

Construction Project Management in Moroccan Small and Medium Enterprises: Exploring the Practices

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Abstract

Projects, particularly the most complex, mobilize a heterogeneity of stakeholders that strongly influence their success. This heterogeneity means a diversity and multiplicity of needs and expectations, often conflicting, of the same project. It is therefore unlikely to meet all the expectations of all stakeholders. Thus, the construction and Public Works SME of faces the challenge of evaluating. We will rely on the results of a study of 34 Moroccan SMEs operating in the construction sector to identify the triptych management practices cost, quality and time in these SMEs.

Keywords: Projects; Construction; SMEs; Triptych cost; Quality delay performance

Introduction

As is the case for any organization, the quest for performance, in a competitively and risky environment [1], is the primary concern of SMEs operating in the construction industry. Nevertheless, being a complex concept and a social construct, performance is apprehended based on complementary and sometimes contradictory attributes. Thus, before starting to think about performance management practices, it is essential to define the concept of performance in the Construction SMEs context. The heterogeneity of perceptions of performance assumes a diversity of driving practices.

The performance, or the success of a project, is widely debated in the literature. Many studies focus on dimensions as how this success is measured and the specific factors that influence it [2]. Based on the fact that there is no general consensus on key performance indicators for a project [2,3] identifying a set of common attributes is a key step in the process of piloting the performance of SMEs at the project level [4]. Admittedly, the criteria for evaluating and measuring the performance of a project were not the subject of a consensus, but the majority of the works raised, and many others, cite the three criteria cost, quality and delay [5-9]. From here, the objective of this article is to explore the piloting practices of this triptych cost [2,10], quality and delay in the construction industry and the question we ask is the following:

Given the specificities of the information system of the SME and the key role played by the factors related to project management in the performance of construction projects, to what degree the management practices of the triptych cost, quality and time are deployed in Moroccan SMEs in the construction industry?

To answer this question, we will first define the concept of project performance. This complex and multidimensional concept will be analyzed by referring to a set of attributes whose cost, quality and delay are the most commonly accepted by the scientific community. Then, we will present the literature review on the performance management practices of projects based on the triptych cost, quality and lead time. Then, we will detail our methodological approach to finally finish the discussion of the results resulting from this empirical study.

Literature Review on Project Performance: A Complex and Multidimensional Concept

The performance or the success of a project is widely debated in the literature. Many studies focus on dimensions as how this success

is measured and the specific factors that influence it [2]. Based on the fact that there is no general consensus on key indicators of project performance [2,3,11] and the diversity of perceptions of this performance. According to the stakeholders [3,4,12-15], the identification of a set of common attributes is a phase important in the performance management process of SMEs at the project level [4]. Admittedly, the criteria for evaluating and measuring the performance of a project were not the subject of a consensus, but the majority of the works raised, and many others, cite the three criteria cost, quality and delay [5-9,16]. These form the iron triangle theorized by Atkinson [16]. The study of all the criteria raised by the works, looking as much at the macro-performance of the project - which concerns the users and the beneficiaries of the project - as at its micro-performance - which interests the entrepreneurs and the consultants [6], reveal that the evaluation of the performance of a project is no longer based solely on the triptych cost-quality-delay.

In addition, some studies highlight the difficulty of evaluating the success of a project based solely on these three indicators [3,17]. Thus, Pinto and Selvin [18] and, Bryde and Brown [13] respectively, suggest the addition of customer satisfaction and stakeholder satisfaction as criteria for evaluating project performance. On their side, underline the insufficiency of the tryptic cost, quality and delay and support the relevance of other criteria such as the productivity, the profitability, the safety and the satisfaction of the members of the project team. In addition, Dermirkesen and Ozorhon [19] retain the time, cost, quality, safety and customer satisfaction as the dimensions of project performance management. Thus, several authors consider successful projects, completed projects on time, with the allocated budget, meeting the specifications and meeting the expectations of stakeholders [17].

