

Article

Project Management Maturity in Renovation and Remodelling Construction Firms

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Abstract: Project Management Maturity Models (PMMM) are considered practical tools to deal with poor Project Management (PM) performance, an issue that concerns academics and practitioners. However, the models that exist are something close to “one size fits all”. This means that those models might not be suitable for activity sectors with specific requirements, such as construction, in particular, the renovation and remodelling construction firms. The present research proposes a PMMM to assess the PM capabilities of Portuguese renovation and remodelling Project-Based Firms (PBF). To achieve this goal, the authors developed documental research, followed by exploratory research through qualitative analysis. The researchers conducted semi-structured interviews and performed a content analysis of the fully transcribed interviews. Compared with the literature review’s findings, qualitative analysis results made it possible to find closure on previous research that indicated two models to have the best fit for an assessment project on construction PBFs: the OPM3 from the PMI and the MMGP-Prado. Based on those findings, the latter has the best fit for an assessment project on construction PBF. However, the model needs adjustments to fit the Portuguese context of renovation and remodelling organisations. This article presents a new PMMM for Portuguese renovation and remodelling construction firms based on obtained results. Furthermore, regarding construction PM, this article is among the few that studied PMMM on renovation and remodelling construction companies. Unlike large construction companies, these are small organisations that academics do not target for research.

Keywords: model development; maturity model; performance evaluation; project management; project performance; renovation and remodelling projects



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1. Introduction

There is a matter intriguing academics and practitioners alike. Why did some projects that did not meet their objectives generate high customer satisfaction while others that met all the project objectives left the client unsatisfied [1]? This issue is transversal to all PBF, which also attends to construction companies. It is undoubtable that construction companies’ purpose is to execute construction projects; it is what makes them PBF [2]. It is why construction firms are considered industries of origin [3]. It makes these organisations fitter to adopt PM practices and naturally more mature in the same terms [4]. This is why applying PM methodologies to construction companies is natural at the outset; through them, these organisations correspond with a higher rate of successful completion of projects [5]. Since PM “competencies are core assets in” a PBF [2], PM has a competitive advantage in itself, and the way to increase this competitiveness is to measure the ability

of these organisations to manage their projects [2]. When an organisation has knowledge and experience in PM, the projects it executes will be more efficient than those executed by organisations without PM skills [2].

One way an organisation can evaluate itself with the competition to increase the success rate of the projects it executes is by implementing a PMMM [6]. Implementing a PMMM enables organisations to self-assess their PM capabilities, compare their practices with PM best practices, and benchmark their results with their competitors [7]. The final goal of implementing a Maturity Model (MM) is to improve success [5]. Primarily, it matches PM performance to a specific maturity level [8,9]. Secondly, it produces outputs that enable the development of an improvement plan on the areas or processes that need to be intervened to improve its capabilities [8,9]. This article builds on research that identified and compared 39 MMs based on two criteria to determine which models were most suitable for construction PBFs [10]. The research conclusions appointed two PMMMs as the most adequate: the OPM3 and the MMGP-Prado.

The scope of the present research is the urban renovation segment in Portugal. More than 90% of the Portuguese construction sector comprises small companies with less than 20 employees [11]. The construction sector in Portugal proved to be COVID-19 resistant since it was considered a priority sector by the Portuguese government, and it did not paralyze during the lockdown [12]. In 2022, the year when the world bounces back from the pandemic crisis, most indicators relative to activity in the construction sector are positive, with cement consumption in the national market registering a more than 10% growth in year-on-year terms in the first quarter of 2022. Furthermore, notably, the urban renovation segment showed signs of development where the total number of building and rehabilitation works licensed increased by 3.5% in homologous terms [13]. By the end of the second quarter of 2022, the urban renovation segment in Portugal registered a new acceleration of growth, indicating a positive variation of 6.2% in homologous terms [14].

The relevance of this research is that the previous research has not found any information on the applicability of PMMM in Portuguese renovation and remodelling companies or in small to medium construction projects. Moreover, this segment is becoming more relevant as most countries are reaching an infrastructure development rate shifting from traditional “greenfield” projects to urban renovation and remodelling ones [11]. In addition, governments worldwide are pushing the need for building renovation, not only for the ageing building stock but also for the urgent need to reduce the buildings’ carbon footprint [15].

To improve success in construction renovation and remodelling projects executed by Portuguese construction PBFs, the researchers developed the following research question: What are the critical areas of relevance for assessing and promoting PM maturity in Portuguese renovation and remodelling PBFs?

To answer the main question, the authors developed three secondary research questions:

- (1st) What are the characteristics of a renovation and remodelling project?
- (2nd) What are the success factors in renovation and remodelling projects?
- (3rd) What factors affect the implementation of project management maturity models in renovation and remodelling projects?

After analysing state of the art projects, the researchers performed exploratory research through qualitative analysis. Then, they conducted in-depth interviews through a semi-structured script. The research sample comprised a Chief Construction Officer (CCO), construction project managers, and construction directors of Portuguese renovation and remodelling companies. These were the chosen interviewees because they are the ones that manage ongoing projects in these organisations. Because the renovation and remodelling PBFs are small in terms of employees, besides the CCO, construction directors and project managers, there are production workers who cannot understand the current problem.

2. Materials and Methods

This article builds on research that identified and compared 39 maturity models (see Table A1) based on exclusion and inclusion criteria to determine which models are most suitable for construction PBFs (see Table A2) [10]. The first criterion excluded all models with no empirical foundation in a construction environment. The second included articles with an empirical foundation, where a PMMM was applied and analysed to shed some light on positive and negative aspects and barriers and future work, even if in cases distant from the construction environment. Furthermore, the researchers developed a search in literature to find inspiration from the academic community to determine what elements could characterise the models. The results showed two PMMMs better suited to assess PM capabilities in construction companies: OPM3 and MMGP-Prado.

Following, the methodology adopted for the exploratory research will be presented. In-depth interviews were conducted through a semi-structured script, and the results were processed through Bardin's content analysis [16]. From the literature review, seven articles addressed the implementation of PMMM in construction firms [9,17–22]. From those, three pointed to contingency factors in the efficiency of implementing models in construction companies [17–19], and one pointed to enhancing factors [9]. These are especially relevant to determining a model's attributes and characteristics to successfully measure PMM in construction companies.

Based on the documental research conclusions (see Table A3), a research model proposal was developed, which resulted in three propositions, presented in Figure 1.

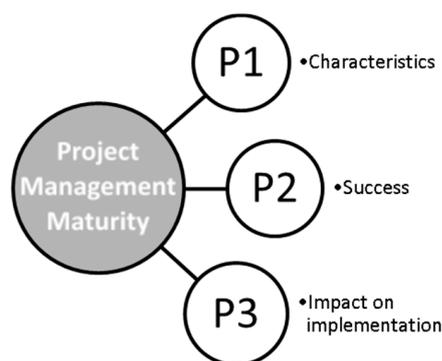


Figure 1. Research model proposal (source: own).

