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MODELING OF CUSTOMER-ORIENTED CONSTRUCTION PROJECT MANAGEMENT USING THE GENDER LOGIC SYSTEMS

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Висвітлено специфіку фемінного та маскулінного контекстів управління потребами клієнтів в будівельному проекті. Описано існуючий гендерний когнітивний розрив стандартів управління проектами в частині окреслення місця і ролі клієнтів. Запропоновано гендерно-збалансовану модель клієнт-орієнтованої системи управління будівельними проектами. Розроблено оціночний інструмент для встановлення фази клієнт-орієнтованості системи управління будівельними проектами у життєвому циклі проекту

Ключові слова: управління проектами, будівельний проект, гендерний підхід, офіс управління проектами

Выявлена специфика феминного и маскулинного контекстов управления потребностями клиентов в строительном проекте. Описаны существующий гендерный когнитивный разрыв стандартов управления проектами в части определения места и роли клиентов. Предложена гендерно-сбалансированная модель клиент-ориентированной системы управления строительными проектами. Разработан оценочный инструмент для установления фазы клиент-ориентированности системы управления строительными проектами в жизненном цикле проекта.

Ключевые слова: управление проектами, строительный проект, гендерный подход, офис управления проектами

1. Introduction

It is known that projects in a competitive environment should be carried out at a higher level of customer service [1]. Many companies demonstrate an understanding that the greatest competitive advantage is that they know about their customers and how they use this data. Marketing strategies go beyond the traditional frameworks of working with target groups of clients in the present management. Appropriate strategies to strengthen the focus on the customer are developed (for example, Customer Relationship Management, CRM) [2]. In particular, it is a transition from a traditional one-way marketing communication model to a two-way, which engages its customers in a permanent dialogue. In this context, the issues of a multifaceted study of consumer behaviour of customers, including from the point of view of gender features of loyalty, are actualized [3].

It should be noted, it is extremely important to strengthen work with property buyers, respond to needs adequately, and moreover, exceed expectations (which is a sign of high service management) for construction projects. The production specifics of the construction "product", its resource intensity requires more expanded work with project users (clients) than the CMR proposes. After all, it should be about customer-oriented processes, tasks throughout the life cycle of projects, and not just certain marketing activities. But this vision is not yet available in the guidelines [4, 5] because these processes, tasks, tools, methods, focused on working with customers, are not represented in any way.

Such mainstreaming requires a "reconfiguration" of the project management system as a whole and it is possible on a

gender theoretical and methodological platform. The gender focus allows us to apply the feminine logic system, which "appreciates the exchange of information and energy, participatory decision making" [6]. However, the construction industry is traditionally insensitive to active horizontal links with the project environment due to its masculine nature of management [7].

So far, there are no corresponding effective tools, despite the general interest of construction companies in applying gender approaches to customer-oriented management processes. Existing methodologies do not sufficiently integrate the relevant parameters, both at the level of work of the project team, and the project system as a whole. This, in particular, explains the need for this study.

2. Literature review and problem statement

At present, the researchers propose management tools and methods focused on taking into account the customers' needs for products produced by various branches of the economy, including construction. In particular, the matrix for assessing the built ski resort infrastructure in terms of the needs of different categories/groups of users is presented in the paper [8]. In housing construction, attention is focused on taking into account the needs of such categories of residents as the elderly [9], children and adults who care for them [10]. Also, the issues of the gender sensitivity of the built objects, that is, the level of their comfort in terms of the specific needs of women and men of different categories of gender + (who perform different social roles, have different physical capabilities, etc.) are considered in the papers [11, 12]. However, the authors of these papers offer partial solutions for improving the management of construction projects only for the tasks "Identification of project stakeholders". The problem about the need to develop client-oriented processes beyond the parameters specified by the authors is not outlined.

On the other hand, the authors [13] propose to maximize the interaction with customers in construction projects: from the initiation of the project to commissioning of the object. Particular attention is drawn to the customers' evaluation of the built objects in terms of their performance characteristics. The issues of building object evaluation by users in the so-called operational period, including possible dissatisfaction with the obtained product, are discussed. This paper allows one to deepen the understanding of the role and specificity of interaction of the team of the construction project with customers throughout the life cycle, while offering rather limited theoretical solutions. It offers feedback tools to improve customer service. But they "hear the customer voice" only with regard to "building efficiency in operation". The task of developing appropriate assessment tools that make it possible to ensure the effectiveness of construction management (namely, for the formation of goals and the content of the project, design and execution of construction works) were left unattended by the authors.