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Operational Management of the Project's Performance, Cost-Quality-Delay Triptych Based Approach

The performance of construction SMEs is linked to the performance of the projects they execute. As a result, the attention of owner-managers focuses more on the success of projects. In the first chapter, we have specified that the attributes of the performance of construction projects are no longer limited to the criteria of the Iron triangle, but they are enriched and supplemented by others schematized in the matrix [3]. However, construction projects are cost-controlled projects. This project category, whose technical specifications and deadlines are fairly fixed [20], requires, in addition to a rigorous control of quality and deadlines, a regular management of costs throughout the project phases. Thus, the study of the practices of measuring the performance of projects in the context of construction and public works SMEs will be structured around these three dimensions, commonly represented by the triptych cost-quality-delay.

Quality management in construction projects

Quality management seeks to frame the organization, execution, and control of the execution of a project so that it meets the technical requirements and standards and therefore achieve the quality desired by the customer, the customers and other stakeholders. Moreover, conclude their study with 150 companies operating in various sectors including construction, stating that the satisfaction of the requirements and expectations of the customer remain the main criteria for the success of projects. As a result, quality, being one of the three pillars of the process of steering the performance of a project, does not exist per se, but in relation to customer expectations and other stakeholders of the company [21]. Moreover, ISO 9001 defines it as "*the ability of a set of intrinsic characteristics to satisfy requirements*".

Quality in the construction sector is not only a luxury to be hoped for, but also a level of safety to be respected, and therefore a regulatory obligation to assume (art.75 CCAGT, Art 759 to 780 DOC). Nevertheless, the realization of a work can mobilize a multitude of speakers around a set of complementary and interdependent phases and tasks whose combination of the qualities obtained at each phase constitutes the final quality of the work. Thus, in case of default, especially during the period of the ten-year guarantee, the responsibility can be diluted between the various stakeholders. Conscious of this problematic, the legislator demanded, through the new decree approving the Cahier of the General Administrative Clauses applicable to the contracts of the Works (CCAG-T), to the companies of the BTP, in particular the SMEs, the holding of a set of tools and material and human resources that claim to lead the technical management of the project. It is mainly (art.41 CCAG-T):

- Site booklet recording the operations related to the execution of the contract, incidents, postponements and their causes, the checks carried out and the traceability of the rejection of the site's waste.
- The technical brief of execution.
- A quality assurance plan that defines the provisions that the contractor proposes to implement to ensure the owner of the conformity of the services with the contractual stipulations.

Likewise, it empowers the entrepreneur to choose his subcontractors. At this level, the contractor produces a declaration on honor certifying, inter alia, its commitment to ensure that subcontractors meet the conditions set out in the 24th article of the

CCAGT and that the volume of the sub-activity processed does not exceed 50% of the market and does not relate to the main lot of the market (Art. 26 Decree 2-12-349).

In addition to the maintenance of the supports required by the decree to control the execution of the project, the contractor is required to be permanently present at the execution of works, or to be represented by one of his collaborators, accepted by the contracting authority, and which has the necessary powers to take the necessary decisions to ensure the proper performance of the works subject of the contract. In addition, the materials and products may only be used after having been checked and provisionally accepted by the client or his representative (Art.42). Thus, all materials used must meet the Moroccan standards approved and published by the Ministry of Equipment, Transport and Logistics.

In addition to satisfying the client's expectations, the entrepreneur is also called upon to take into account the aspirations of other stakeholders in proportion to their involvement in the project. These include the prime contractors, employees, the company as direct partners. Also, we have financial organizations, professional associations, the parent ministry as indirect partners.

In terms of environmental responsibility, construction companies produce five times more waste than households. In Morocco, the construction sector produces an average of seven million tons of waste per year. If the theory is that each waste producer is responsible for their future and the conditions under which they are collected, transported, disposed of or recycled, the waste from the construction industry is unloaded in the wilderness. However, Article 24 of the Waste Management Act 28-00 stipulates that such waste must be disposed of "in the places and disposal facilities designated for this purpose by the regional master plan under the control of the municipalities or their groups concerned as well as agents commissioned for this purpose". In addition, the CCAG-T, in its Article 31, requires the contractor to provide the client with the elements of the traceability of waste and materials from the site, including the site waste monitoring slip. However, the absence of a dedicated landfill and an industrial sector for the storage, recycling and treatment of this waste makes it difficult to apply the dissuasive sanctions provided by the second chapter of Law 28-00.

