Diagram.

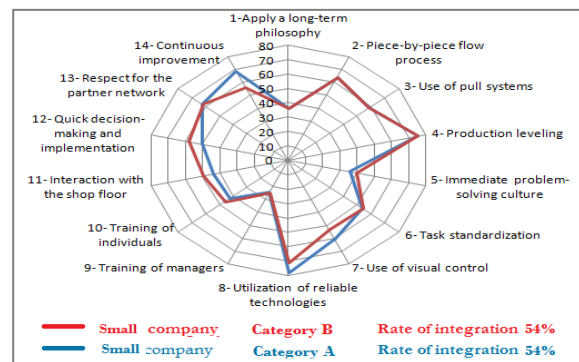


Fig. 4. Comparison between Category B and Category A (Small companies) - Spider Web Diagram.

The most aligned practice for category B (**industrial**), is that of the use of reliable technologies, logically the most important thing in the improvement of industrial products, Unlike on-site projects, construction companies are required to maintain at home different know-how and skills and to diversify their practices, without doing so on the integration of innovations¹, Having regard to the configuration of the Algerian construction sector, composed essentially of all small enterprises and having neither the skills, the will, nor the means necessary to invest in research and product innovation (Building and construction is one of the sectors where innovation and technology transfer are very limited).

There is an overlay of the Lean average application curves for Class 03 and Class B firms and for both size cases (large and small) Remember that both classes are in the process of implementing a waste reduction approach.

¹Innovation is, therefore, a crucial element for the survival of businesses and the companies of their competitive advantage.

This proves that the Lean approach can be extended to companies in the building and construction sector, and the relational compatibility between the application of Lean concepts and the performance of construction companies exists sequentially or simultaneously.

4.2. Comparison between categories “A” classes (construction).

Comparing the averages of Lean practices according to the level of maturity of management systems clearly removes the gap between the three business classes, and the implementation of a managerial formulation (either a Lean approach, a quality management system or other managerial system), is positively reflected in the level of maturity of Lean practices.

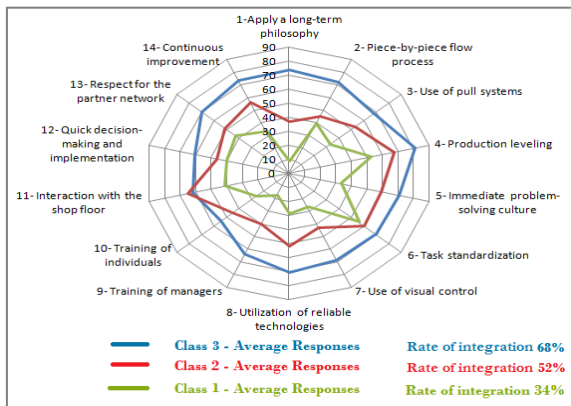


Fig. 5. Comparison between class 1; class 2 and class 3 - Spider Web Diagram.

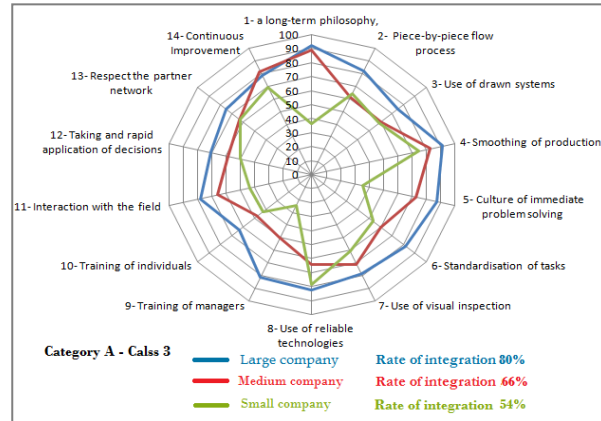


Fig. 6. Category A, class 3-Comparison by Company Size (between Large, medium and small companies) - Spider Web Diagram.

