

Modeling of the procedure for the public procurement system in Madagascar

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Abstract

Public procurement in Madagascar is a key pillar of public resource management and national economic development. Governed by legal texts, the process is based on the principles of transparency, fairness, and competition. Several bodies are responsible for regulating, monitoring, and implementing procedures, with the support of international organizations. However, irregularities are still being observed, which leads to the following problem: Despite the implementation and development of procurement procedures, non-compliance in their execution persists. The objective of this research is to determine effective strategies for optimizing the public procurement system. A survey was conducted among stakeholders in the sector, and the data collected were analyzed using multiple analysis and discriminant analysis for the development of a strategic rectangle. The results show that the gradual improvement of the system stems mainly from the absence of comments from decentralized local authorities, the ease of responding to a tender, the proper application of the public procurement code, respect for the needs of local authorities, and the role of the tender committee. Variations in the level of satisfaction with the public procurement code and perceptions of the texts also influence the system. That is why an emergency response must be prioritized and a performance model for the procurement system must be developed. Finally, it remains essential to coordinate public procurement with budget management, while taking local needs into account, in particular by adopting an appropriate procedure and complying with the key stages of the service monitoring and control process.

Keywords: Public resource management; Economic development; Irregularities; Performance; Execution

1. Introduction

Public procurement in Madagascar is a key pillar of public resource management and national economic development. This system is governed by a legal framework, notably the Public Procurement Code (PPC), which sets out the rules on transparency, competition, and fairness that are essential for good governance of public spending.

In Madagascar, since 2004, regulatory texts including the PPC, namely "Law 2004-009 of July 26, 2004 [1], and Law No. 2017-055 of January 25, 2017," [2] and the code of ethics for public procurement have been in force. Public procurement bodies such as the person responsible for public procurement (PRPP), the procurement management unit (PMU) (established by Decree No. 2015-1094 of July 7, 2015) [3], and the Bid Evaluation Committee (BEC) (established by Decree No. 2006-344 of May 30, 2006) [4] have been established in all ministries and public institutions to conduct the

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procurement process (PP), ranging from the choice of procedure to the appointment of the contractor and approval of the final contract for the PRPP and the PMU, as well as to participate in the opening session, evaluation, and ranking of bids for the BEC.

Various texts on public procurement (PP) concerning the establishment of acceptance committees for public works, supplies, and intellectual services contracts, as well as procurement thresholds and the thresholds for review by the Procurement Commission, the list of publications of general public procurement notices, and standardized documents and templates have already been drawn up. Regulatory and control bodies have been set up, including the Public Procurement Regulatory Authority (PPRA) established by Decree No. 2005-215 of May 3, 2005 [5], the Committee for the Amicable Settlement of Disputes relating to the Execution of Public Contracts established by Decree No. 2006-345 of May 30, 2006 [6], as well as the National Procurement Commission (NPC) and the Regional Procurement Commission pursuant to Article 16 of Law No. 2017-055 of January 25, 2017 [2]. This legal framework aims to regulate all procedures by emphasizing the separation of regulatory and supervisory functions, transparency, and fairness in access to markets.

Several anti-corruption organizations such as the Independent Anti-Corruption Bureau, Transparency International, the Anti-Corruption Pole (ACP), and civil society groups have already been set up to help Madagascar ensure the proper functioning of PP and also to fight corruption in public procurement.

Several initiatives are being carried out and funded by the United Nations Development Program (UNDP), the World Bank (WB), and the Governance and Institutional Development Project in order to reduce malfunctions and poor practices in procurement procedures, including training in digitalization.

Several applications are already operational to regulate the procurement system, such as the computerized public procurement management system, the procurement review system (PRS), and other applications. However, in 2017, the NPC reported that 53% of PP contained irregularities [7]. The details of the offenses handled by the Antananarivo First Instance Public Prosecutor's Office between July 2019 and June 2020 include abuse of office (16.3%), embezzlement of public funds (8.6%), and both active and passive corruption (12.7%) [8].