According to the National Federation of Building and Public Works (NFBPW) "Each project owner dedicates in his book of special prescriptions (BSP) 5% of the price of the work for the so-called expenses of folds which serve essentially to clean the site of all the waste". To get rid of this waste, entrepreneurs, for lack of a dedicated landfill, pay 50 to 100 dirhams to landowners on the outskirts of cities or to the operators of old quarries. Responsible management of this waste is still embryonic in Morocco. Today, "barely three or four major developers have machines for the reuse of their debris of concrete and bricks" because of the important means that must be available to value them, according to the national federation of construction and public network.

In summary, the search for a better satisfaction of the expectations of the owner, materialized by the respect of the technical clauses of the market, must not be made safe from the delays and the costs which it is necessary to assume. Moreover, an SME construction industry is required to control several delays that condition the performance of its project.

Delay management

Upon the signature of the contract with the client, the owner-

manager of the SME is required to respect a set of deadlines that have passed, legitimate. Otherwise, he is subject to penalties of delay and dissatisfaction of his partners, even a loss of his customers [22]. In addition, completion of the project on time is often cited second as a criterion for project success.

The completion of a work goes through several interdependent phases. Each phase has a definite time in the technical brief of the project that the contractor agrees to respect. However, these delays are attributed to a number of factors that are not always under control. Indeed, the activities of the construction are by nature subjected to bad weather which can affect the good progress of the execution of the works, or even to stop the site. For this reason, and in order not to penalize the SME in case of occurrence of an event, qualified as force majeure, it benefits from a "reasonable increase of the deadlines for execution" (Article 47 of CCACT). The legislator has left to the project owner, taking into account local geographical and meteorological specificities, the care to fix the thresholds of the bad weather and other natural phenomena which are deemed to constitute an event of force majeure.

Certainly, the extension of the deadlines of execution following a force majeure does not lead to a penalization of the company, but it has costs for the SME. In fact, following a temporary interruption of the worksite due to force majeure, the employees are remunerated (article 352 of the Labor Code), the rent charges are invoiced, the fixed costs are recorded, etc. In addition to an effective stoppage of work during inclement weather, weather conditions influence the quality of work and the time required for each task. Thus, taking the example of the concrete drying time, it varies between 2:30 and 18 hours, depending on the temperature. As a result, the quality of the concrete measured by its megapascal strength (MPa) depends on the drying time.

In addition to the technical deadlines, the SME is also obliged to manage the payment deadlines of its suppliers, the time of collection of the receivables, the tax and social delays, etc. Payment deadlines are another constraint for managing the performance of a project. In fact, between the date of notification of the work and that of the collection of the first bill, the SME spends huge sums (purchases of raw materials, payment of wages, purchases of equipment, etc.), which generate a significant need in the fund, rolling. However, construction professionals point out that today companies create trusting relationships with suppliers, which allows them to finance the activity at least in the short and medium term (more than 166 days).

In addition to these supplier credits, the majority of companies, according to the principals, use the pledge of public contracts and market advances in accordance with the law n 112-13 relating to the pledge of public contracts and the decree and decree. No. 2-14-272 concerning advances in the area of public procurement.

This practice is justified, on the one hand, by the insufficiency of the funds of the SME to continue the activity without receipt of the counts, and on the other hand, by the delays of payment which are very high in the sector. Moreover, according to a survey conducted by COFACE with 208 companies, 70% of which are SME-TPE and 12.50% belong to the construction-construction sector, the latter is counted among the worst students in the class with more 120 days.

These long payment terms have a direct impact on the performance of the SME, even its sustainability. Indeed, construction is ranked the third most vulnerable sector, after trade and real estate. It recorded a 17% increase in business failures in 2013. Failure to meet one of the

above deadlines has consequences for the other criteria of the project's performance, including the financial impact.

Cost management, a necessity to control the profitability of projects

A cost management system goes beyond the production of a price schedule from the specifications and the project's technical support, to integrate the different phases of the project's implementation. Project cost management includes "processes related to cost planning, estimating, budgeting, financing, provisioning, management and cost control, so that project is completed within the approved budget. In addition, it is important that the progress of the project implementation is aligned with the consumption of the allocated budget [23]. In other words, the management of the costs of a project occurs in three distinct stages of the project: at the time of the preparation of the financial offer, during the execution of the project and after the receipt of the project. Having already presented the first part during the budget planning of the project, we will now focus on the other two components. Initial project costs are rarely static. In fact, there are many factors that can cause a change in project costs. According to the European Commission, delays are one of the main factors. The mismanagement of the project, the unforeseen ground conditions, the modification of the plans, the shortage of materials and equipment, the financing problem and finally the force majeure. Hence, the critical importance of a cost tracking system during project implementation.