Note that the managerial choices, and the major orientations of Algerian construction companies, towards customer satisfaction practices, while ensuring an understanding of the needs, explicitly or implicitly expressed project, In order to translate them into activities to be carried out, which is explained by the rate of alignment of practices of the following nature: Smoothing of production, Standardization of tasks, Use of reliable technologies, Interaction with the field, and Continuous improvement, These guidelines, which have an average of 58% against a total average of 51%, are not without consequences for the company’s capabilities, particularly as regards the medium and long-term strategy, where the gap in management decision-making practices on a long-term philosophy, integration of problem-solving methods, and training and skills development practices can be highlighted, This can be explained by resistance to change (especially by top management in private companies), the lack of maturity in these practices leads us to ask questions about the adaptation of the Lean approach (breakthrough¹ improvement, or/and radical² improvement), within Algerian companies in the building and construction sector, faced in recent years with a change in its business model, are experiencing significant competition due to the decline in public demand, and struggle to find new growth levers.

This essentially leads us to identify the typology of each business class, in relation to the level of acceptability of Lean practices.

For enterprises of class 03 considered to be the most efficient, we note for the case of state enterprises, and according to the enterprise size indicator;

¹Generally used for breakthrough or field-close strategic driving.

²Reengineering, also called BPR (Business Process Reengineering).

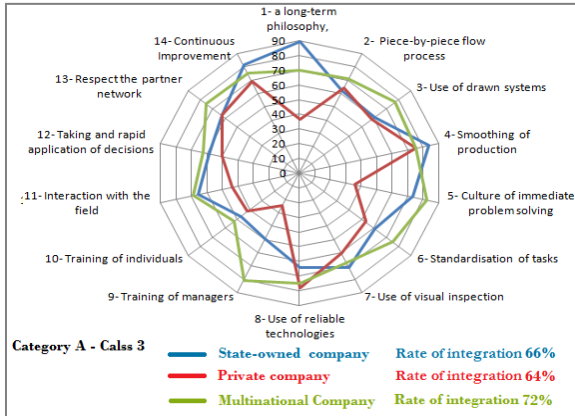


Fig. 7. Category A, class 3- Comparison by Legal Form (State-owned, Private and Multinational companies) - Spider Web Diagram.

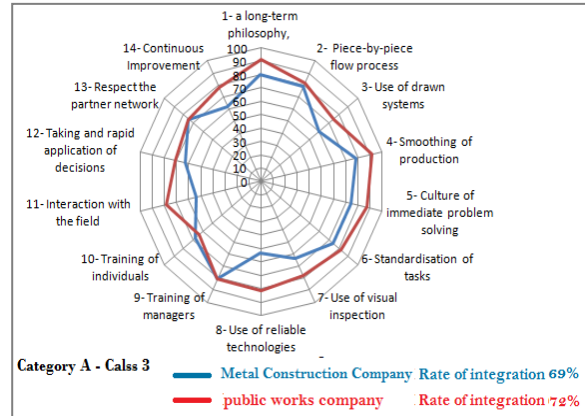


Fig. 8. Category A, class 3- Comparison by activity (Metal Construction and Public Works companies) - Spider Web Diagram.

A uniform alignment rate with insignificant differences, in the level of alignment of Lean porticos, in favor of large companies, explained by the same strategic orientations, and the involvement of all the actors of the company to contribute to the achievement of the objectives of its scope of action, and the managerial maturity adopted by the deployment of the quality management system and the implementation of the Lean Construction approach, which has made it possible to provide each level of the company/project with the means to resolve process deviations from the achievement of objectives.

In addition, there are discrepancies and differences in the pace of radars for the indicator of the legal status of the enterprise, where state enterprises have higher rates of alignment to Lean practices, and this is due to a strong involvement (managers and staff); a more respected commitment policy, and a more managerial system oriented towards practices based on formal, correlated and interactive processes, its components are found at the level of multinationals where the integration of practices seems more convenient through technology transfer and practice alignment across the company's subsidiaries.

Unlike the private company in particular the personal company, majority in the Algerian building and construction sector, (unlike the managerial companies [27] and which is characterized by a more informal managerial system, a specific organizational routine, with a very high level of lack of knowledge of management tools, and characterized by a dominance of the Community spirit and a weakness of the hierarchical line, where it is found that the least aligned practices are those which are not of interest to business leaders (which are not of financial interest), such as long-term planning, training and problem-solving culture, which are generally regarded as unproductive practices with an uncertain return on investment, Too complex or even impossible to envisage within their management systems.