Faced with these contradictory realities, despite the efforts made by the State, non-compliance in the implementation of PP procedures persists. This issue has led to the formulation of an objective aimed at determining effective strategies for optimizing the public procurement system in Madagascar. How, then, can the performance of the public procurement system be improved? The hypothesis to be tested posits that simplifying procurement procedures by amending the relevant legislation will improve the quality of public procurement in Madagascar.

2. Methods

The research informs decision-makers' thinking on measures to improve PP procedures in order to make public administration and procurement more efficient. It aims to measure the importance of the PP system in the country's development. As a system, these considerations are expected to impact both direct beneficiaries and the general population. Specifically, the research consists of identifying malfunctions in the PP process by highlighting the major factors that impact its performance, with a view to contributing to the improvement of the process and strengthening the performance of those involved in public procurement.

In Madagascar, the CPM applies to the State and its public institutions, public authorities and their public institutions, any public or private entity benefiting from or managing a State or public authority budget, or any other public funding, and companies in which the State has a majority stake.

As part of the organization of work within these departments, several directorates and services are appointed, such as the Cabinet, the General Secretariat, the Directorates-General, the Directorates, various services, and above all the PRPP. This research therefore focuses on the bodies responsible for public procurement that are already in place, namely the PRPP, which is responsible for conducting the procurement procedure; the PMU, which supports the PRPP throughout the process; the BEC, which is responsible on behalf of the PRPP for performing the evaluation functions provided for in the code, from the opening of bids to the formulation of a reasoned opinion to the PRPP; and the Receiving Committees for public works, supplies, and intellectual services contracts.

To verify the hypothesis, the approach involved two steps: identifying the dominant and influential variables of the factors determining procurement procedure using the strategic rectangle, and developing two models to reduce dysfunctions in procurement procedure.

Multivariate statistical analysis, Multiple Correspondence Analysis (MCA) and Discriminant Analysis (DA), were used to obtain the inter-variable correlation matrix and define the strategic rectangle summarized in a table.

For the strategic rectangle, the following steps were taken:

- Removal of insignificant variables and the lower diagonal part of the correlation matrix
- Calculating the values of X and Y with $X = L/P$ and $Y = L*P$
- L = Sum of the rows of the correlation matrix variables
- P = Sum of the columns of the correlation matrix variables

Sorting by descending order of X values: influential variables were selected from values greater than 1 ($X > 1$) (colored yellow) in the rectangle.

Sorting in descending order of Y values, considering all the highest values in the influential variables up to a significant deviation to be classified as dominant and influential variables (colored green) in the rectangle.

The following variables were used (Table 1).

Table 1 Variables used for the strategic rectangle

Code	Variables	Code	Variables
Prof-U	Procurement management unit	Dar-N	Difficulties in responding DAO-No
Prof-C	Bid Review Committee	NPA-C	Number of participants in an open tender - between 5 and 10
NE-L	Bachelor's degree level	Cav-N	Hide Notice – No
Ag-A	Age under 40	NGE-N	Negotiations with companies - No
NE-M	Level of study Master's degree	RSs-P	Rejection of bids - Not widely observed
TE-B	Type of study: Construction, Civil Engineering	GaG-O	Over-the-counter trading encourages corruption - Yes
Ag-C	Age over 50	RSs-R	Rejection of bids - Compliant
TE-I	Types of studies Computer Science	CC-A	Causes of corruption - Other
Exp-A	Less than 12 months of experience	RSs-T	Rejection of submissions - Highly respected
TE-A	Other types of studies	Dex-U	Difficulties during execution - Some
SC-P	PPC unsatisfactory	Dex-O	Difficulties during execution - Yes
Exp-C	Experience over 36 months	RMP-N	Regularization in public procurement - No
PCMP-B	PPC Practice - Well	ADU-C	Direct purchase for emergencies - Recommended
F°-O	Training - Yes	RP-P	Compliance with PP - Low
CT-B	Concerns texts - Fine	RP-N	Compliance with PP - No
NrP-O	Non-compliance with the PP	SA-O	Archiving service - Yes
PCMP-M	PPC practice - Mediocre	POF-A	Percentage of NC and NQ offers - 26-50%
BC-R	Compliance with CTD Requirements	NAI-B	Number of unsuccessful AO - 3 to 5
IPC-N	Impact of the CTD project - None	NAI-A	Number of unsuccessful AO - Less than 2
PCMP-T	PPC practice - Very good	PF-R	Fundamental principles—Respected
IPC-P	Impact of the CTD project - Not so much	CTR-O	Knowledge of regulatory texts - Yes
Du-A	Duration of the PP less than 45 days	CNP-B	Knowledge of PCOP nomenclatures - Good