A cost management system must take into consideration the nature of the project, the stakeholders involved in the project, the specificities of the company and the requirements of the specifications. In fact, an SME that chooses to rent equipment does not have the same budget concerns as the one with its own equipment. This is the same remark for projects with a strong mechanization of production processes and development projects that require more manpower. Since the construction process is highly dependent on weather conditions, extreme conditions can significantly affect construction costs [24]. Indeed, the precautions, which must take the contractor, impact the costs incurred for the payment, placement and hardening of concrete. In addition, productivity at work is associated with the weather: "During poor weather when it is cold, damp, and windy, the morality of workers exposed to adverse elements, drops, which in turn results in a decline of productivity" [25].

Cost management involves linking the execution of the budget allocated to a project with the strategic objectives of the company [22]. This objective is reflected in the budget management of the site. In fact, depending on the size of the project, some SMEs use a construction supervisor to manage the construction site budget, in addition to supervising the construction work [25,26]. He is often assisted by a storekeeper who maintains the building's material accountancy, but other owner-managers prefer to keep track of costs incurred in order to minimize the overhead costs of the building site management, which varies between 8% and 30% of the overall cost of the project [27], so that their management is a good starting point for optimizing the cost of a project and increasing its profit margin [28-32].

Methodology

We recall that the objective of this article is the exploration of the tryptic management practices cost, quality and delay in projects led by Moroccan SMEs in the construction industry. To this end, we are part of a hybrid exploration approach. As for the theoretical exploration, we referred to work on the performance of projects in the construction

sector, especially construction, in many countries (Palestine, UAE, USA, Syria,...), which allowed us to identify the main determinants of the success of projects in relation to each dimension (quality, cost, time). Then, based on determinants and inspired by the books on the management of the projects, we announced piloting practices for each dimension and we put a Likert scale of 5 points to collect the score given by each owner-manager to a given practice. The study was conducted among 34 Moroccan SMEs whose profile is presented below. These companies were chosen for convenience because of the difficulty of accessing information and owner-managers of small and medium-sized construction companies [33-35].

Data Characteristics and Discussion of Results

Data characteristics

The SMEs in our sample come from five regions of the kingdom. The Marrakech-Safi region is represented by 28 SMEs, followed by the Draa-Tafilalt region and the Casablanca-Settat region (2 SMEs) and finally the Béni Mella-Khénifra and Souss-Massa regions (1 SME each). The distribution of our results by industry shows a preponderance of SMEs building construction (64.7% of SMEs). 47.1% of SMEs operate either in the civil engineering branch or the specialized construction sector.

The qualification and classification system distinguishes between seven classes going in a descending order from class S to class 5. For this work, we have also added an "unclassified" category for companies that have not yet integrated the SQC. Moreover, out of 180,781 legal entities in the construction sector until the end of April 2018, only 1,500 companies have integrated the qualification and classification system. This justifies the distribution of our sample. In fact, 47% of the SMEs studied are not classified. We also selected companies belonging to the S class and the class 1, even if the quantitative criteria of the definition of the SME are not respected, in order to evaluate the relevance of the qualitative approach in the definition of the SME, to analyze their performance management practices and that they can serve as vectors for the classification of SMEs.

In terms of workforce, our sample of 18 very small businesses, 5 small businesses, 5 medium enterprises and 6 large companies. This weakness in terms of permanent staffing is offset by the use of SMEs by seasonal staff. In fact, of the eighteen who reported fewer than ten permanent employees, 61% use a number of temporary employees that varies between ten and fifty employees. This recourse to temporary jobs is not specific to SMEs with a low number of permanent employees. Indeed, even SMEs with between 50 and 200 employees seek to fill their workforce needs by a seasonal workforce (60% of SMEs). In parallel with the number of results on workforce distribution, we have 35.3% of the SMEs studied have achieved an average turnover of less than 500,000 dirhams in recent years. Companies that have achieved a turnover of more than 75 million dirhams, the maximum threshold retained by the charter for the definition of an SME, represent, for their part, 17.6% of the sample studied.