The comparison by activity type factor shows that the pace of integration rates of Lean practices is the same, and the differences observed are practically negligible, which explains why in the construction field, Whatever the main activity of the enterprise, managerial behavior is practically the same.

For class 02 companies, led by a desire to implement managerial practices focus on the search for performance, a context, in which the behavior of all the actors of the company is inscribed, this is translated at the radar level where the pace of the plots is practically identical with some differences in size, a common result with class 03, explained by the managerial discipline.

Concerning the indicator of the legal status of the enterprise, a very marked difference in the level of alignment of practices in favor of the state enterprise, remains that the most striking thing, contrary to class 01 (more efficient), is the identical appearance of the radars. Explained by the same orientations, this rigor in the application of organizational processes, perhaps explained by the youth of management systems, and poses the case of the sustainability of the Lean approach.

For the case of the nature of activity, the pace of integration rates of Lean practices, we can notice the superposition of radars, is the deviations observed are practically negligible, Despite this, to signal the difference in alignment rates between two classes, influenced mainly by the commitment in operational practices for class 02, which proves that there are different profiles of integration of the Lean approach, according to the organizational specificities of each company, what [21] confirms by «an application of some Lean practices that remains weak that can be explained by the typology of companies» On the other hand, the companies in the building and construction sector show convergences of behavior and orientation in the practices and specificities of integration of the Lean approach.

However, the case remains for companies in class 01, which have no approach to formulating the management system, and the comparison shows that the pace of radars for companies of different sizes is identical, and the differences are not significant, and similarly the speed of radars for the nature of activity indicator.

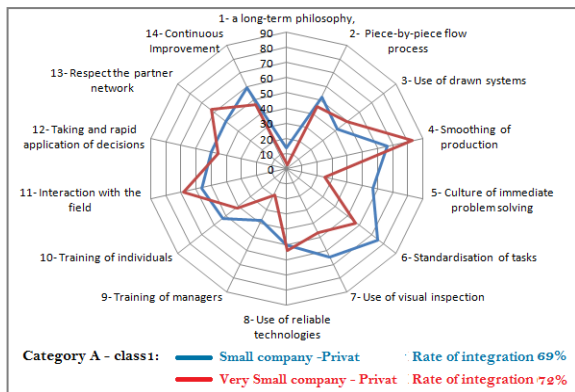


Fig. 9. Category A, class 1- Comparison by Company Size (small and very small companies) - Spider Web Diagram.

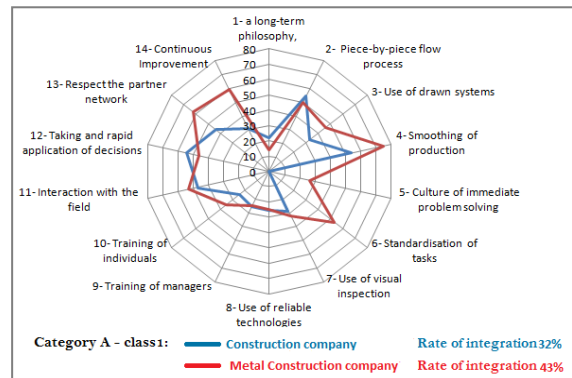


Fig. 10. Category A, class 1-Comparison by Activity (Metal Construction and concrete Construction companies) - Spider Web Diagram.

During the development of the Lean practice alignment assessment, we found that each class has its own interests and level of practice application, Emphasized which according to the specifications of the organization of the company conform to the advances of Koskela [18] during the presentation of Lean construction, Remains the most important thing for the success of a Lean itch and the involvement of all staff.

The common orientations for each class’s enterprises are collected in the following table.

Table 2. Common orientations of companies according to practices.

Type	Orientations	Comments
1	2	3
Class 1	4- Smoothing of production 6- Standardization of tasks 11- Interaction with the field	Class of business that is solely focused on customer happiness, and that values informal project management techniques and standardizes activities as a way to protect beneficiaries' margins. A Lean practice alignment rate that is close to 34%.
Class 2	3- Use of drawn systems. 4- Smoothing of production 5- Culture of immediate problem solving 11- Interaction with the field 14- ContinuousImprovement	Class of enterprises with a more developed and process-oriented management system. The processes associated with the deployment of ISO management systems include Practices 3, 4, and 14. A Lean practice alignment rate that is close to 52%.

