A Lean Approach for Multi-criteria Decision-Making in Public Services' Strategy Deployment

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Abstract – The public services' related strategy deployment (SD) process involves complex and multi-criteria decision-making. Group decision-making is often characterized by, among other things, some degree of managerial discretion, silo thinking, poor consensus and ad hoc approaches, for simplification purposes. This reduces consistency and results in a high level of variability in the overall performance, due to ambiguous and flawed translation into operational targets. Hence, it is necessary to investigate the potential use of scientific approaches to improve the consistency and minimize the variability of the performance of organizations providing public services. This paper presents the use of a Lean approach, by incorporating Gemba Walks, A3 and the analytic hierarchy process, to improve consistency and minimize the variability of an SD-related decision-making process in a public organization. Action research, supplemented by a practical case exercise, is performed, using qualitative and quantitative data, in one Norwegian police district. The proposed methodology provides a structured approach to consolidating different managerial perspectives, to systematically prioritize strategic alternatives and directions in a more meticulous and credible way, decreasing the possibility of minority domination and subjective views. The suggested approach can help build consensus and improve the consistency associated with group decision-making and minimize the adverse consequences of an ineffective SD process.

Keywords: Public services, Lean, multi-criteria decision-making

1 Introduction

Public organizations are subject to increasing political and social demands on performance enhancement and service efficiency and quality, in a financially constrained environment [1, 2]. As such, it is vital that policies and strategies are used to focus the organization on key priorities that need to be aligned, developed, and deployed throughout the whole organization, to ensure their translation into operational targets that are integrated into daily routine management [3]. However, as identified in this study`s case organization, root causes of ineffective policy or strategy deployment (SD) are found to be associated with lack of knowledge about

tools and methods for problem-solving, as well as strategic anchoring and group decision-making processes when faced with complex multi-criteria decision-making (MCDM) involving prioritization or trade-offs of alternatives.

Lean is a management philosophy found to improve organizational decision-making and shared vision [4], as a continuous improvement (CI) approach that reinforces the participation and involvement of all organizational levels through a common set of principles, tools and techniques for problem-solving [3]. Moreover, in the context of complex group decision-making, MCDM methods can play a significant role when there is a need to prioritize alternatives and build group consensus on strategic guidelines and priorities, which is vital for effective SD [5]. However, public organizations represent unique challenges to such management ideologies and practices [1]. That is, they are rarely observed in practice, or they are unsuccessfully implemented as an integral part of a comprehensive management system and adapted to the organizational decision-making context [4].

Henceforth, a practical understanding of Lean complemented by MCDM methods can be of significant value in public managers' aim to have more meticulous and credible SD-related decision-making and deployment. Action research, supplemented by a practical case exercise, is conducted in one Norwegian police district that is undergoing a CI program. In such, *Gemba Walks* are performed by the district management group to identify organizational needs or improvement areas, for strategic problem-solving using the A3 tool and Deming cycle: Plan, Do, Check, and Act (PDCA). Followingly, the MCDM method; Analytic Hierarchy Process (AHP), is used to prioritize and select which of the strategic A3s to deploy. Before discussing the proposed methodology in the context of SD, the next section presents the challenges faced by the case organization and the relevant theoretical background to this study.

2 Background

2.1 Organizational challenge

In 2015, a new reform for the Norwegian police was decided upon, involving, among other things, the reduction of 27 districts to 12. Findings from the reform`s latest evaluation report point out that lack of organization, plans and systematics, lack of competence among managers and lack of follow-up and prioritization have been key barriers to learning and development. Moreover, when considering future organizational challenges and barriers, strategic managers highlight structure, work processes, strategy, and management as important factors [2]. Top-level management in the Norwegian police describes increased distances internally between strategic management and the subordinate levels in the police organization. These are unintended consequences of the police reform, which breaks with the reform`s objectives and ideals [6].

In one of the police districts, current managerial challenges are identified as being related to, among other things, the district management group`s overall SD process, that is, their ability to effectively plan and continuously execute "FAIR" – 1) Focus short-term strategies, 2) Align plans, systems, and processes with the decided

priorities, 3) Integrate priorities in daily management, and 4) Review the management of priorities [7]. In this context, among the underlying root causes and improvement areas, the following are identified: 1) lack of knowledge regarding methods, tools, and techniques for problem-solving and 2) strategic anchoring and group decision-making.