Also, researchers consider the problem of construction project clients indirectly, through internal customers of construction projects (subcontractors, suppliers). The paper [14] shows that the evaluation of the effectiveness of the project processes "supply management" should be built both from the point of view of external and internal clients. An assessment of the effectiveness of the activities of suppliers and subcontractors is important for real estate buyers, because it allows them to evaluate the technical level of the created object. At the same time, suppliers and subcontractors, due to the assessment of their activities by customers, are able to improve their work. The model for assessing building project management in part of the contractor-client extends the methodological platform for developing a "customer care" strategy. Thus, in [15], a new logistics system for building project management "Customer Synchronized Resource Planning" is developed. However, to date, an extensive review of the literature on this issue has not revealed any system of evaluation in the client-supplier parameters for construction projects.

At the same time, CRM-solutions that integrate several processes (human resources management, change management, benchmarking) are proposed in the papers [16, 17]. This makes it possible to determine the degree of customer-oriented organizational management systems through the maturity model – CRM Maturity Model. However, uncertainty remains regarding the assessment of the maturity of a customer-oriented project management in general and construction in particular. Moreover, client-oriented management evaluation models that cover all business processes defined by international project management standards are not presented in the literature.

It should be noted that the necessary methodological condition for the development of integrated models of customer-oriented management of construction projects is the creation of a specific structure – Construction Project Management Office (CPMO). The papers [18, 19] noted that properly organized CPMOs can effectively manage all processes throughout the life cycle of the project, including managing customer needs. However, there is no special attention to the systematic use of customer-centric tools and methods in these papers, which are developed on the methodological platform "Guide to the Project Management Body of Knowledge" (PMBOK).

A peculiar methodological "blindness" in the customer needs management is explained by the authors [6, 20, 21] from the point of view of the existing "gender gap" in the logical system of project management "body of knowledge". Gender critique of the dominant system of project management, presented in these papers, has highlighted a certain logical limitation of hierarchical (masculine) management strategies, clearly focused on the parameters of cost, time, and resources. However, feminine (horizontal) management strategies are only generally identified as desirable in developing other important qualitative project management parameters (including evaluating project outcomes from the point of view of customer satisfaction). In the paper [22], a comprehensive discourse on the peculiarities of gender logic management systems is presented and a maturity evaluation matrix of the Gender-Oriented Project Management Office is developed. The authors attempted to extrapolate a gender perspective into all areas of project management knowledge. This made it possible to clearly highlight, in particular, the customer-oriented focus of the Office's specific functional characteristics at II-VIII maturity levels. At the same time, this gender interpretation of logical management systems requires further scientific and practical development in the direction for a specific industry context, including construction projects. The application of the cognitive potential of gender logical systems to create customer-oriented management models of construction projects is still outside the special attention of researchers.

3. The aim and objectives of the research

The aim of the research is to develop a solution for the customer-oriented evaluation of the construction project management system on the PMBOK Construction [5] methodological platform in the context of gender logic systems.

To achieve this goal, it is proposed to solve the following tasks:

– to investigate the gender cognitive gap in project management practices in terms of outlining the place and role of customers;

– to identify customer-oriented components of project management (tools and methods) in contextual parameters of feminine and masculine;

– to offer an evaluation tool for detecting the level of customer-oriented construction project management system (for example, the Construction Project Management Office, CPMO) at the phases of the project life cycle.

4. Customer-oriented project management: from masculinity to femininity

Project task management is traditionally organized taking into account the triple limit (time, resources and results). Today, incorporating the customer-user needs into the project system acquires special significance for the authority of the project manager. However, management processes are not sensitive to customers in PMBOK. The Guide is more fully filled with the concept of "stakeholders", which often gives preference to such groups as a sponsor. As for PMBOK Construction [5], it contains additional processes, implying the inclusion of customer, besides basic project management processes. First of all, it is "complaints management in construction".

A more detailed analysis of the process of "complaints management in construction" showed that it mainly deals with different groups of stakeholders (suppliers, subcontractors, etc.) [5], but not customers. It is important to identify customer complaints to the developer in dealing with claims (regarding compliance with the construction terms of the object, as well as the cost and quality parameters (subject of the contract), etc.). There are also widespread "pretentious issues", such as:

– the compliance with the warranty terms of the quality of work performed by the developer;

– the actual deviation from the planned space-planning decisions; the obligatory finishing works and engineering equipment, etc.