The cost, quality and delay triptych management in construction projects

We dedicate this section to the analysis of the results of our sample in relation to the control of the triptych cost, quality and delay. For this, we asked respondents to rate a set of Likert scale practices that were theoretically and contextually approved as practices that would achieve the project's expected objectives against the criteria of cost, quality, and timeliness.

Delay management practices: Through the vertical analysis of the results, we find that the majority if not all of the respondents affirm the importance of these driving practices. Indeed, direct supervision is considered to be the practice most noted by all respondents. This also justifies by the regulatory provisions of the CACGT which requires the contractor to be permanently present on the site or to be represented. In addition, the positive impact of site supervision on timeliness is theoretically sound (Faridi and El-Sayegh, 2006). The pace of payments is also considered to be very important in managing the lead times of construction projects (88.2%), followed by the availability of construction materials (79.4%) and labor productivity. direct (55.9%).

On the basis of these results, SMEs wishing to deliver the project within the set deadlines are first required to appoint a competent team to monitor and supervise the execution of the project. The effectiveness of the supervision system will have impacts on the productivity of the workforce. However, good supply planning is essential to ensure the timely availability of materials.

The surprising result of this study is the score obtained by the preparation of the execution schedule. 58.9% of respondents consider that this practice is of little importance, or even not important for the control of the project implementation deadlines.

Management practices of project costs: By analyzing the responses on the existence of the nine project cost management practices, we find that only the presence of labor that is controlled by all the SMEs in the sample by keeping an attendance register (82.3%). However, the other components of the cost of projects are not subject to formal and instrumental control. In fact, if the programming of material needs for all projects allows the SME to save money by negotiating purchase prices and minimizing the costs of logistics, the SMEs studied do not make this programming very rarely, 4%. In addition, the SMEs in the sample do not recruit a storekeeper to monitor the consumption of materials (70.6%) and minimize the risks that a lack of control of the inputs and outputs of the materials can induce. This situation hampers the owner-managers from having a clear view of the fate of the materials purchased by keeping stock records (70.6%). Similarly, the non-daily monitoring of the progress of projects by drawing up a daily survey (47%) and the negligence of the importance of a report on the project's progress (44.1%) make the managing the costs of a less structured project and not at all equipped.

The use of outsourcing of labor (70.6%) and the regular reconciliation of the value of the work performed and the payroll (44.1%) remain the most cost-effective project management practices. widespread in the sample.

Quality management practices in SME projects studied: To evaluate the quality control of the work carried out in the Moroccan SMEs of the BTP, we based ourselves on the practices that we could identify in the case of a SME of construction during the phase of the contextualisation, and which are of Moreover, it is obligatory in the light of the regulations governing works contracts and is subject to regular control by project owners and contractors.

Indeed, we note that apart from the control of the quality of the equipment used by the entrepreneur who rarely practiced (35.3%), the studied SMEs place a lot of importance on the criterion of the quality in the operational piloting of the construction projects. Thus, a permanent verification of the conformity of the executed works with the requirements of the specifications is introduced (64.7%). This relies heavily on the direct supervision of the tasks performed by the workforce (94.1%). In addition, SMEs submit to the control of an

approved laboratory all the materials they use on site (35.3%). This low percentage is explained by the fact that the conformity of the materials is only at the start of the construction site or when the SME changes its material supplier. In order to guarantee the acceptance of the works, the SMEs submit the results of the laboratory to the project owner and the contractors (76.5%).

Conclusion

The success of construction projects is conditioned by a set of factors, including those related to project management. Project management means all organizational and training operations to achieve the objectives assigned to the project. Theoretically, the management of construction projects is mainly focused on the technical component of completing the project on time in accordance with the requirements of quality and cost. However, the analysis of the responses of 34 SMEs reveals that these companies do not resort to tryptic management practices cost, quality and time as indicated by the review of literature on the subject. This situation we want to deepen the reflection in another work on the factors that explain the deployment of project management practices in construction SMEs.

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