RCTD-N	CTD remarks not considered	CTR-N	Knowledge of regulatory texts - No
CM-A	Corruption in public procurement - None	CNP-P	Knowledge of PCOP nomenclatures - Not good
Du-D	PP duration Over 75 days		

The development of models based on the analysis of key variables, aimed at framing strategies to ensure the proper execution of the PP procedure, required an emergency response model and a public procurement system (PMS) performance model.

3. Results

3.1. Determining factors of procurement procedures

The strategic rectangle summarizes twelve (12) dominant and influential variables and fifteen (15) influential variables (Table 2).

Table 2 Dominance effect and influence of factors determining procurement procedures

Code	Variables	X=L/P	Y=L*P
RCTD-N	No comments from decentralized local authorities	1,78	31,34
CT-B	Concerns texts deemed good	2,44	27,77
SC-P	Unsatisfactory public procurement code	4,46	24,07
Dar-N	No difficulty in responding to a tender application	1,16	22,86
Cav-N	No hidden information on a specific notice	1,47	21,12
IPC-P	Impact of decentralized local government projects not so much	1,26	20,27
PCMP-B	Public procurement code practice deemed good	3,47	15,67
BC-R	Needs of decentralized local authorities respected	2,35	15,49
F°-O	Existence of training	2,11	12,51
CC-A	Causes of corruption - Other	1,14	10,94
TE-A	Other types of studies	2,81	10,52
NrP-O	Failure to comply with the procurement procedure	2,36	10,47
GaG-O	Over-the-counter trading encourages corruption - Yes	1,18	9,68
Ag-A	Age under 40	3,70	8,75
Du-A	Duration of the procurement procedure: less than 45 days	2,39	8,74
Ag-C	Age over 50	3,44	8,63
TE-B	Type of studies: Bachelor's degree	4,38	8,57
Prof-U	Role of the procurement management unit	7,94	7,94
NE-M	Level of education: Master's degree	1,86	7,31
Exp-C	Experience over 36 months	2,83	6,76
TE-I	Type of studies: Computer Science	3,39	6,46
Exp-A	Less than 12 months of experience	3,79	6,12
PCMP-T	Public procurement code practice rated as very good	2,47	5,49
IPC-N	Impact of decentralized local government projects	2,60	4,62
CM-A	No corruption in public procurement	1,54	4,53
NE-L	Bachelor's degree level	3,07	4,38
PCMP-M	Public procurement code practices deemed mediocre	1,67	2,86

The dominant and influential variables in the PP process are defined based on the importance of their value on the Y-axis, namely the absence of comments from decentralized local authorities (RCTD-N), texts deemed satisfactory (CT-B), no difficulty in responding to a tender dossier (DAR-N), the public procurement code deemed unsatisfactory (SC-P), no hidden information on a specific notice (CAV-N), little impact on the projects of decentralized local authorities (IPC-P), the practice of the public procurement code deemed good (PCMP-B), respect for the needs of decentralized local authorities (BC-R), the existence of training (F°-O), other causes of corruption (CC-A), other types (TE-A); and finally, non-compliance with the procurement procedure (NrP-O).