In current critique of project management approaches, issues about the need to rethink the parameters of project success beyond "The Iron Triangle" (time, cost and quality) are raised. The project time and cost are assumptions in most cases, since they are calculated at a time when the least is known about the project. A clear example of this can be construction projects. So, the state of progress of housing construction projects in the Ukrainian capital Kyiv as successful housing projects can be illustrated by such a fact. The percentage of unsold apartments after the commissioning of construction projects was about 10 % in 2015 and approximately 30 % in 2017. All apartments in new buildings can be sold for 28 years at the current pace of transactions [23]. The emphasis is on "creating product value for both the project team and stakeholders" [25], represented by the following types: asset values, innovation values, property values, and intellectual property values [26].

Current critics of managerial approaches emphasize the need to go beyond the frame of "The Iron Triangle" and cover such areas as social consequences, health, safety and ethical issues [24]. In particular, it is about expanding the understanding of the value generated by the project, as presented by the Japanese Manual (P2M). The emphasis is on "creating the product value, both for the project team and for stakeholders" [25], which is represented by the following types: "asset values", "innovation values", "property values", "intellectual asset values" [26]. For example, different stakeholder groups (depending on the place and role in the project) can bring the "intellectual asset values" (knowledge gained through experience and research). Today, the facts that show how customer participation in decision-making processes makes more effective and more sustainable project results become more and more evident.

According to the experts, PMBOK shows certain conservatism in relation to new trends in management. The gendered critique of PMBOK evaluates the "body of knowledge" of project management as a masculine system of values and logical thinking [27]. The concept of masculinity is outlined by such features as appreciating hierarchical power, analytical and impersonal problem-solving. Project managers strive for strong control over people and processes, and double efforts to prevent the appearance of project "risks" that lead to deviations from the original project specification [20].

A detailed analysis of the tools and methods that are defined by the PMBOK for management output processes ("Drafting of the Project Statute", "Develop Project Charter", "Develop Project Management Plan") do not contain a clearly defined customer-oriented strategy. PMBOK more fully operates with the concept of stakeholders, which is often referred to as a "significant group" – the sponsor/investor. The PMBOK logical system can be defined as masculine, taking into account this context, as well as its general orientation on management within "the iron triangle". The consequence of such a cognitive one-sidedness of the project management system is often "erroneous improvement efforts" that do not improve customer satisfaction with the project's product [28].

It is clear that managerial processes should include greater customer participation in such a situation. And this means that projects require a "reconfiguration" of the management system on the project team's communication with customers, which is designated in terms of gender theory as "feminine sense-making". The existing gender gap in the theoretical and methodological platform PMBOK encourages the search for solutions that can balance the two logical systems of thinking and behaviour of project managers.

5. Development of a gender-balanced model for evaluating a customer-oriented construction project management system

The gender approach to project management points to the methodological need to expand the customer's involvement in managerial processes, and thereby outline the feminine management tools and methods. For this purpose, the relevant matrix (Table 1) is developed. It includes an

analytical toolkit for customer needs management, which deepens the integration of participative [29] (feminine) management in the "knowledge body" of PMBOK. The matrix is designed based on the overall architecture of project management processes (Fig. 3–1 Mapping of Project Management Processes and Construction Management Processes to the Process Group and Knowledge Areas, PMBOK Construction) by adding the appropriate tools and methods, providing the work with customers. Drawing up customer-sensitive architectonics of the construction project management processes revealed a low level of customer articulation. PMBOK and PMBOK Construction operate mainly by the general term "stakeholders" (these are individuals or organizations that actively participate in the project, or whose interests may affect the results of the execution or completion of the project). Thus, the hypothesis about the masculine character of the "body of knowledge" of PMBOK was confirmed. The customer-oriented components of the characteristics of the corresponding processes were formulated by further extrapolation of the feminine logic system on the matrix of customer-sensitive construction project management processes.

The proposed gender focus of customer-oriented construction project management gives an idea of how to use feminine and masculine cognitive styles in the team's work on all phases of the project. In particular, the customer participation at the planning stage (consultations of the project team with clients) allows determining the characteristics of the construction object, design of the adjacent territory, architectural and planning solutions of the surrounding landscape.

The gender focus of the customer-centric approach in the construction project management can be applied not only at the level of cognitive systems, but also at the level of identifying the customer needs in terms of gender roles. For example, a father (customer) and his wife, children (users) are identified in the housing projects for the traditional family. Information about different gender groups of customers and users may be presented as a separate "customers need matrix" [10] in "Plan Stakeholder Engagement" and "Manage Stakeholder Engagement" processes.