The latter is related to the management group`s ability to have a structured approach to complex multi-criteria-based group decision-making, which is often characterized by, inter alia, the following factors: ad hoc approaches for simplification purposes, silo-thinking, minority domination, poor consensus, and ambiguity [1]. Lack of knowledge regarding methods and tools for problem-solving is organizational and involves the district`s ability to approach complex organizational problems or improvement opportunities in a systematic and scientific way. Currently, there is a culture of identifying a problem, jumping to a conclusion regarding the solution and managing the problem in an ad hoc fashion, without sufficiently considering its entire scope and having a plan for implementation, review, and control. Consequently, this has been shown to result in a limited or immature problem-solving decision basis. Henceforth, both improvement areas, which are interconnected, require modernization and development in the given public organization.

2.2 Lean, Gemba Walks and A3

Lean is a highly promoted management philosophy, due particularly to its inherent emphasis on long-term organizational thinking, leadership and learning [8], as well as its ability and objective to eliminate waste by concurrently reducing or minimizing variability and overburden [9]. As a combination of *Gemba* ("the real thing"), *Genchi Genbutsu* ("go and see"), and *Genjitsu* ("real facts"), a *Gemba Walk* is a significantly valuable Lean technique, for observing, interacting, gathering information and understanding organizational conditions and processes, that creates value [10, 11].

A *Gemba Walk* is characterized by four distinctive elements: 1) location – observing something or someone at "the actual location" where the work is being performed; 2) observation – watching something or someone perform their work "in person"; 3) teaming – "interacting" with the employees performing the work, by respectfully asking questions if appropriate; and 4) reflecting – after "seeing and listening" – on what actions are required to support innovation and continuous improvement [10-12]. In this context, a supplementary tool is the A3, which is reinforced by the PDCA cycle [13]. Performing a *Gemba Walk* with the support of the A3 can be a powerful approach and communication technique that can direct managers and problem solvers to gain a deeper understanding of the problem or opportunity, generating innovative ideas on how to tackle the problem [3].

However, common Lean tools and methods for waste elimination and problem-solving are arguably insufficient for tackling many business-improvement-related problems such as complex decision-making, conflict resolution, project prioritization or trade-offs, resource allocation or workforce scheduling [14]. MCDM methods, which are a sub-discipline of operations research, are well positioned to complement the existing Lean tools and methods and effectively solve these problems.

2.3 Multi-criteria decision-making

In contrast to private organizations, public sector organizations are financially constrained, accountable to society, and subject to new reforms. They are governed by political directives and objectives that are often conflicting, complex, and ambiguous [1]. In this context, strategic decision makers are challenged by some degree of managerial discretion and often in a position in which prioritization or trade-offs of strategic directions and initiatives are required. The AHP is a MCDM method that was first developed and described by Saaty [15]. It enables the synthesis of the knowledge, experiences, data, information, intentions, and intuitions of the decision makers [16]. In essence, it describes a structured mathematical approach that enables decision makers to develop priorities and preferences by converting human judgements (e.g., experiences, the intuitions, and intentions of experts in different disciplines) into numerical values. MCDM methods, such as AHP, aim to reduce uncertainty and build consensus in the decision-making process, by simultaneously laying out all relevant factors of concern, tangible and intangible [17].

Primarily, AHP is built on the following three underlying concepts [16]: 1) visually structuring the decision problem as a hierarchy of goals, criteria and alternatives (Fig. 1), 2) pairwise comparison of elements at each level of the hierarchy with respect to each criterion on the preceding level, and 3) vertically synthesizing the judgements over the different levels of the hierarchy. In general, the measurement of indicators is 'often based on the quantitative analysis (through scoring, ranking, and weighting) of a wide range of qualitative impact criteria' [16, 18]. However, although there have been numerous studies encouraging organizations to apply MCDM methods, it is noteworthy that such rational decision-making processes are rarely observed in practice [19, 20]. Henceforth, it is a necessity to explore and contextualize how such methods can complement strategic managers and make it an integral part of a broader management system and group decision-making processes in practice.