Other variables influence the procurement process, including private agreements, which encourage corruption (GAG-O), age under 40 (Ag-A), the duration of the procurement procedure, particularly less than 45 days (Du-A), age over 50 (Ag-C), type of bachelor's degree (TE-B), the role of the procurement management unit (Prof-U), Master's degree level (NE-M), experience over 36 months (Exp-C), type of IT studies (TE-I), experience less than 12 months (Exp-A), practice of the public procurement code rated as very good (PCMP-T), the impact of decentralized local authority projects (IPC-N), the absence of corruption in public procurement (CM-A), bachelor's degree level (NE-L), and the procurement procedure perceived as poor by some respondents (PCMP-M).

3.2. Framework aimed at improving the public procurement system

3.2.1. Emergency treatment model

Five key steps that are inseparable from the monitoring and control process that has been put in place (Figure 1): establishing the facts, holding meetings to deal with emergencies, identification of the company by the contracting authority, implementation of planned actions, and ex-post control. PP should be avoided for all emergency responses by following the steps in the proposed model.

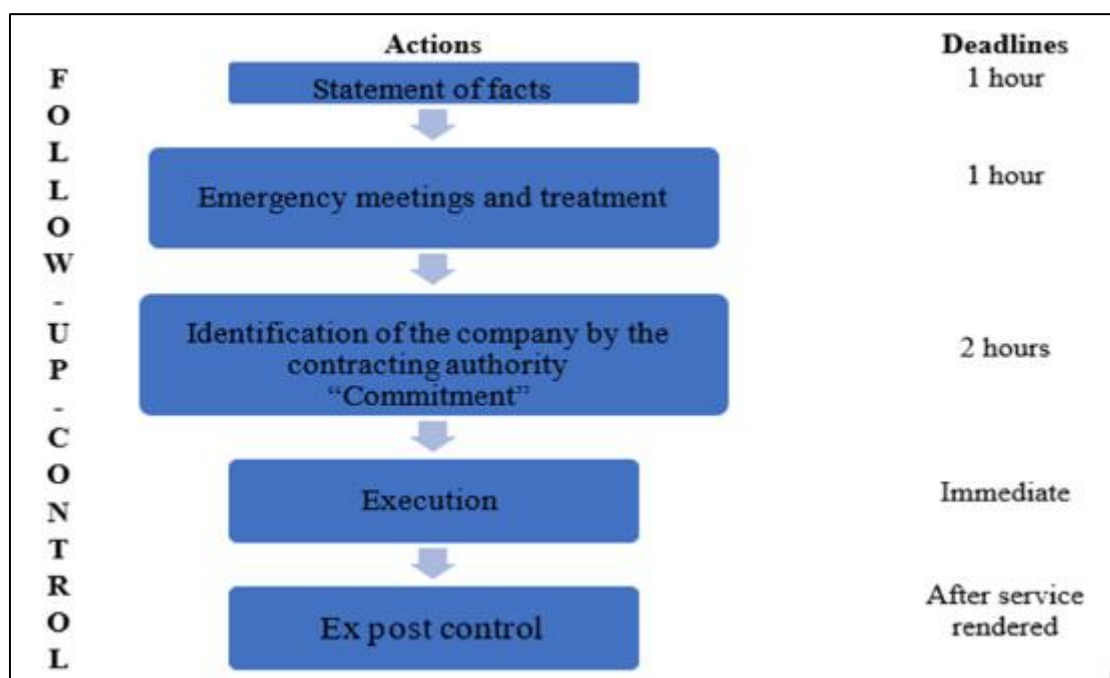


Figure 1 Emergency treatment model

The five key stages, which are inseparable and include the post-control process passing through the phases with deadlines, are as follows:

- Assessment of the facts
- Meeting and handling of emergencies
- Identification of the company by the contracting authority - Commitment
- Execution
- Post-execution review

This emergency treatment model must be anchored in a legislative and regulatory framework to prevent any form of infringement.