Five in-depth interviews were undertaken using a semi-structured script (the information gathered in the literature review, summarised in Table A3, along with other relevant literature identified in the documental research, which supported the conceptual map of the interview script, disclosed in Table A4), followed by a content analysis [16]. Then, what becomes clear from the conceptual map represented in Table A4, are the questions directly related to the three secondary research questions are addressed, which happens as follows:

- (1st) What are the characteristics of a renovation and remodelling project?
To try to answer this question, it was developed the following:
- Question 4 for the characterisation of the PBFs;
 - Questions 5 and 6 for characterising Portugal's rehabilitation and remodelling segment.
- (2nd) What are the success factors in renovation and remodelling projects?
To try to answer this question, the researchers developed the following:
- Questions 7 and 8 for the definition of project success;
 - Question 9 to determine the relationship between project success and PMMM.

(1st) What factors affect the implementation of project management maturity models in renovation and remodelling Projects?

To seek to answer this question, the researchers developed the following:

- Question 10 for the characterisation of PMMM;
- Questions 11 and 12 to make the association between PBF competencies with maturity assessment;
- Questions 13 and 14 to determine contingencies and enhancing factors for implementing a PMMM.

A single researcher undertook the five interviews. The mean duration of the interviews was 100 min. The 5 respondents are all related to the construction sector in Portugal, as we can interpret from the interviewees characterisation table (Table 1).

Table 1. Interviewees characterization table.

Respondent	A	B	C	D	E
Age	48	37	58	36	50
Academic background	Civil Engineering	Civil Engineering	Civil Engineering	Civil Engineering	Enterprise Management
Current position	Construction Project Manager—renovation and remodelling	Construction Director—renovation and remodelling	Higher Education Lecturer. construction management	Chief Construction Officer	Construction Director—renovation and remodelling
Past Professional Experience	–	–	Construction Project Manager	Construction Project Manager	Real Estate Developer

To determine and validate non-probable samples in qualitative analysis, Guest, Namey and Chen [23] developed a precise, simple, repeatable and reliable method. For validating this research, it was used the concept of saturation [23]. These authors developed a method that operationalises saturation as a proportion. The number of categories identified at a given point in the analysis is divided by the total number of categories identified in an entire sample. The saturation level is considered attained when 80–90% of the categories in a data set have been identified. In short, the first interview is the one that reveals more categories. The second will reveal much less. Moreover, as interviews are being undertaken, there is a point where no new categories arise. It is when the base size is identified.

3. Results

3.1. Documental Research Results

The present article focuses on identifying the PMMM that best fits the Portuguese renovation and remodelling projects and PBFs, between the OPM3 and the MMGP-Prado. For that reason, first, it was necessary to determine what characteristics distinguish these projects and PBFs from other construction projects and companies.

3.1.1. Characteristics

According to Cruz et al. [11], in 2013, 92.9% of the Portuguese construction sector was composed of small companies, with 20 or fewer employees, with a turnover below 300 k EUR per year. According to AICCOPN [12], the construction sector in Portugal showed signs of being COVID-19 crisis resistant. The first quarter of 2022 proved to be proficuous as most indicators relative to activity in the construction sector, with cement consumption in the national market registering a growth of 10.7% in year-on-year terms, totalling 1020.9 thousand tonnes in the first three months of 2022. In the first two months of 2022, the total number of building and rehabilitation works licensed increased by 3.5% compared to the same period last year due to variations of 5.8% in residential buildings and –3.2% in non-residential buildings [13]. Recent figures show that the urban renovation

segment in Portugal registers a new acceleration of growth, showing a positive variation of 6.2% in homologous terms after closing the second quarter of 2022 [14].

Construction companies, in general, are considered “industries of origin” [3], and PM methodologies are more manageable to implement by PBF (such as construction companies) than other industries. According to Chen et al. [2], construction companies’ scope is to execute construction projects; therefore, the nature of these activities makes them PBF. Moreover, several authors back up this bottom-up assumption [24–26]. Miterev et al. [27] argued that an organisation might change its structure based on projects from a top-down perspective. They are formerly instituting processes and structures to support its decision, viewing itself as a PBF.

Nevertheless, what exactly means to be a PBF? According to Miterev et al. [27], a PBF is an organisation that strategically decides on a project program and portfolio management framework to manage its business. According to Gareis and Huemann [28], PBF is a firm that determines its governance through PM as an organisational strategy. It also creates temporary teams to execute complex processes, manage a portfolio of projects, establish protocols to designate and integrate roles, apply the new management paradigm (people empowerment), and have a PM organisational culture. According to Whitley [29], each PBF has specificities and attributes that make them keener to prosper in specific activity sectors. Archibald [30] considered applying a general PM methodology over a specific and tailored one as a cause for the project’s failure. The author believes that the project’s categorisation is a safe way to avoid this cause and proposed 11 general project categories: space/defence, change management, communication systems, event management, infrastructures, information systems, international development, media and show business, research and development, and healthcare. The author also states that each project’s category has specificities and requires different governance, management, planning, scheduling and control practices.

Whitley [29] categorised PBF based on a bi-dimensional characteristics matrix: (1) singularity and (2) separation of roles and stability. From this matrix, the author categorised PBFs into four different types: (1) Hollow, (2) Craft, (3) Organisational, and (4) Precarious. Furthermore, Söderlund [31] agreed with this organisation since categorising a PBF must consider the complexity of the projects, the number of stakeholders involved, and the ability to manage multiple projects simultaneously. According to Whitley’s [29] categorisation, the Portuguese renovation and remodelling PBF are proxies for Craft PBFs, because of the high level of specialisation. In Portugal, a collective labour contract regulates the whole construction sector.

To successfully manage a PBF, aligning the stakeholders while executing their roles is necessary. According to Gareis and Huemann [28], it must be instilled in all internal stakeholders that the organisation is a PBF to implement any management system correctly. Expressly, implementing a PM methodology must be accepted and practised by everyone in the organisation, and these best practices contribute to efficiency, competitiveness, and success.

3.1.2. Success

One significant concept that needs to be clarified is the concept of success. Along with the definition of success, it is also essential to explain a successful construction project. According to Chen et al. [2], PM competencies are a nuclear asset in any PBF, and construction companies, by their nature, are PBFs. According to Backlund et al. [17], in PBFs, knowledge, competencies, capabilities, and resources are accumulated by executing projects. Because of that, the global success of these organisations is related to the success attained on their projects. Therefore, these authors consider PM competencies and experience as the most critical factors influencing a successful project.

Project-related and organisation-related factors impact the PM performance of construction projects [32]. Regarding PM areas of practice, Bryde [32] considered procurement and contract management, human resource management, site supervisors and organisational behaviour the most relevant in impacting the construction project outcome.

Experience can be considered as the accumulation of tacit knowledge, which cannot be transferred because it is not expressed explicitly, contrary to explicit knowledge that is codifiable and easy to transfer [33]. Marques et al. [34] indicated that organisational commitment to knowledge transfer influences its maturity level. According to Love and Josephson [35] and Murray and Chapman [36], experience and learning capabilities are significant success factors in a construction project.