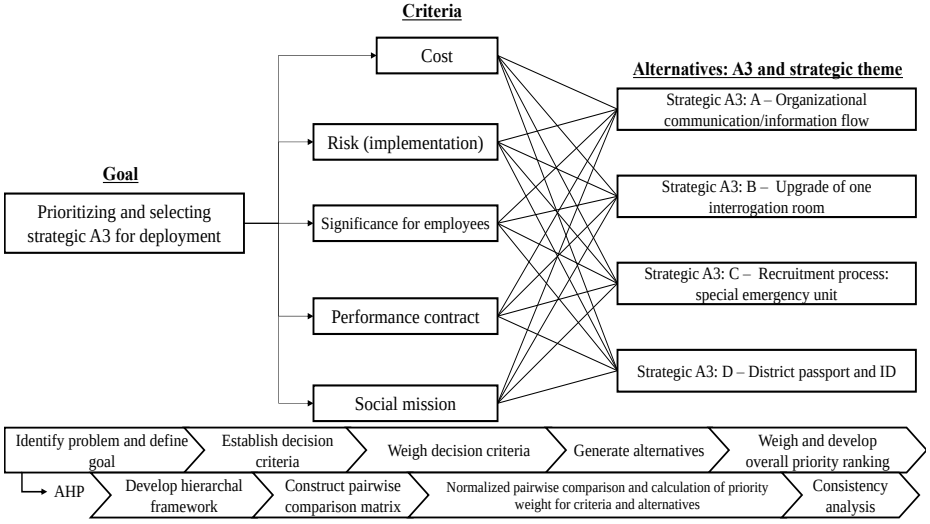

Fig. 1 Summarized rationale decision-making process, AHP and hierarchical structure

3 Methodology

As this study aims to address an improvement potential in an organization and, accordingly, generate practical implications and innovative solutions for the identified improvement areas through participation, an action research strategy is proposed, supplemented by a practical case exercise [21].

Based on the previous section, a model displaying the overall SD process is developed (Fig. 2), to contextualize the methodology of this study, in which the *Gemba Walks* are performed by the district management group (i.e., strategic level) to identify strategic themes and improvement areas in the organization. The output of each *Gemba Walk* is an A3, conveying the most critical information according to the PDCA cycle. Furthermore, as part of the practical case exercise, an excerpt of the developed A3s is chosen for the AHP (Fig. 1). Table 1 provides a summarized description of the established decision criteria. The management group was divided into three sub-groups to perform the AHP, using the Expertchoice software tool. In this, the geometric mean approach is recommended to combine the pairwise comparison matrix obtained from individual evaluators [5].

Table 1 Description of decision criteria

Decision criteria	Description
Cost	Direct cost (or expenses) of implementing the described strategic A3
Risk	Threats or level of uncertainty related to implementing the described A3. It determines the level of risk tolerance that the managers accept.
Significance for employees	The direct value or significance that the strategic A3 has for the employees on a system level
Performance contract	The value or significance that the strategic A3 has for key performance indicators described in guidelines and directives for the district
Public (or social) mission	The value or significance that the strategic A3 has on the district`s ability to prevent crime, maintain order and safety in society, and investigate and prosecute offences