Table 1

Evaluation of customer-oriented construction project management processes in the parameters of feminine and masculine logic systems

Construction Project Management Knowledge Areas	Tools & Techniques	Characteristics of customer-oriented construction project management processes
1	2	3
I phase – "INITIATING"		
1. Develop Project Charter	1.1. Expert judgment	*applied to all technical and management details during this process and presented by: consultants, ..., stakeholders, including customers or/**and** sponsors*
	1.2. Data gathering	*utilized techniques ("facilitation techniques"): – brainstorming – identifies a list of ideas ... **(with the involvement of customers)**; – focus groups – bring together stakeholders **(including customers)** and subject matter experts ... to learn about the perceived project risks and success criteria; – interviews – obtain information on high-level requirements, ... from stakeholders, **including customers***
	1.3. Meetings	*They are held with key stakeholders **(including customers)** to identify the project objectives, success criteria, key deliverables, ..., "**use values**"* [25]
2. Identify Stakeholders	2.1. Expert judgment	*ensures comprehensive identification and listing of stakeholders **(including customers)** from: senior management, ..., **gender experts, experts in gender urban and universal design***
	2.2. Data gathering	similarly to p. 1.2
	2.3. Data analysis	*stakeholder analysis* **(including customers)** *is carried out by developing a list of stakeholders **(including customers)** and relevant information ..., definition of the role and place in the project, expectations*
	2.4. Data representation	*in the form of "matrix of power/interests of stakeholders to the project" **(including customers)***
	2.5. Meetings	*designed to develop an understanding of major project stakeholders **(in particular customers)**, as well as positions in the project*
II phase – "PLANNING"		
3. Develop Project Management Plan	3.1. Expert judgment	utilized to: *– tailor the process to meet the project needs **(including customers)**; – develop technical and management details **(including customer information)** to be included in the project management plan*
	3.2. Data gathering	*utilized techniques ("facilitation techniques"): – brainstorming – identifies a list of ideas and solutions ... **(with the involvement of customers)**; – focus groups – bring together stakeholders **(including customers)** and subject matter experts ... to discuss the approach to project management; – interviews – obtain specific information from stakeholders **(including customers)** to develop a project management plan*
	3.3. Meetings	*The project kick-off meeting is very specific to explain the roles and responsibilities of each stakeholder **(including customers)***

Continuation of Table 1

1	2	3
4. Plan Scope Management	4.1. Expert judgment	*project scope management is used to take into account the requirements of all stakeholders* ***(including customers)****, may be provided by: top-management, ...,* ***experts in gender urban and universal design, customers***
	4.2. Data analysis	*alternatives evaluation is done by collecting and eliciting the requirements of stakeholders* ***(including customers)****, elaborating a* ***customer-oriented*** *project, ...*
	4.3. Meetings	*may include the project stakeholders* ***(including with the attraction of customers)***
5. Collect Requirements	5.1. Expert judgment	*is used to identify and analyze the requirements of stakeholders* ***(including customers)****, ...*
	5.2. Data gathering	similarly to p. 1.2, p. 2.2.
	5.3. Decision making	*carried out on the basis of multi-criteria decision making* ***(including the criteria "use values")****.* *Among the set of criteria, preference is given to* ***those that are important to customers***
	5.4. Data Representation	is used in the form of: *– affinity diagram: the stakeholders* ***(including customers)*** *identify a large number of ideas and similar ideas are grouped together;* *– mind mapping: the stakeholders* ***(including customers)*** *identify a large number of ideas through the process of backtracking*
	5.5. Context diagram	*visually depicts how stakeholders* ***(including customers)*** *will interact with the construction object (construction project product)*
	5.6. Prototypes	*by visualizing* ***(creating a working 3D model) of the construction object*** *allows you to get previous references from stakeholders* ***(including customers)***
6. Define Scope 7. Create WBS 8. Plan Quality Management 9. Plan Resource Management 10. Estimate Acquire Resources 11. Plan Communications Management 12. Plan Risk Management 13. Identify Risks 14. Perform Qualitative Risk Analysis 15. Perform Quantitative Risk Analysis 16. Plan Risk Responses		
17. Plan Stakeholder Engagement	17.1. Expert judgment	*applied for deciding upon the level of engagement required at each stage of the project from each stakeholder* ***(including customers)****, may be provided by: top-management, ...,* ***gender experts, experts in gender urban and universal design, representatives of key customer groups***
	17.2. Data analysis	*can be presented in the form of "matrix of estimation of participation of stakeholders* ***(including customers)****"*
	17.3. Decision making	*may involve technologies, processes of the* ***attraction of customers***
	17.4. Data representation	*can be applied in the form of "stakeholder engagement assessment matrix",* ***"matrix of customer needs of the construction project"*** [10], ***special GIS-visualization*** [30]
	17.5. Meetings	*experts* ***(including representatives of customers)*** *and the project team to define the required engagement levels of all stakeholders* ***(in particular customers)*** *throughout the life cycle of the project*
18. Safety Planning 19. Environmental planning		
20. Claim Identification	20.1. Contract terms	*The contract describes the conditions for changes and information about them.* ***The text of the contract documentation provides the fullest possible list of possible claims of customers***
	20.2. Expert judgement	*is used to achieve a consensus on the resolution of the claim. If necessary, lawyers, ...,* ***experts in gender urban and universal design*** *are involved*
21. Claim Quantification		
III phase – "EXECUTING"		
22. Direct and Manage Project Work	22.1. Expert judgment	*is used to assess the inputs needed ..., which is realized by: units within the organization; ...,* ***gender experts, experts in gender urban and universal design****; stakeholders,* ***including customers****, suppliers, or sponsors...*
	22.2. Project management information system	*Automated gathering and reporting on key performance indicators (KPI) and* ***automated gathering, storage and analysis of customer information (CRM)*** *can be part of the project management information system*
	22.3. Meetings	*to discuss and address pertinent topics of the project when directing and managing project work, may include the appropriate stakeholders* ***(including customers)****, which perform certain roles in the project*