Table 2. Continuation.

1	2	3
Class 3	1 - a long-term philosophy, 2- Piece-by-piece flow process. 4- Smoothing of production 5- Culture of immediate problem solving 8- Use of reliable technologies 14- Continuous Improvement	A class of enterprises that has started implementing Lean construction. The practices 3, 4, 5, and 14 are examples of processes used in ISO/Lean management systems. More focus on innovation and cutting-edge technologies A Lean practice alignment rate that is close to 66%.
Category B	1 - a long-term philosophy, 2- Piece-by-piece flow process. 4- Smoothing of production 5- Culture of immediate problem solving 8- Use of reliable technologies 14- ContinuousImprovement	Class of enterprises that was well-structured and had less waste has been eliminated, and a solid organization has more favorable implementation conditions

5. CONCLUSION.

The implementation of the Lean approach within Algerian companies in the construction sector, confronts to the application of Lean practices, the adequacy of with the existing management system, and the compatibility with the socio-managerial culture of all management and personal of the company.

Indeed, the Lean approach has proved its worth in the sectors of industry, with the considerable gains obtained, this weighting the adaptation of Lean manufacturing, with its version for the companies/projects of the construction sector «Lean construction» is able to ensure the same trends, in a sector characterized by a majority of enterprises of the type any small enterprise and small and medium enterprise, a strong dependence on public procurement and long-term achievements, with strong changes in requirements and very limited managerial performance, it is most obvious that managers are not motivated to support structured improvement approaches, In addition, the single decision-making structure that characterizes the majority of companies in the building and construction sector (more than 78% of companies are very small companies with a management organization structured on a single authorizing officer), will not promote efficiency in decision-making, alignment of practices and production flow in a Lean context.

But this interest for the adaptation of the Lean concept, does not engage a direct copy of applications from Lean Manufacturing which is a set of managerial principles that aims to eliminate all waste throughout the value chain [45], and this is due to the multi-differences in the compositions of the two sectors, at least as exposed by the founders of Lean Construction, such as a production system with maximization of value, minimization of waste [18], has the same principles and the same objectives of Lean Manufacturing, but the fact remains that this ambition for adaptation is conditioned by the specifications of the construction company’s organization, is demanding the use of means and approaches specific and distinct to that of Lean Manufacturing, in this context Lean Construction was born the gap observed between theoretical models and reality in the construction sector [18].

For this reason, the transformation of the Lean approach towards construction companies cannot be carried out by simple conversion, and requires the deployment of an adjusted strategy (HoshinKanri¹), and based on the sharing of a single vision by all the actors of the organizational structure with a total understanding of the key factors of its success [29], which ensures a performance of the application of Lean practices as the basis for the integration of the Lean approach.

The difficulties encountered in applying Lean practices in the case of a construction company during this work, which can be interpreted by the weak alignment of training practices for individuals or managers, although training and continuing training ensure the improvement of

¹Ho: denotes direction; Shin: refers to concentration/focus; Kan: refers to alignment; Ri: denotes reason

overall performance, know-how, practices, and develop a more collaborative culture of the company's personnel, and boost performance.

However, on the one hand, this implies a major investment on the part of the company, which must pay for part or all of the training and agree to give the employee time on training [28], just as the company has other fields or needs to increase the poorly mastered or missing skills of the staff.

In addition, it is necessary to take into consideration the specification of the Lean approach, especially in Algeria where it is considered a new approach and a grandiose lack in training and in number of training entities.

Similarly, long-term philosophy and problem-solving culture practices show a low level of implementation and require more involvement from both the staff and management, especially in the case of very small enterprises and small and medium-sized enterprises.

To successfully implement the Lean approach, it is imperative to involve the staff. Therefore, the entire organizational structure must be oriented toward added value and its place of creation. Employee empowerment should be ensured through an effective motivation process, a clear definition of roles and responsibilities for each individual, and the sharing of the company's vision.

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