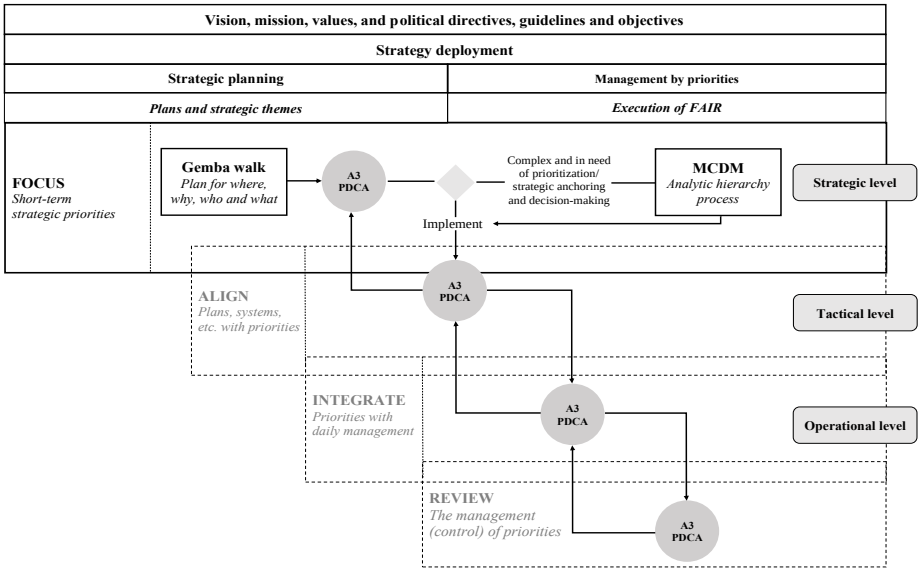

Fig. 2 Overall SD process using Gemba Walks, A3 and AHP, adapted from [7]

4 Findings

As the data and results are from a government agency and contain some sensitive information, the content of the A3s and decision criteria are intentionally censored or not elaborated in detail, to conform to the organization's confidentiality policies. From the *Gemba walks*, a total of 12 A3s was obtained. Of these, four were evaluated as needing strategic anchoring and group decision-making, due to their complexity and scope (Fig. 1 and 2). The weight of criteria and overall priority scores of the different strategic A3s obtained during this case exercise are shown in Table 2 and Fig. 3. From Fig. 3b, it could be found that strategic A3: D, which involves the district`s passport and ID services, has the maximum overall priority score. As a sequel to the performance of this study, efforts have been taken by the case organization to implement strategic A3s: D, A and C which are concretized and operationalized through, among other things, tactical A3s in the subsequent steps of the SD process and FAIR method (Fig. 2).

Table 2 Weight of decision criteria and overall priority score of alternatives

	Cost = 0.1860	Risk = 0.0646	PC = 0.3028	PM = 0.3203	SE = 0.1263	Overall priority
A3: A	0.5110	0.2889	0.0980	0.2978	0.5801	0.3080
A3: B	0.3292	0.1409	0.0667	0.0621	0.1617	0.1256
A3: C	0.0788	0.4405	0.3147	0.2337	0.0654	0.2264
A3: D	0.0810	0.1297	0.5205	0.4064	0.1928	0.3400

NB: Performance contract (PC), Public (or social) mission (PM), and Significance for employees (SE)

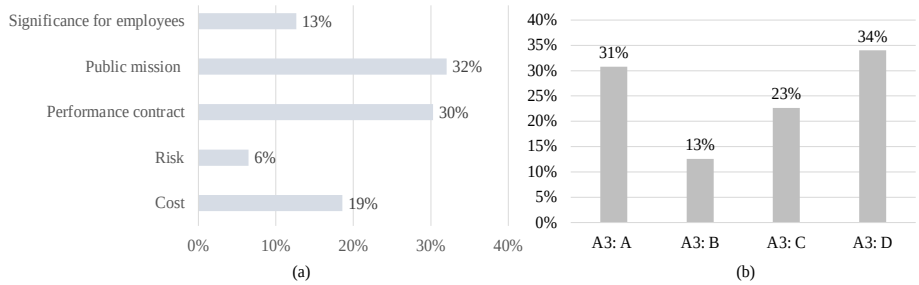

Fig. 3 Visual presentation of weight of criteria and overall priority of alternatives

Performing *Gemba Walks* using the A3 provided a bottom-up approach to learning and the accumulation of knowledge regarding organizational improvement opportunities and problem-solving. It was perceived as a valuable practice for realizing the vertical integration of all levels of management and their connectivity with the organization and employees [11]. As opposed to a top-down hierarchical approach to decision-making, which is currently evident in the police, Lean`s Gemba-based decision-making can, among other things, increase trust and consensus on strategic guidelines and priorities within the organization [12]. Moreover, if routinely performed as an integral part of the overall SD process, it can provide evidence that the organization`s strategic plans and objectives are being deployed effectively [22].