Continuation of Table 1

1	2	3
23. Manage Project Knowledge	23.1. Expert judgment	*is used to manage knowledge ..., carried out with the involvement of specialists,* ***gender experts, experts in gender urban and universal design***
	23.2. Knowledge management	*integrates team members knowledge, ...,* ***gender experts, experts in gender urban and universal design, customer****.* ***Knowledge of customer information can be presented in case-staty, document templates, special module of information management system (for example, CRM-module)***
	23.3. Information management	*is used as a single information platform to support communication between all project stakeholders* ***(including gender experts, experts in gender urban and universal design, customers)***
24. Monitor and Control Project Work	24.1. Expert judgment	*is used by the project management team to interpret the information provided by the monitor and control processes and implemented by: project manager, in collaboration with the team and* ***gender experts, experts in gender urban and universal design, customers***
	24.2. Data analysis	*provides alternatives analysis for determining the differences (or variances) between planned and actual performance, "****use values****"*
	24.3. Meetings	*conducted with the involvement of stakeholders* ***(including customers)***
25. Perform Integrated Change Control	25.1. Expert judgment	*is used to summarize the experience of change management and implemented by: consuls tants, stakeholders* ***(including customers)****,* ***gender experts, experts in gender urban and universal design***
	25.2. Change control tools	*selection should be based on the needs of the project stakeholders* ***(including customers)*** *and used to manage the change requests and the resulting decisions*
	25.3. Meetings	*for controlling changes in the design of the project, the effectiveness of the results (*"***use values***"*) are conducted with the involvement of stakeholders* ***(including customers)***
26. Validate Scope 27. Control Scope 28. Manage Quality 29. Control Quality 30. Acquire Resources 31. Develop Team 32. Manage Team 33. Control Resources 34. Manage Communications 35. Monitor Communications 36. Implement Risk Responses 37. Monitor Risks		
38. Manage Stakeholder Engagement	38.1. Expert judgment	*should be considered from ... characteristics of stakeholders* ***(including customers)****, stakeholder groups* ***(including, for example, gender-segregated customer groups)*** *and organizations ...*
	38.2. Ground rules	*set the expected behavior for project team members, as well as other stakeholders* ***(including customers)****, with regard to stakeholder engagement*
	38.3. Meetings	similarly to p. 17.5
	38.4. Data analysis	*similarly to p. 2.3, p. 17.2*
39. Safety Plan Execution 40. Environmental assurance 41. Environmental control 42. Claim Prevention		
IV phase – "CLOSING"		
43. Close Project or Phase	43.1. Expert judgment	*is applied when performing administrative closure activities and is carried out by: project management office, ...,* ***gender experts, experts in gender urban and universal design, customers***
	43.2. Data analysis	*includes the analysis of the interrelationships between different project variables that contributed to the project outcomes, "****use values****" to improve performance on future projects*
	43.3. Meetings	*At the final meeting:* *– demonstration presentations of the construction site (architectural and planning decisions, engineering support, territory improvement, rules of operation);* *– approval of the received results, ..., acquired "****use values****"*
44. Administration and Reporting. Maintenance 45. Claim Resolution		

Conventions:
"They are held with key stakeholders ..." – parameters of the masculine logic system;
*"... **including customers** ..." – parameters of the feminine logic system*

The presented model can be the basis for further development of the method for evaluation of the level of customer-orientation of construction project management systems. Masculine and feminine characteristics of the tools for managing the customer needs in construction projects confirm the need to apply them in an iterative way throughout the project cycle. The characteristics of customer-orientation of the company-developer can be defined in the range: from "customer interest" (at the stage of initiation of the project) to "creating a loyal customer" (at the stage of project completion). The construction project management system, which is capable of implementing customer-oriented management processes, is presented in the form of the "Construction Project Management Office (CPMO)" [18, 19]. Further discussion of the results of modeling the customer-oriented evaluation of PMBOK is proposed for different phases of the project life cycle ("initiating", "planning", "executing", "closing").