According to Chen et al. [2], the economic success of a construction PBF is directly related to the success attained in the projects the organisation executes. Atkinson [37] and Turner and Zolan [38] defended that fulfilling the triple constraint of scope, time, and cost is mandatory to achieve project success.

Pollack et al. [39] are aligned with the previous authors but argue that one of the vertices of the iron triangle is not static. For these authors, quality can interchangeably switch with any of the vertices, appointing it as one of the most critical constraints based on research of more than 100 k articles from 1970 until 2015. On the other hand, Williams et al. [40] defended that the iron triangle was not a success factor but a PM efficiency measure. According to these authors, to measure success, it was necessary to consider several stakeholders' perspectives. However, the client's perspective is considered the most important, and client's satisfaction is a critical dimension in measuring the project's success.

Besides the client, four other dimensions were also crucial to measure the project's success: the iron triangle, project team satisfaction, profit, and readiness for the future. According to Williams et al. [40], this is the most holistic way to measure project success. Previously, Serrador and Turner [41] defended that client' and stakeholders' satisfaction significantly contributes to global project success.

More recently, Ram [42] presented a new iron triangle concept, introducing the idea of agility as a new dimension. In short, agility is related to the project's size. The bigger the scope, time, and/or budget, more projects should be agile to fulfil these constraints. The idea of agility lies in that it depends directly on a PM's response in readiness, adaptability, and leadership. Measuring a project's success is difficult [1]. Some projects did not accomplish any budget or time deadline but were successful. On the contrary, the client was unsatisfied with the result of projects where all objectives were met.

According to PMBOK® Guide—Sixth Edition [43], success can be measured by the quality of the product or the project's result, by the accomplishment of time, budget and the level of satisfaction of the project's stakeholders. Cooke-Davies [44] relates the project's success to meeting the project's global objectives and the PM's success to meeting scope, cost, time, and quality. Shenhar et al. [45] and Shenhar and Dvir [46] consider the accomplishment of all the scope within the estimates of time and budget, a measure of project efficiency, and the achievement of business goals (profit) as the objective criterion for project success. Several authors [47–50] confirmed a positive relationship between project performance and Project Management Maturity (PMM).

Archibald and Prado [5] also defined the project's success in the construction sector, specifically construction management. They distinguished total success from partial success and failure. Total success is when a construction project ends within the time, scope and budget deadlines. The client is satisfied with the result. The company or the single business unit accomplished the desired financial goal, and there was no significant technical judicial or labour issue. Additionally, there was no severe accident during the project's execution.

According to Prabhakar [51], there are a lot of divergent opinions on this issue, and the only touchpoint is the disagreement over project success. However, despite the lack of consensus on the subject, the present research accepted the last definition presented by Archibald and Prado [5].

3.1.3. PMM and Project Success

The relationship between PMM and project success has been the subject of debate in the PM community [52]. PMMMs emerged during the '80s because many projects did not achieve all of the project's goals [53]. Cooke-Davies and Arzymanow [3] believed that organisations with a higher level of maturity have more chances to succeed in project effectiveness and efficiency, augmenting their competitiveness. According to Backlund et al. [17,54], improving effectiveness and efficiency is one of the main benefits of PMMMs and also states that aiming to improve PM capabilities contribute to more effective and efficient project performance. Several authors concluded that maturity and project success walks hand in hand [55–59]. Others do not share the same opinion [6,47,60–62]. Grobler and Steyn [53] believe that an organisation should not focus on achieving the highest level of maturity in all aspects of maturity but on finding a balanced one capable of delivering the best business results.

Nieto-Rodriguez and Evrard [63] found a strong positive correlation between maturity level and project efficiency. These authors defended that achieving a higher maturity level brings higher project outcome efficiency and financial success. In line with these conclusions, Santos et al. [9] concluded that a maturity level is a strong indicator of a successful PM and the organisation's success. According to these authors, a maturity assessment is a meaningful way of assessing the organisation's capabilities. Whether it is performed internally (self-assessment) or externally, its results point to the organisation's competitiveness, survival capabilities, innovation capabilities, level of technological prone and business results. Some factors cloud the manager's vision, and others enlighten the path to achieving project goals.

3.1.4. Enhancing and Contingency Factors

Despite the lack of empirical foundation on the application of PMMMs in construction projects, it was possible to identify contingency and to enhance factors on its applicability through the literature review analysis. As for contingencies: Guangshe et al. [18] concluded that the OPM3 could not be directly applied to Chinese construction projects, mainly referring the organisational culture as one of the main obstacles in this issue; Sarshar et al. [19] identified the need for adapting the SPICE model according to the type of supply chain, adapting the tools used by each organisation in that chain according to its dimension, financial state and business model; Backlund et al. [17] appointed: the lack of focus on a single PM methodology across the organisation; PM competencies being concentrated on a single resource and not on a project team; the high degree of engineering competencies shading the interest on management and organisation development; and the necessity of having pre-established PM practices in order to assess the organisations PMM; Khoshgoftar and Osman [64] identified: the associated costs of an assessment project; the difficulty of implementation of a PMM model; the problem of interpreting a PMMM; inconsistencies in between models iterations; and the difficulty in obtaining the proper training, as significant contingencies.

As for enhancing factors, Santos et al. [9] identified: the existence of a free online tool to apply and analyse the assessment results; the departmental and corporate approaches; the fact that the model produces outputs that provide meaningful information for the development of an improvement plan that appoints effective measures on the organisational context; a tool that promotes a project-based organisational structure; and also a tool that supports the active participation of a project team, the usage of information systems, the use of PM tools and techniques, and the strategic alignment to PM.

3.2. Field Research Results

According to our research and carrying out the recommendations of Guest et al. [23], saturation happened at the end of the third interview, so we have a base size of three interviews. Next, we continued to code interviews, and when less than 5% (similar to a p -value < 0.05 in quantitative analysis) of new categories were found, the validation process

was concluded. The new information threshold was then measured. In our research, it is 3.23% with the run length of two interviews. Therefore, according to this method, saturation was achieved in 3⁺² (base size of three interviews and two interviews more were needed to meet –5% of new categories found criterium) information with a new information threshold of 3.23% (see saturation matrix in Table A5).

Content Analysis Results

Premature categories were primarily created when performing content analysis. The next step consisted of coding those early categories into analysis categories (see the overview of the progression of categories in Table A6). Nvivo 10 (version 10, QSR International Pty Ltd., Doncaster, Australia), released in 2014, was used to support the coding process. Regarding the first secondary research question, twenty-seven initial categories were identified, and more than half of those categories were confirmed by 80% of the interviewees.

Only characteristics with 80% or higher saturation were validated. Then those characteristics were analysed, and several authors verified that some had already been identified [28,29]. However, considering the categorisation suggested by Whitley [29], none of the identified categorisation matches any specific category proposed by Whitley.

Regarding the second secondary research question, eight metrics were identified. Once again, more than half had a saturation of 80% or more.