3.2.2. Procurement System Performance Model

The process of executing a public contract should be linked to public finance management. Figure 2 highlights the need for a balance between the projects launched, the needs of local authorities, the execution of the work, and the adequate budget and facilitation of payment.

The balance between public procurement and public finance is a prerequisite for the PP foundation. It therefore requires consideration of local authorities' needs to ensure consistency between the projects launched and the budget/revenues. This facilitates the execution phase and the honoring of payment commitments to avoid delays.

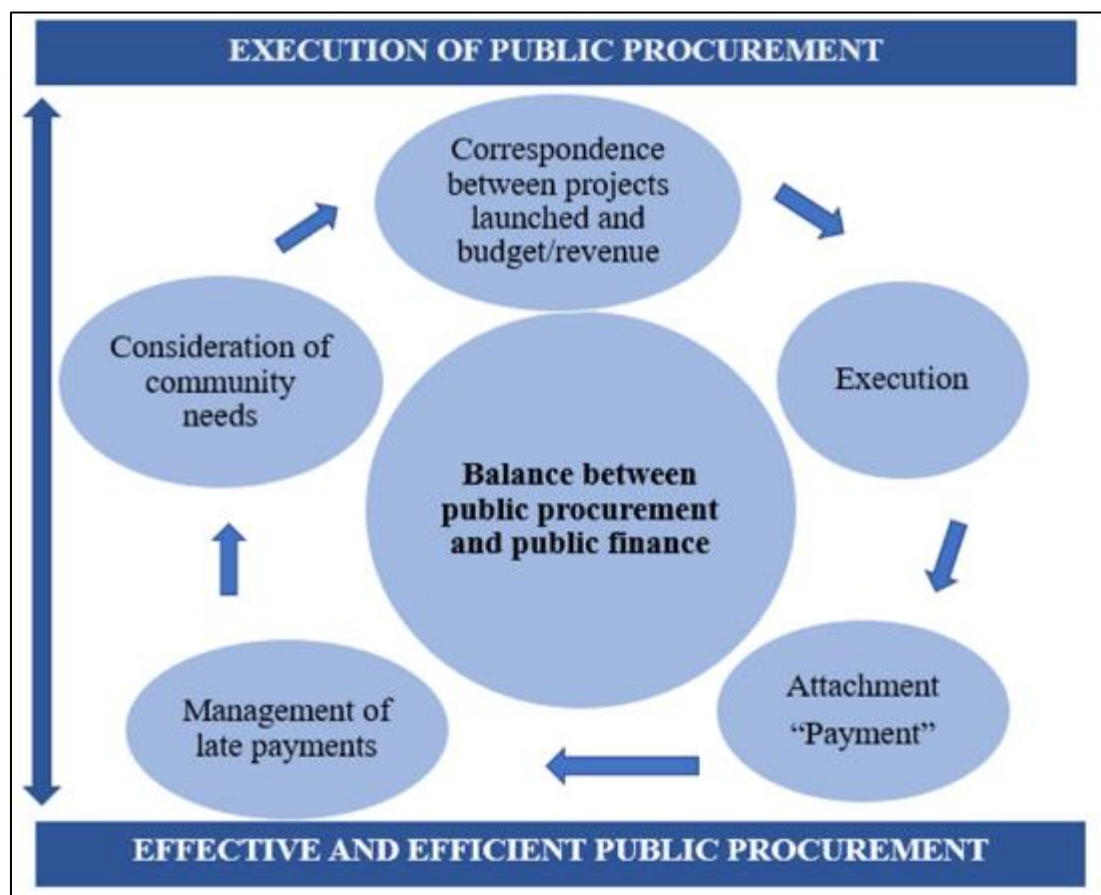


Figure 2 Performance model for the procurement system

4. Discussion

4.1. Strategic focus on improving the procurement system

The results show that several dominant and influential variables are linked to public procurement practices (Table 2). Although texts, codes, and policies are in place, their application differs among those involved in public procurement. As long as there are no comments from decentralized local authorities (RCTD-N), companies have no difficulty responding to a tender dossier (DAR-N), the practice of the public procurement code is considered good (PCMP-B), and the needs of decentralized local authorities are respected (BC-R), the procurement procedure is considered effective.