6. Discussion of results of $CPMO_C$ customer-oriented assessment modeling

The $CPMO_C$ customer-oriented model allows you to measure the effectiveness of $CPMO_C$ and select strategies for transforming the system from the level of "customer search" to the level of "creating a loyal customer". Determination of $CPMO_C$ customer-oriented is based on an assessment of the level of requirements of the customer in the processes of managing construction projects (Table 1). The following rating scale is proposed: "0" – non-compliance with the criterion (no criterion); "1" – compliance with the criterion in full. The objective function describing the $CPMO_C$ customer-oriented takes the form of (1)–(10):

$$\Delta CPMO_C = \sum_{d=1}^{d'}\sum_{j=1}^{j'}\sum_{a=1}^{a'}\sum_{m=1}^{m'}\sum_{n=1}^{n'}\sum_{p=1}^{p'}\sum_{w=1}^{w'}\sum_{z=1}^{z'}\sum_{y}^{y'}\left(I_d+S_j+Q_a+R_m+C_n+K_p+H_q+T_z+L_y\right)\to \text{opt}, \quad (1)$$

$$I=\{I_1,I_2,...,I_d\},\ \ d=\overline{1;d'}, \quad (2)$$

$$S=\{S_1,S_2,...,S_j\},\ \ j=\overline{1;j'}, \quad (3)$$

$$Q=\{Q_1,Q_2,...,Q_a\},\ \ a=\overline{1;a'}, \quad (4)$$

$$R=\{R_1,R_2,...,R_m\},\ \ m=\overline{1;m'}, \quad (5)$$

$$C=\{C_1,C_2,...,C_n\},\ \ n=\overline{1;n'}, \quad (6)$$

$$K=\{K_1,K_2,...,K_p\},\ \ p=\overline{1;p'}, \quad (7)$$

$$H=\{H_1,H_2,...,H_w\},\ \ w=\overline{1;w'}, \quad (8)$$

$$T=\{T_1,T_2,...,T_z\},\ \ z=\overline{1;z'}, \quad (9)$$

$$L=\{L_1,L_2,...,L_y\},\ \ y=\overline{1;y'}, \quad (10)$$

where $CPMO_C$ – complex organizational and technical system of the customer-oriented construction project management office;

I_d – assessment of the customer-oriented construction project integration management, d – quantitative assessment of the customer-oriented construction project integration management capacity of $CPMO_C$, $d=\overline{d;d'}$, d' – expert's evaluation of the customer-oriented construction project integration management capacity of $CPMO_C$;

S_j – assessment of the customer-oriented construction project scope management, j – quantitative assessment of the customer-oriented construction project scope management capacity of $CPMO_C$, $j=\overline{j;j'}$, j' – expert's evaluation of the customer-oriented construction project scope management capacity of $CPMO_C$;

Q_a – assessment of the customer-oriented construction project quality management, a – quantitative assessment of the customer-oriented construction project quality management capacity of $CPMO_C$, $a=\overline{a;a'}$, a' – expert's evaluation of the customer-oriented construction project quality management capacity of $CPMO_C$;

R_m – assessment of the customer-oriented construction project resource management, m – quantitative assessment of the customer-oriented construction project resource management capacity of $CPMO_C$, $m=\overline{m;m'}$, m' – expert's evaluation of the customer-oriented construction project resource management capacity of $CPMO_C$;

C_n – assessment of the customer-oriented construction project communication management, n – quantitative assessment of the customer-oriented construction project communication management capacity of $CPMO_C$, $n=\overline{n;n'}$, n' – expert's evaluation of the customer-oriented construction project communication management capacity of $CPMO_C$;

K_p – assessment of the customer-oriented construction project risk management, p – quantitative assessment of the customer-oriented construction project risk management capacity of $CPMO_C$, $p=\overline{p;p'}$, p' – expert's evaluation of the customer-oriented construction project risk management capacity of $CPMO_C$;

H_w – assessment of the customer-oriented construction project stakeholder management, w – quantitative assessment of the customer-oriented construction project stakeholder management capacity of $CPMO_C$, $w=\overline{w;w'}$, w' – expert's evaluation of the customer-oriented construction project stakeholder management capacity of $CPMO_C$;