Following the criterion previously presented, only the characteristics with 80% or higher saturation were validated. The profit metric surpasses all the other metrics. The iron triangle and quality were not referred as important characteristics, and customer satisfaction was mentioned as much as profit, with a saturation level of 80%. For that reason, this metric was considered more important than the others.

Regarding the third secondary research question, twenty factors impact the implementation of PMMMs. However, again, more than half of them have 80% or more saturation.

It was decided to validate only contingencies with 80% or more saturation to keep the same orientation. After analysing these factors, it was verified that the interviewees understood and commented on them. Unfortunately, the same has not happened with the enhancing factors.

Using Nvivo features, it was possible to cross categories identifying at the same time when categories were mentioned simultaneously. It is a meaningful way of understanding the positive or negative relation that those categories have with each other.

Through this method, there were identified characteristics that are drivers for success. There were identified the following positive relations:

- Speed of execution X Profit: labour has much weight in terms of rehabilitation and remodelling project costs. It comes with no surprise that the speed of execution comes as a driver to make a profit, and profit was the success metric with higher importance;
- Customer follow-up X Customer satisfaction: the interviewees consider the rehabilitation and remodelling client to be more present and require more attention. Being the client and also the sponsor makes him the most important stakeholder. This is why customer follow-up is a driver to customer satisfaction;
- Recommendation X Customer satisfaction: logically, a customer recommends the product or service acquired when satisfied. Considering that recommendation is of paramount importance for the organisation's financial results, this connection makes perfect sense;
- Experience X Quality: this connection reveals that time associated with learning leads to increased experience. Moreover, every experience increment translates into executing a higher-quality final result or product.

Profit is an essential metric for measuring the success of renovation and remodelling projects. The interviewees tended to control the driver speed in execution to achieve a good result on this metric. It is also noticeable that customer follow-up is essential for customer satisfaction. On the other hand, customer satisfaction proved necessary to ensure recommendations, which is crucial to attracting new clients.

In short, the growing spiral of time associated with the learning factor brings more experience. Experience is an essential driver for producing quality results, and quality perception associated with customer follow-up is crucial for customer satisfaction. A satisfied customer tends to be a significant “word-of-mouth” marketing agent. Suppose that efforts made to monitor and control produce a quick result according to the client’s expectations. This will have a satisfactory financial impact on the organisation, which means a higher profit.

4. Discussion and Model Development

4.1. Field Research vs. Documental Research Conclusions

We could almost answer the first secondary research question from the analysis made in the literature review. However, because the definition proposed by Archibald and Prado does not refer specifically to the renovation and remodelling segment and even less to Portuguese renovation and refurbishment PBF, we needed to embark on a new research path, in this case, qualitative research through in-depth interviews [5]. This information was used to develop the interview script. Later on, its conclusions were confronted with content analysis outputs.

In short, the primary conclusions were as follows:

1. Dimensions or key areas a PMMM must address according to Prado [65]: a. Technical and contextual competence; b. PM methodology; c. Informatisation; d. Organisational structure; e. Behavioural competence; f. PM competence; g. Strategic alignment.

The dimensions identified are presented in the MMGP-Prado model [65].

2. Success metrics to evaluate a project or organisation’s performance [5]: a. Client satisfaction; b. Financial result; c. Zero accidents and zero labour or judicial pendency; d. Time; e. Cost; f. Scope.

The success metrics identified are the ones proposed by Archibald and Prado [5].

3. Renovation and remodelling construction projects’ and PBFs’ characteristics [29]: a. Execution of multiple projects simultaneously; b. Incremental innovation; c. Highly specialised workforce, liable and stable; d. Low singularity; e. Execution of short-term projects; f. Cumulative learning; g. Little client involvement; h. The organisation is capable of presenting elaborate solutions in a short period.

The characteristics identified come from the categorisation proposed by Whitley [29], specifically from the “Craft PBFs” category.

From the analysis of the field research, it is essential to acknowledge that the companies targeted for this research are much more focused on the technical aspects of the projects than on PM. The interviewees showed a degree of unfamiliarity with PMMMs. Nonetheless, it was vital to interview professionals in these organisations to understand their needs to succeed in the projects they execute.

It is worth noting that this research has an exploratory nature, and more in-depth interviews and analyses need to be pursued to confirm the results obtained from this research. Nonetheless, these research conclusions effectively identified key areas to address in a maturity assessment project for these PBFs.

This research identified profit, deadline meeting, scope compliance, quality, and client satisfaction as success metrics.

Regarding the success definition, the documental research pointed to an almost perfect fit in the definition proposed by Archibald and Prado [5]. Empirical research conclusions validate this if we equate some concepts. The “financial result” can be equated to “profit”, and the “scope” metric can be equated to “scope compliance”.

The research identified imponderables, such as the experienced crews, small-scale projects, speed of execution, recommendation, customer follow-up, incipient planning phase, multidisciplinary, specific solutions dependence, multipurpose labour dependence, high projects' singularity, and works with limited accessibility as project's and PBF's characteristics.

Regarding PBFs' categorisation, the documental research pointed to a possible match between Whitley's [29] category "craft PBFs" and Portuguese renovation and remodelling companies, but the field research proved to be otherwise. In addition, the interviewees identified the execution of multiple unique projects simultaneously, which does not fit the craft PBFs definition.

We partially validate the craft PBFs category from this comparison by the documental research. The categorisation model is based on a bi-dimensional matrix, and one of its dimensions is the singularity. The field research showed that the renovation and remodelling projects are highly singular and unique. This is the main reason for explaining the 50% match between the field research and literature review conclusions.

The unique nature of the renovation and remodelling projects makes this type of PBFs, renovation and remodelling construction companies, the most suited for implementing PM methodologies and PMMMs. Singularity is a very often used term to define projects, and definitions usually mention that the primary project goal is to produce a unique product, service or result [43,66,67].

Therefore, based on these conclusions, a proposed maturity model will be able to measure the PM maturity of Portuguese renovation and remodelling PBFs, based on a PM framework that takes into consideration the following knowledge areas: time; cost; scope; procurement; quality; human resource/resource; integration; stakeholder; risk; and communications. Because the MMGP-Prado model clearly and explicitly builds up in such a framework, it was the chosen model to assess the PM capabilities of Portuguese renovation and remodelling companies. The following section addresses this issue and promotes changes to the original model to fit these PBFs.

4.2. Adapting the MMGP-Prado to the Portuguese Renovation and Remodelling PBFs

The MMGP-Prado, in its last iteration, has its foundation in the PMBOK® Guide—Fifth Edition. It combines the five process groups and the 10 knowledge areas with the five maturity levels of the Capability Maturity Model (CMM). This model is based on the author's experience and applies to isolated departments or the organisation as a whole. The model tries to be simple, composed of seven dimensions and five maturity levels [65].

4.2.1. Knowledge Areas Intertwined with the Model's Dimensions—Level of Importance and Weighting

The MMGP-Prado five dimensions are present in the five levels of maturity, assuming greater or lesser importance depending on the level at which it is presented. The maturity assessment is based on a 40-question questionnaire (10 questions per maturity level, starting on level two) and may assess only a part or the whole organisation (sectoral and corporate approach). Each question refers to one or more dimensions, and each dimension relates to one or more knowledge areas [65].