The unsatisfactory public procurement code (SC-P) and texts deemed to be good (CT-B) are also factors that have a positive influence. Other variables, in particular those with little impact on the projects of decentralized local authorities (IPC-P), no hidden information on a specific notice (CAV-N), non-compliance with the procurement procedure (NrP-O), and the existence of training (F°-O), draw attention to the need to improve the current procedure so that it is properly

applied while respecting the principles established. Throughout the various reforms, capacity building is being carried out to facilitate implementation.

The results therefore indicate the importance of several aspects of public procurement, including consideration of local authorities' comments, ease of responding to calls for tenders, compliance with procurement rules and meeting local authorities' needs, and above all the absence of corruption throughout the process. These trends are consistent with recent reforms observed in many African countries, notably Madagascar, which has adopted the Methodology for Assessing Procurement Systems (MAPS II) to evaluate and reform its public procurement system so as to align regulatory, institutional, and governance provisions with international standards. According to the PPRA (2014), public procurement is an instrument of economic development, and competition is a guarantee of the quality of public spending. Its effectiveness depends on the procedure, the preparation of contracts, the preparation of tender and consultation documents, and, in short, the overall control of the public procurement process.

Recommendations emphasize on strengthening human resource capacities, political will, and institutional transparency [9]. Several factors contributing to the failure of the public procurement system in Africa have been identified, including weak commitment to fighting corruption, ineffective implementation of the reformed procurement system, lack of transparency in the awarding of public contracts, and lack of accountability on the part of the government, both at the national and local levels, in the use of public funds, among others [2]. Given that the legal framework faces challenges such as weak regulatory authorities and the need to update texts and application manuals inherited from earlier legislation, improving certain texts is considered useful.

4.2. Strengthening the monitoring and control process

The mechanism facilitates decision-making in the context of activities, as well as the execution of activities and their evaluation. The monitoring and control process presented in the research highlights a responsive and structured approach, enabling effective emergency management through five successive stages: fact-finding, consultation for emergency management, contractual commitment, execution, and finally, ex-post evaluation. This model emphasizes rapid response while ensuring monitoring and evaluation at each stage (Figure 1).

This result is broadly consistent with the conclusions of Mintzberg [10], who emphasizes the importance of organizational structures being adaptable in emergency situations, particularly through direct coordination and simple but effective oversight mechanisms. Similarly, through their Balanced Scorecard approach, emphasize the need to link operational actions to strategic objectives while ensuring rigorous monitoring, which is made possible here by ex-post evaluation [11].

However, this process differs somewhat from the approach recommended by the Plan-Do-Check-Act (PDCA) cycle [12], which favors a preventive planning approach prior to action, whereas the model tends to intervene after assessing the realities on the ground.

Furthermore, in the specific context of public procurement management or interventions in sensitive areas, the importance of incorporating upstream control has been emphasized, i.e., prior control, in order to limit the risks of non-compliance [13].

The observation of the facts is a preliminary step that allows the actual needs to be identified before starting a meeting to deal with emergencies. It allows the situation to be analyzed and emergencies to be identified in order to facilitate decision-making. The identification of the company by the contracting authority, or "Commitment," particularly the public institution, makes it easier to choose the company that meets the criteria set out in the tender. The implementation of "Execution" activities, including the performance of work, the provision of services, etc., is planned according to the schedule drawn up. Ex-post evaluation is carried out to assess the conformity of the execution with the commitments. The award of a contract must be well organized and carried out in an appropriate manner in terms of quantity, quality, timing, and value for money (IFAD, 2019) [14].

4.3. Improved system performance

Optimal management of these markets is crucial to ensuring the effectiveness of public spending and maximizing socio-economic benefits. The goal is to ensure that public procurement is both effective and efficient, balancing budgetary requirements and stakeholder satisfaction.