T_z – assessment of the customer-oriented construction project safety management and project environmental management, z – quantitative assessment of the customer-oriented construction project safety management and project environmental management capacity of $CPMO_C$, $z=\overline{z;z'}$, z' – expert's evaluation of the customer-oriented construction project safety management and project environmental management capacity of $CPMO_C$;

L_y – assessment of the customer-oriented construction project claim management; y – quantitative assessment of the customer-oriented construction project claim management capacity of $CPMO_C$, $y=\overline{y;y'}$, y' – expert's evaluation of the customer-oriented construction project claim management capacity of $CPMO_C$.

Restrictions of the objective function of $CPMO_C$ customer-oriented are shown in Table 2, and the mathematical model (1)–(10) takes the form:

$$\Delta CPMO_C = \sum_{d=1}^{d'}\sum_{j=1}^{j'}\sum_{a=1}^{a'}\sum_{m=1}^{m'}\sum_{n=1}^{n'}\sum_{p=1}^{p'}\sum_{w=1}^{w'}\sum_{z=1}^{z'}\sum_{y}^{y'}\left(I_d+S_j+Q_a+R_m+C_n+K_p+H_q+T_z+L_y\right),$$

$$\begin{cases} V_{\mathrm{I}} \in I \cup H, \\ V_{\mathrm{II}} \in I \cup S \cup Q \cup R \cup C \cup K \cup H \cup T \cup L, \\ V_{\mathrm{III}} \in I \cup S \cup Q \cup R \cup C \cup K \cup H \cup T \cup L, \\ V_{\mathrm{IV}} \in I \cup T \cup L. \end{cases} \quad (11)$$

Table 2

Restrictions of the objective function of customer-oriented $CPMO_C$

Construction project management processes	$CPMO_C$ project life cycle phases			
	"initiating" I	"planning" II	"executing" III	"closing" IV
Integration management (*processes: 1, 3, 22, 23, 24, 45, 43*), *I*	1	1	1	1
Scope management (*processes: 4, 5, 6, 7, 26, 27*), *S*	0	1	1	0
Quality management (*processes: 8, 28, 29*), *Q*	0	1	1	0
Resource management (*processes: 9,10, 30, 31, 32, 33*), *R*	0	1	1	0
Communication management (*processes: 11, 34*), *C*	0	1	1	0
Risk management (*processes: 12, 13, 14, 15, 16, 36, 37*), *K*	0	1	1	0
Stakeholder management (*processes: 2, 17, 38*), *H*	1	1	1	0
Safety management and Environmental management (*processes: 18, 19, 39, 40, 41, 44*), *T*	0	1	1	1
Claim management (*processes: 20, 21, 42, 45*), *L*	0	1	1	1

The path (trajectory) to development of $CPMO_C$ customer-oriented takes the form:

$$T \in M_{\mathrm{I}} \cup M_{\mathrm{II}} \cup M_{\mathrm{III}} \cup M_{\mathrm{IV}}. \quad (12)$$

The positive synergy of optimality of the state (phases) of customer-oriented $CPMO_C$ is defined by:

$$\mathrm{opt} \approx \frac{\partial CPMO_{Cx+1}}{\partial CPMO_{Cx}}, \quad (13)$$

where $CPMO_{Cx}$ – complex organizational and technical system of the construction project management office, which is at the x phase of customer-orientation; $CPMO_{Cx+1}$ – complex organizational and technical system of the construction project management office, which moved to the next (x+1) phase of customer-orientation.

The global criterion is considered as a "phase of customer-orientation" of $CPMO_C$ and defined by:

$$M_{CPMO_{Cx}} = \sum_{\forall_i} \alpha_i \times v_i, \quad (14)$$

where α_i – weighting factors, $i = \overline{1;9}$, 9 – number of construction project management knowledge areas (which integrate the customer requirements); $\forall_i$ – cum restrictions of the objective function of $CPMO_C$ customer-oriented (Table 2). Numerical values of weight coefficients are obtained by an expert method (for example, based on the method of analysis of the hierarchy).

In a situation where for one decision-maker (individual decision-making), the importance of integrating the customer-orientation in construction project management knowledge areas in the form of: α_I=0.15; α_S=0.13; α_Q=0.11; α_R=0.07; α_C=0.09; α_K=0.1; α_H=0.16; α_T=0.08; α_L=0.11 is determined, the overall result can be integrated as follows:

Phase 1 – customer interest (to hear his voice) (global criterion range [0;0.31]). $CPMO_C$ analyzes "its potential (real) customer": it identifies its inclusive features, requirements and concerns about the expected results and values of the construction object. At this phase (initiation of the project), the main role of $CPMO_C$ is to inspire the customer's trust and prove their ability to effectively implement the project and conclude an agreement on investing in construction.