However, according to the field research, not all knowledge areas should have the same weight when measuring the PM capabilities of Portuguese renovation and remodelling companies.

According to the results obtained, the knowledge areas are scaled by level of importance: 1st time; 2nd scope; 3rd quality; 4th stakeholder; 5th resource; 6th procurement; 7th risk; 8th communications; 9th integration; and 10th cost.

To better understand the ability of the MMGP-Prado to assess PM capabilities of Portuguese renovation and remodelling PBFs, a matrix was developed to cross each of the model's dimensions to each knowledge area. The results are in Table 2.

Table 2. Cross between PMBOK® Guide—Fifth Edition 10 knowledge areas and the MMGP-Prado seven dimensions.

	PM Competencies	Technical and Contextual Competencies	Behavioural Competencies	Methodology	Informatisation	Organisational Structure	Strategic Alignment
Time	X	X	X	X	X	X	X
Cost	X	X		X	X		X
Scope		X	X			X	X
Quality		X	X			X	X
Resources	X	X	X			X	X
Integration	X	X	X	X	X	X	X
Risk	X	X	X	X	X		X
Stakeholders	X	X	X		X		X
Communications	X	X	X		X	X	X
Procurement	X	X	X	X	X		X

By analysing Table 2, it is clear that the more relevant MMGP-Prado model dimensions are “Technical and contextual competencies”, “Strategic alignment”, and “Behavioural competencies”. The interviewees did not give much importance to the cost of raw materials; they also mentioned that negotiating with subcontractors is meagre. However, considering the high number of subcontracts and their interference with the execution speed, procurement was also classified as an essential knowledge area.

A similar situation occurs with the “Communications” knowledge area because: these projects need a close relationship with the client; the interviewees identified that, in general, these projects do not have a specifications notebook or an execution project, so there is a need to “navigate by sight”; and several projects are carried out at the same time.

Now the MMGP-Prado dimensions can be scaled according to their density in terms of knowledge areas, as follows: first “Technical and contextual competencies” evened with “Strategic alignment”; second “Behavioural competencies”; third “PM competencies”; fourth “Informatisation”; fifth “Organisational structure”; and sixth “Methodology”.

The value proposition given by the present research consists of promoting a model capable of measuring PM capabilities of Portuguese renovation and remodelling PBFs. The documental research conclusions pointed to the MMGP-Prado as the model with the best fit, but the qualitative research proved differently. However, using the MMGP-Prado as its original form, most likely no Portuguese renovation and remodelling PBF would achieve a satisfactory level. Moreover, this does not match what was found to be the most critical success metric, “profit”. However, most interviewees represented companies that existed for at least 10 years, and all had very satisfactory financial results.

These are the reasons for suggesting changes to the MMGP-Prado model, specifically to the point system. This way, the new model will be fit for assessing these organisations.

4.2.2. Changes Made to the MMGP-Prado Model and Comparison Results of Before and After

As mentioned in the previous sub-section, changes will be produced to the classification system. The original MMGP-Prado has only one scale. The scores are as follows on the five answer options (a to e): a-10; b-7; c-4; d-2; e-0.

The MMGP-Prado dimensions have a per level maturity saturation, as shown in Table 3.

Table 3. Dimensions saturation by maturity level according to the original MMGP-Prado model.

	2nd Level— Known	3rd Level— Standardised	4th Level— Managed	5th Level— Optimised
PM competencies	40%	13.33%	8.33%	20%
Technical and contextual competencies	10%	0%	10%	20%
Behavioural competencies	10%	3.33%	8.33%	15%
PM Methodology	10%	48.33%	15%	10%
Informatisation	15%	8.33%	5%	15%
Organisational structure	5%	23.33%	18.33%	15%
Strategic alignment	10%	3.33%	35%	5%

Considering the results from the interviews, the change suggested will focus on the scores of the multiple-choice options; five scales were developed to be applied according to the dimensions' relevance for each question:

- (I) a-17.5; b-12.5; c-7; d-3.5; e-0
- (II) a-15; b-10.5; c-6; d-3; e-0
- (III) a-10; b-7; c-4; d-2; e-0
- (IV) a-5; b-3.5; c-2; d-1; e-0
- (V) a-2.5; b-1.75; c-1; d-0.5; e-0.

The new model's dimensions proposed by this research have a per level maturity saturation, as shown in Table 4.

Table 4. Dimensions saturation by maturity level according to the new model.

	2nd Level Known	3rd Level Standardised	4th Level Managed	5th Level Optimised
PM competencies	36.25%	22.2%	6.67%	22.5%
Technical and contextual competencies	17.5%	0%	15%	30%
Behavioural competencies	10%	5%	6.67%	15%
PM Methodology	2.5%	35%	16.25%	2.5%
Informatisation	13.75%	7.5%	1.25%	15%
Organisational structure	2.5%	25%	11.67%	10%
Strategic alignment	17.5%	5%	42.5%	5%

As shown in Tables 3 and 4, we can confirm the following: according to the results from Tables 3 and 4, it is now possible to reorganise the dimensions' relevance.

The model in its original version gives more relevance to some dimensions over others, as shown in Table 5.

By the success metrics and characteristics identified in the qualitative research, the following conclusions can be pointed: the manager must have a thorough knowledge of the specific segment of construction—renovation and remodelling, in terms of business. Furthermore, the manager must be a good performer in strategic management and have a high cumulative experience in managing these projects.

Because of these conclusions, it is justifiable to over-weight the following dimensions: strategic alignment; technical and contextual competencies; over the following dimensions: methodology; and organisational structure.

Table 5. Dimensions relevance: MMGP-Prado vs. New Model.

MMGP-Prado Relevance	Dimensions	New Relevance
2	PM competencies	1
4	Strategic Alignment	2
6	Technical and contextual competencies	3
1	PM methodology	4
3	Organisational structure	5
5	Informatisation	6
7	Behavioural competencies	7

5. Overall Conclusions, Limitations, and Future Research

This research aimed to develop a tool for Portuguese renovation and remodelling PBFs to assess and enhance their PM capabilities and deliver more successful future projects.

Documental research took place and concluded with three specific terms:

- First, a categorisation that best fits these organisations and their projects. By that, it pointed to the “Craft PBFs” category proposed by Whitley [29];
- Second, a project success definition for these specific projects. The documental research pointed to the definition proposed by Archibald and Prado [5];
- Third, the critical factors that enhance or undermine a PMMM to assess these specific organisations. They were found over some conclusions made by the following authors: Backlund et al. [17]; Guangshe et al. [18]; Sarshar et al. [19]; Santos et al. [9]; and Khoshgoftar and Osman [64].