The study proposes a number of important characteristics of an effective public procurement system, whose fundamental principles are as follows:

- Economy and efficiency. Spending public money in a cost-effective manner, promoting competition among businesses and avoiding delays in the bidding process.
- Transparency in the bidding process. Through the application of clear bid evaluation criteria and rigorous contract management, and
- Fairness: Giving all participants equal opportunities to compete and avoiding discrimination among potential bidders.

To improve their procurement performance, governments should strive to create a corps of skilled procurement specialists who are subject to high ethical standards. This approach saves time in preparing and reviewing bids and minimizes delays in the acquisition of goods and services. Senior officials should also be able to delegate decision-making.

Strengthening public procurement systems is of paramount importance in creating an environment conducive to good governance. Furthermore, public procurement can be a powerful lever for promoting the achievement of social development objectives.

However, it must also be emphasized that inefficient and corruption-prone procurement systems can cause enormous economic losses. Improving these systems will therefore contribute to economic and social development.

It has been suggested that adequate and ongoing training would facilitate the development of the technical expertise needed to prevent errors and opaque practices.

The conditions necessary for the proper functioning of a procurement system were outlined, including the following: more efficient communication and reporting structures, adequate control at all levels (delegation of authority and setting of thresholds), and decentralization (rationalization of resources at the local level, while ensuring supervision and monitoring at the central level) (International Trade Center, 1998) [15].

An efficient public procurement system ensures better management of public funds and the smooth running of public services, as public procurement accounts for a very significant proportion of public spending in developing countries (International Development Law Organization, 2007) [16]. The city of Lyon, cited as an example, has been engaged for several years in the process of digitizing expenditure documents with the implementation of the PES expenditure flow (Galliano, 2019) [17].

The restricted tendering procedure limits the effects of transparency and freedom of access to public procurement, and the mechanisms put in place to regulate its use are largely ineffective (SAMB, 2015) [18].

For capacity building in the area of procurement, the Paris Declaration refers to good practices established by the OECD based on the experience of developing countries and bilateral and multilateral donors (OECD, 2008) [19]. In many pilot countries such as Afghanistan, Cameroon, Laos, Mongolia, Sierra Leone, and Vietnam, Malawi has opted to use the OECD assessment methodology with the assistance of the UNDP (OECD, 2008) to develop its capacity building strategy.

Given the technical nature and complexity of the procedures to be followed, public procurement is a crucial step because it determines the successful bidders. The process of selecting tenders and bids requires expertise that must be acquired, as any failure to follow established procedures may result in litigation.

The reform of public procurement law, implemented with the transposition of the European directives of February 26, 2014, has changed the perspective on these contracts. From now on, a more strategic dimension based on economic performance is taken into account. Public procurement also serves public policies, particularly in the area of anti-corruption (Prébissy-Schnall, 2020) [20].

Indeed, according to Hanine (2008) [21], "public procurement is a hot topic, regardless of the country concerned, and it is important for us to improve it." He believes that these improvements must be made at the beginning of the PP process in order to enable the contract to be executed under the best possible conditions.

5. Conclusion

Public procurement in Madagascar takes place within a political context marked by the government's commitment to strengthening governance and transparency in the management of public funds. Under the supervision of the Ministry

of Economy and Finance, the country benefits from international support, notably from the African Development Bank and the World Bank, to evaluate and reform its system in line with international best practices. These reforms aim to combat malfunctions such as irregularities, corruption, and favoritism.

The objective of this research is to determine effective strategies for optimizing the public procurement system in Madagascar. Several strategies have been developed, prioritizing the key elements that impact the performance of the procurement system, as well as emergency management.

From an economic perspective, public procurement represents a strategic lever for Madagascar's development by supporting public investment projects. That is why the optimal management of these markets is crucial to ensure the efficient use of public expenditure while maximizing socio-economic benefits.

Compliance with ethical standards

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Disclosure of Conflict of Interest

The authors declares that there is no conflict of interest associated with this study.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study

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