Phase 2 – implementation of "individual customer requirements" in architectural and spatial, design and technical solutions (global criterion range [0;1]). $CPMO_C$ determines how "individual customer requirements" can be taken into account in project design estimates. Engineering and reengineering of planning processes for project management of the construction project are carried out. Creative solutions are arranged in an overall project management plan. The customer receives all necessary information on the planning of the construction project and is involved in the "approval of the final design decisions". Interaction and understanding of the Developer and the customer are enhanced. Decisions are made on a participatory basis (with the involvement or communication of the customer).

Phase 3 – customer-oriented execution of construction and installation work (global criterion range [0;1]). The $CPMO_C$'s potential is aimed at applying qualitative/effective approaches to tracking the customer-orientation of construction project management processes. $CPMO_C$ systematically applies knowledge/approaches/tools for customer-oriented construction project management. IT tools (information management system of projects, CRM-system), online services for communication "developer-customer" are actively used. The customer has access to the facility (subject to the appropriate instruction and safety rules). $CPMO_C$ pays a lot of attention to how a customer is involved in monitoring the work execution. The customer's evaluation is taken into account when registering acts of completed work and executive documentation.

Phase 4 – loyal customer of the company-developer (global criterion range [0;0.34]). $CPMO_C$ pays more attention to the correct generalization of the results, values of the construction project. IT tools, online services are actively used for public presentation of the results. The best experience in implementing customer-oriented processes for managing construction projects is documented

and used for benchmarking, dissemination and is included in the developer's knowledge base. $CPMO_C$ is characterized by the achievement of significant results in the customer-oriented management of construction projects (the positive experience of project implementation increases). Marketing of successful customer-oriented construction projects is important to support the motivation of all project groups and functional managers of the company-developer.

Developed $CPMO_C$ customer-oriented evaluation tools are important for improving the system of marketing, monitoring and analysis of customer-oriented construction project management. The application of the developed analytical tools will be useful in the project activity of companies-developers, as well as capital construction units of local self-government bodies, which carry out customer-sensitive construction projects and programs.

At the same time, the author's approach requires further scientific and practical development in the direction of working with specific data. Analytical reports on the functioning of $CPMO_C$ in construction companies in Ukraine, state regional administrations and local government should form an empirical basis for further research. It should be noted that currently in Ukraine there are several $CPMO_C$ within the framework of the project activity of international funds (UNOPS, GIZ, etc.). Creation of $CPMO_C$ in state structures and local government is in the initiation stage. Targeted programs for the construction, reconstruction, overhaul of infrastructure facilities, in particular, the State Target Program for the Construction of Affordable Housing in Ukraine, become the impetus for customer-oriented construction project management [31]. Currently, organizational and technical measures for "reloading" the system of management of construction projects are carried out at the local level: the elimination of capital construction departments and the creation of the $CPMO_C$.

7. Conclusions

1. The specificity of the feminine and masculine contexts of managing the customer needs in the construction project is highlighted. The existing gender cognitive gap of project management standards (PMBOK, PMBOK Construction) is described in terms of defining the place and role of customers. It has been established that the masculine cognitive system of a construction project is aimed at the accurate execution of all procedures in accordance with the normative standards defined at the beginning of the project. Feminist project management strategies require the immediate detection and response to dynamic environment signals (including customer needs) that are deployed as the project progresses. Such a strategy allows forming a qualitative context of architectural and planning decisions of construction projects.

2. The feminine context of customer-oriented tools and methods for realizing the construction project management processes as a system of knowledge PMBOK Construction is outlined. The continuous client's "presence" in the tasks and tools is demonstrated. The feminine and masculine practices of setting up a project make it possible to identify the specifics of the gender context of managing the needs of customers and users in the construction project.

3. The model of customer-orientation of the construction project management system is developed in the parameters of processes, methods and tools of project management. Four phases of client-orientation are revealed: "I – customer interest (to hear his voice)"; "II – implementation of "individual customer requirements" in architectural and spatial, design and technical solutions"; "III – customer-oriented execution of construction and installation work"; "IV – loyal customer of the company-developer". The application of this model will allow the top management of the companies-developers, $CPMO_C$ to carry out a self-assessment of progress in the development of client-oriented construction project management and to choose the actions necessary to move from "initiation" to "closing" of the project.

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