Qualitative research was performed through a semi-structured questionnaire and content analysis to confirm these conclusions. Qualitative research findings pointed to a 50% match with the “Craft PBFs” category. The documental research identified an almost perfect match with the project success definition. Because of these findings, the researchers concluded that the MMGP-Prado was not an ideal fit to assess PM capabilities of Portuguese renovation and remodelling PBFs. Those were the reasons behind developing a new model by adapting the MMGP-Prado point system to fit the Portuguese renovation and remodelling PBFs assessment needs.

This work showed that it is possible to assess the PMM of those organisations through this new model, although some limitations have arisen; the MMGP-Prado has a significant limitation. It is possible to attain levels 4 and 5 only after 24 months of consolidated and active PMMM practices. We disagree because simply hiring an experienced resource will bring immediate cumulative experience, severely impacting the organisation’s performance from the start or in a short time. Additionally, the third edition of the MMGP-Prado questionnaire did not relate to procurement or communications knowledge areas. These areas are essential for these organisations because of their direct relationship with their multidisciplinary nature. Furthermore, the subsequent need to efficiently manage this element strongly impacts the “speed of execution” (referring to the above third edition); the “behavioural competencies” dimension does not have much relevance within the model. This research strongly indicated this dimension as the third most relevant to assess these PBFs.

In terms of limitations, the fact that the researchers could not find information about the vast majority of the PMMM identified may have conditioned the outcomes of this research. Another limitation was related to the interviewees showing a certain degree of unfamiliarity with PMMMs. It is important to highlight that most interviewees have accumulated skills and technical knowledge in engineering to the detriment of management. In addition, it is essential to mention the exploratory nature of this research. This work’s

findings need confirmation through more direct and structured interviews and fieldwork, although some key elements were identified here.

In future work, developing a new questionnaire should consider that project success is mainly profitable for these organisations. Because of that, the researcher must adapt the language accordingly.

This research clearly showed budgeting as a critical process for these organisations' business models and a strategic means to conduct business.

Additionally, the experience was referred to time and again by the interviewees: experience in budgeting; experience in implementing solutions; resource experience; experience in a strategic sense (cost of opportunity on budgeting—which projects to win or not). This mentioned experience is tacit knowledge, which is difficult to transfer, and considered of utmost importance for construction project success, as found in the literature review. These research findings strongly support this concept and those conclusions. Furthermore, these terms quickly fall under the determination of the economy of experience. Similar to the term economy of scale, this means that with more experience comes the execution of tasks more quickly, better, and more efficiently. It means that the organisation will be more mature and, therefore, more efficient in terms of PM.

Finally, this research is of great scientific value because it is among the few that studied PMMM on the specific segment of renovation and remodelling construction companies. Organisations that are typically small in size are not targeted for research. Usually, only big construction projects or multinational construction companies are frequently targeted for study, so this article brings novelty and overall, opens a precedent.

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Appendix A

Table A1. Comparison table for the 32 identified PMMM.

Maturity Model	Model Structure		Maturity Assessment Method				Model Help and Support		
	N° of Levels	Maturity Definition	Assessment Cost	Weaknesses and Strengths Identification	Continuous Assessment	Improvement Opportunities Prioritisation	Authors Availability	Iterations or Version Continuity	
1 ISO/IEC 15504	6	Yes	High	Yes	Yes	Yes	High	Yes	
2 CMMI—SEI	5	Yes	High	Yes	Yes	Yes	High	Yes	
3 Model-driven Development (MDD)	5	No	?	Yes	?	?	Low	No	✓
4 Metrics Based Verification and Validation Maturity Model (MB-V2M2)	5	No	?	Yes	?	?	Low	No	
5 Documentation Process Maturity Model	4	No	?	No	No	?	Low	No	
6 Business Process Maturity Model (BPMM)	5	No	?	Yes	?	?	Low	No	
7 OMG Business Process Maturity Model	5	No	Medium	Yes	Yes	?	Medium	No	
8 Gartner BPM Maturity Model	6	No	Low	Yes	?	?	Medium	No	
9 Group IT Controlling (GITC) Maturity Model	6	No	?	No	?	?	Medium	No	
10 IT Capability Model Framework (IT-CMF)	5	Yes	High	Yes	Yes	Yes	High	Yes	
11 Business-IT Alignment Maturity Model	5	No	?	No	?	?	Medium	No	
12 The IT Service CMM	5	No	?	No	?	?	Medium	No	
13 Records Management Maturity Model	5	No	?	No	?	?	Medium	No	
14 Gartner Enterprise Information Management Maturity Model	5	No	?	No	?	?	Low	No	
15 Research Data Management (RDM) Maturity Model	5	No	?	Yes	?	?	Low	No	
16 Enterprise Content Management (ECM) Maturity Model	5	No	?	No	No	?	Low	No	
17 Digital Asset Management (DAM) Maturity Model	4	No	?	No	No	No	Low	No	
18 Asset Management Maturity Model	6	No	Low	Yes	Yes	?	Medium	No	
19 Risk Maturity Model	4	No	?	No	No	No	Low	No	
20 COBIT Maturity Model	6	Yes	High	Yes	Yes	Yes	High	Yes	
21 Information Governance Maturity Model	5	No	Medium	Yes	Yes	?	High	No	
22 Stanford Data Governance Maturity Model	5	No	?	Yes	?	?	Medium	No	
23 OPM3 (PMI)	-	Yes	Low	Yes	Yes	Yes (medium)	High	Yes	✓
24 P3M3 (OGC)	5	Yes	High	?	?	Yes (low)	High	Yes	✓
25 Prince2 Maturity Model (P2MM—OGC)	5 (autor refere 3)	Yes (medium)	High	?	?	Yes (low)	High	Yes	✓
26 PMMM (Kerzner)	5	Yes (medium)	Low	Yes	Yes	Yes (medium)	High	Yes	✓
27 PM2 (Berkeley)	5	Yes (medium)	High	Yes	Yes	?	Low	?	✓
28 PMMM (Anderson)	-	Yes (medium)	Medium	Yes	Yes	Yes (medium)	No	No	
29 FAA-CMM (SEI)	5	Yes (medium)	Medium	Yes	Yes	Yes (medium)	Medium	Yes	✓
30 SPICE	5	Yes (medium)	Medium	Yes	Yes	Yes (medium)	Medium	Yes	✓
31 PMS—PMMM	5	No	?	No	Yes	Yes (low)	?	?	✓
32 MMGP—Prado	5	Yes	Low	Yes	Yes	Yes (low)	Low	?	✓

Legenda:		Proenga & Borbinha (2016) [68]		✓	C—Article theme is construction project management
		Khoshgofar & Osman (2009) [64]			
		Carvalho et al. (2005) [69]			
		C—Backlund et al. (2014) [17]			
		C—Guangshe et al. (2008) [18]			
		Prado (2012) [65]			
		C—Sarshar et al. (1999) [19]			
		C—Santos et al. (2019) [9]			
		Pinto (2013) [70]			
		Berssaneti & Carvalho (2015) [71]			
		Hilson (2003) [72]			
		C—Dragon Jr & Ghobril (2020) [21]			
		C—Neto et al. (2019) [20]			
		C—Kwak et al. (2015) [22]			

Table A2. Comparison table of identified maturity models applied to construction.

Variable\Model	OPM3	P3M3	MMGP-Prado	SPICE
Underlying Standard	PMBok 6	PRINCE2	PMBok 5, PRINCE2 e ICB	PMBok 1
Rating type	4 levels measured in %	5 levels	5 levels measured in points	5 levels
Key areas of action	Methodologies, resources, help/support, strategic alignment, and organisational knowledge	Control management, beneficial management, financial management, stakeholders management, risk management, organisational management, resource management	Technical and contextual competencies, PM methodology, computerisation, organizational structure, behavioural competencies, PM competencies, and strategic alignment	Repeatable requirements management, organisational focus processes definition, quantitative management processes acquisition, and defects prevention optimisation
Strategic alignment	Yes	-	Yes	-
Organisational culture	No	-	Yes	-
Applicability and usability	Medium	-	Simple	-
Continuous improvement	Yes	-	Yes	-

Table A3. Documental research conclusions summary.

Dimensions (Prado, 2012) [65]	Success Metrics (Archibald & Prado, 2015) [5]	Projects and PBF Characteristics (Whitley, 2004) [29]
Technical and contextual competencies	Customer satisfaction	Multiple projects
PM Methodology	Financial result	Incremental innovation
Computerisation	Zero accidents and zero technical/judicial/labour pendencies	Stable, reliable and specialized workforce
Organisational structure	Schedule	Low singularity
Behavioural competencies	Cost	Short term projects
PM competencies	Scope	Cumulative learning
Strategic alignment		Low client involvement
		Present solutions in short period of time

Table A4. Conceptual map of the interview script.

Question	Justification
1 How did your relationship with the construction sector begin? 2 Can you give me an insight into how your career in this sector has gone so far?	<i>Interviewee characterisation questions</i>
3 Of the construction organisations you have passed through, how did they manage their projects?	<i>Project management methodologies:</i> (Carvalho et al., 2005; Frame, 1999; ISO, 2017; Miklosik, 2015; PMBOK® Guide—Sixth Edition, 2017) [43,66,67,69,73]
4 Construction companies are considered “Industries of Origin” in terms of their PBF classification, and as such it is expected that they are better adapted to implement a project management methodology. From your experience in the sector and specifically in the national market, do you agree with this statement?	<i>PBF characterization:</i> (Archibald, 2013; Canonico & Söderlund, 2010; Chen et al., 2019; Cooke-Davies & Arzymanow, 2003; Gareis & Huemann, 2000; Lindkvist, 2004; Miterev et al., 2017; Pretorius et al., 2012; Söderlund, 2014; Turner, 2007; Whitley, 2004) [2–4,24–31]
5 The construction sector can be divided into several segments. As you know the segment with importance for the study is renovation and remodelling. What do you know about this segment? 6 How do you consider the renovation and remodelling segment to be similar and different compared to the other segments?	<i>Renovation and remodelling segment:</i> (AICCOPN, 2019, 2020, 2022; Cruz et al., 2019; DGOTDU, 2004) [11–14,74]
7 The notion of success is of paramount importance to this study. For you, what does success of the management of renovation and remodelling projects mean?	<i>Construction project success:</i> (Archibald & Prado, 2015; Atkinson, 1999; Chen et al., 2019; Collyer & Warren, 2009; Cooke-Davies, 2002; Love & Josephson, 2004; Munns & Bjeirmi, 1996; Murray & Chapman, 2003; PMBOK® Guide—Sixth Edition, 2017; Pollack et al., 2018; Ram, 2019; P. Serrador & Turner, 2014; Shenhar et al., 1997; Shenhar & Dvir, 2007; Thomas et al., 2008; Turner & Zolan, 2012; Williams et al., 2015) [1,2,5,35–46,75,76]
8 You have been part of or led construction projects that have been considered as a success or partial success or certainly failure. What are the main reasons you give for considering that a construction project can be considered a success?	<i>Relationship between success and PMMM:</i> (Bresner & Hobbs, 2013; Christoph & Konrad, 2014; Cooke-Davies & Arzymanow, 2003; Grant & Pennypacker, 2006; Grobler & Steyn, 2006; Ibbs et al., 2007; Jugdev & Thomas, 2002; Kerzner, 2016; Labuschagne et al., 2008; Mullaly, 2006; Mullaly & Thomas, 2010; Nieto-Rodriguez & Evrard, 2004; Prado, 2016; Prado et al., 2013; Santos et al., 2019; Sonnekus & Labuschagne, 2004; Sukhoo et al., 2005; Yazici, 2010) [3,6,9,47,49,50,52,53,55–58,60,61,63,77,78]
9 As you know, the subject of this dissertation focuses on the application of project management maturity models in renovation and remodelling companies. One of the propositions about PMMMs is that the higher the level of maturity, the higher the probability to conclude projects successfully. From your experience, do you agree with this statement?	<i>PM Maturity Models:</i> (Andersen & Jessen, 2003; Archibald & Prado, 2015; Backlund et al., 2014; Berssaneti & Carvalho, 2015; Carvalho et al., 2005, 2000; Christoph & Konrad, 2014; Crosby, 1979; Gareis & Huemann, 2000; Guangshe et al., 2008; Hillson, 2003; Humphrey, 1989; Kerzner, 2016; Khoshgoftar & Osman, 2009; Mullaly, 2006; OPM3®—Third Edition, 2013; Pinto, 2013; Pinto & Williams, 2013; PMBOK® Guide—Sixth Edition, 2017; Prado, 2012; Pretorius et al., 2012; Proença & Borbinha, 2016; Santos et al., 2019; Sarshar et al., 1999; SEI—Software Engineering Institute, 2006) [4,5,9,17–19,28,43,55,62,64,65,68–72,77,79–85]
10 What do you know about maturity models? What about maturity models in project management? What about project management maturity models applied to construction companies? What about PMMM in renovation and remodelling PBFs?	<i>PM Maturity Models:</i> (Andersen & Jessen, 2003; Archibald & Prado, 2015; Backlund et al., 2014; Berssaneti & Carvalho, 2015; Carvalho et al., 2005, 2000; Christoph & Konrad, 2014; Crosby, 1979; Gareis & Huemann, 2000; Guangshe et al., 2008; Hillson, 2003; Humphrey, 1989; Kerzner, 2016; Khoshgoftar & Osman, 2009; Mullaly, 2006; OPM3®—Third Edition, 2013; Pinto, 2013; Pinto & Williams, 2013; PMBOK® Guide—Sixth Edition, 2017; Prado, 2012; Pretorius et al., 2012; Proença & Borbinha, 2016; Santos et al., 2019; Sarshar et al., 1999; SEI—Software Engineering Institute, 2006) [4,5,9,17–19,28,43,55,62,64,65,68–72,77,79–85]

Table A4. Cont.

Question	Justification
11 What do you think are the ideal characteristics for a renovation and remodelling PBF to be able to undertake a project management maturity assessment?	<i>Association of PBF competencies with maturity assessment:</i> (Archibald, 2013; Backlund et al., 2014; Guangshe et al., 2008; Santos et al., 2019; Sarshar et al., 1999) [9,17–19,30]
12 E no seu entendimento quais serão as características que um modelo de maturidade em gestão de projetos deve ter para conseguir avaliar a maturidade das empresas de reabilitação e remodelação?	
13 PMMMs have been included in the management practices of many PBFs. However, this does not cut across all sectors of the economy. In particular, the construction sector, which is composed exclusively of source industries, PBF per excellence, and one of the sectors with the highest number of associated members of project managers associations worldwide, which is a sector that at the outset would greatly benefit from its implementation, is one of the sectors with lower effectiveness in the application of PMMMs. The literature review pointed to contingency factors for PMMM application in construction companies and I would like to know your opinion about each of them: The organisational culture; The adaptability of the model to the specificities of the specific case, be it a project, a portfolio or an organisation, in terms of size, financial status and business model; The non-use of a PM methodology transversal to the whole organisation; The PM competences being concentrated in a manager and not in a team; The high degree of engineering competences; The need to have PM practice in order to be able to carry out PMM assessments; The costs associated to implementation; The difficulty in implementation; The difficulty in interpretation; The inconsistency in continuity between versions; The difficulty in obtaining adequate training. The literature review pointed to enhancing factors for the application of PMMM in construction companies and I would like to know your opinion about each of them: Online and free tool for application and analysis of the model; Sectorial approach of the model that can be applied in isolated sectors, which provides a more detailed action plan; Corporate approach that comprises a more global aspect, which includes the company as a whole, which promotes a more robust result; Tool that enables effective improvements in the organizational context; Tool that provides an organizational structure for projects; Tool that promotes: effective participation of the project team; use of information systems; use of PM tools and techniques; strategic alignment to project management.	<i>Validation of contingencies and enhancing factors:</i> (Backlund et al., 2014; Guangshe et al., 2008; Khoshgoftar & Osman, 2009; Santos et al., 2019; Sarshar et al., 1999) [9,17–19,64]
14	<i>Closing interview questions</i>
15 The construction sector in Portugal, even in these times of pandemic crisis, has shown itself to be strong and capable. In your opinion, how will the sector develop in the near future?	
16 What do you see as the role of PM and PMMM in this development?	

Table A5. Saturation matrix.

Categories	Respondent A	Respondent B	Respondent C	Respondent D	Respondent E
Recommendation	x	x	x		x
Difficulty of implementation	x		x	x	x
Team relationship	x		x		x
Versatile workforce	x		x	x	x
Speed of execution	x	x	x	x	x
Execution project	x	x	x	x	x
Multidisciplinarity	x	x	x		x
Lack of PM competencies	x	x	x		
Renovation cost Vs. New works cost	x	x		x	
High degree of engineering skills	x	x	x	x	
Adaptability of the model	x		x	x	x
Profit	x	x	x	x	x
PM competencies concentrated in a single manager	x	x	x	x	x
Relationship between experience and maturity	x	x		x	
Targeted solutions	x	x	x		x
Lack of information about PMMM	x	x	x	x	x
Lack of information about PM	x	x	x	x	x
Project singularity	x	x	x		
Imponderables	x	x	x	x	x
Executing entity business model	x	x	x	x	x
Experience	x	x	x	x	x
Planning	x	x	x		x
Budgeting	x	x	x	x	x
Sectorial approach	x		x		
Free online tool	x		x	x	
Promotes the active participation of the project team	x		x	x	
Compliance with the specifications	x	x	x	x	
Need for PM practice	x	x	x	x	x
Non-use of a PM methodology transversal to the organisation	x	x	x	x	x
Flexibility of the executing entity	x		x		x
Recognition	x				x
ERU—exceptional regulation for urban regeneration	x	x			
Difficulty of interpretation	x		x	x	x
Promotes the use of PM tools and techniques	x			x	
Promotes strategic alignment to project management	x		x	x	
Construction size	x	x	x		x
Financial amount	x	x	x	x	x
Organisational culture	x		x	x	
Promotes the use of information systems	x		x	x	
Team availability	x		x		x
Critical path management	x	x	x		
Customer follow-up	x	x			x
Limited work accessibility	x	x	x		x
Difficulty in obtaining training	x	x	x	x	x
Implementation costs	x	x	x	x	x
Customer satisfaction	x	x		x	x
Quality		x	x	x	x
Deadline compliance		x	x	x	x
More assertive solutions		x	x		
Employer type		x	x		
Full or partial execution of the scope		x			x
Approach to the works		x		x	x
Executive board management skills			x	x	
Inconsistencies between versions			x	x	
Adaptability of PM to the property development segment			x		x
Corporate approach			x		
Enables effective improvements in the organisational context			x		
Top management commitment			x		
definition of a renovation and remodelling project			x		
Promotes a project organisational structure			x		
Executing entity manage multiple projects simultaneously					x
Little room for negotiation with suppliers					x
N° of categories	46	52	60	60	62
New categories per interview	46	6	8	0	2
% of saturation for determining the base		11.54%	13.33%	0.00%	3.23%

Table A6. Overview on the progression of categories.

Initial	Intermediate	Final
Imponderables		1st Research Question: What are the characteristics of a renovation and remodelling project?
Experience		
Financial amount		
Executing entity business model		
Speed of execution		
Execution project		
Budgeting		
Planning		
Construction size		
Multidisciplinarity		
Targeted solutions		
Versatile workforce		
Project singularity		
Recommendation		
Customer follow-up		
Team relationship		
Flexibility of the executing entity		
Team availability		
Renovation cost Vs. New works cost		
Critical path management		
Approach to the works		
Employer type		
RERU—exceptional regulation for urban regeneration		
Executing entity manage multiple projects simultaneously		
Little room for negotiation with suppliers		
Limited work accessibility		
definition of a renovation and remodelling project		
Profit		
Deadline compliance	3rd Research Question: What factors affect the implementation of project management maturity models in renovation and remodelling projects?	
Quality		
Compliance with the specifications		
Customer satisfaction		
Recognition		
More assertive solutions		
Full or partial execution of the scope		
Implementation costs		
Non-use of a PM methodology transversal to the organisation		
PM competencies concentrated in a single manager		
Difficulty in obtaining training	Contingency factors	
Need for PM practice		
Organisational culture		
High degree of engineering skills		
Difficulty of implementation		
Difficulty of interpretation		
Adaptability of the model		
Inconsistencies between versions		
Free online tool		
Promotes the active participation of the project team		Enhancing factors
Promotes strategic alignment to project management		
Promotes the use of information systems		
Sectorial approach		
Promotes the use of PM tools and techniques		
Corporate approach		
Enables effective improvements in the organisational context		
Promotes a project organisational structure		

Table A6. Cont.

Initial	Intermediate	Final
Lack of information about PMMM		Categories identified by inductive categorisation: subject matter considered relevant
Lack of information about PM		
Lack of PM competencies		
Adaptability of PM to the property development segment		
Relationship between experience and maturity		
Executive board management skills		
Top management commitment		

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