There are high expectations of and pressure on top-level managers to continuously improve and enhance performance and service quality. However, contextual factors, such as financial constraints, political directives, objectives, and guidelines, which are at times excessive, ambiguous and conflicting, challenge the managers' degree of managerial discretion. As such, complex decision-making requiring prioritization or trade-offs is arguably more evident in public sector organizations than in the private sphere. The AHP provides a systematic approach to consolidate different perspectives for the managers. The rational decision-making process provided a structure comprised of a common goal and decision criteria to approach the problem, as well as to elicit the group's tacit knowledge and make it explicitly available through visual data representation. This increased transparency and openness in the group`s discussions, reducing variability, minority domination, silo-thinking, and subjective opinions or idiosyncratic views, ultimately contributing to a higher level of consensus and consistency within the group, which is vital for effective SD [3].

However, although there have been numerous studies encouraging organizations to apply MCDM methods, it is noteworthy that methods such as AHP also face some difficulties in aiding group decisions [23] and have been subject to criticism and controversy [24]. For instance, although the majority of the group's judgements had an acceptable inconsistency ratio (i.e., smaller or equal to 0.1), the level of inconsistency in the judgements provided had no significant effect on the usefulness of the MCDM method, as also concluded by [25].

5 Conclusion

This paper contextualizes the combined use of *Gemba Walks* and A3 as an integral part of a public management group`s SD process, to identify and methodologically generate critical information regarding organizational improvement opportunities, which are then selected for implementation via the AHP. Such fieldwork, involving the integration and implementation of these tools and methods in police services' SD, is arguably scarce in the literature. This study can have practical implications, as it ideates a model (Fig. 1), broadly demonstrated in a case exercise, which is adoptable by other public organizations seeking to implement Lean and MCDM as part of their strategic management system. The suggested approach can help to enhance the consensus and consistency associated with multi-criteria group decision-making and minimize the adverse consequences of an ineffective SD process. However, there are limitations to this study. Among other things, this study displays challenges and a single case exercise conducted in one police district. Hence, there are limitations to its generalizability. Additionally, this study does not report on further implementation of the A3s and the sequenced steps in the SD process. Further research shall therefore follow the continuation and deployment of one of the selected strategic A3s and its subordinate tactical A3s, to report on the overall SD process and performance of the organization.

References

1. Santhiapillai, F.P. and R.M.C. Ratnayake: Risk-based prioritization method for planning and allocation of resources in public sector. The TQM Journal (ahead-of-print) (2021).
2. DFØ.: Evaluering av nærpolitireformen: Statusrapport 2019. Oslo. pp. 1-64 (2020).
3. Tortorella, G., P.A. Cauchick-Miguel, and P. Gaiardelli.: Hoshin Kanri and A3: a proposal for integrating variability into the policy deployment process. The TQM Journal 31(2), 118-135 (2019).
4. Simons, P., Benders, J., Bergs, J., Marneffe, W. and Vandijck, D.: Has Lean improved organizational decision making?. International Journal of Health Care Quality Assurance 29(5), 536-549 (2016).
5. Ratnayake, R.M. and T. Markeset.: Implementing company policies in plant level asset operations: Measuring organisational alignment. European Journal of Industrial Engineering 4(3), 355-371 (2010).
6. Glomseth, R., Toppledere og toppledelse i politi og påtalemyndighet. The Norwegian Police University College. p. 1-40 (2020).
7. Witcher, B.J. and V. Sum Chau.: Balanced scorecard and hoshin kanri: dynamic capabilities for managing strategic fit. Management Decision 45(3), 518-538 (2007).
8. Netland, T.H. and Powell, D.: The Routledge Companion to Lean Management. 1st ed. Routledge, New York (2016).
9. Narayanan, S., Vickery, S.K., Nicolae, M.L., Castel, M.J., Mcleod, M.K.: The effects of lean implementation on hospital financial performance. Decision Sciences, 1-21 (2021).
10. Romero, D., Gaiardelli, P., Wuest, T., Powell, D., Thürer, M.: New Forms of Gemba Walks and Their Digital Tools in the Digital Lean Manufacturing World, in: B. Lalic et al. (Eds.), IFIP, AICT, vol. 592, Part II, pp. 432-440. Springer (2020)
11. Ballé, M., Chartier, N., Coignet, P., Olivencia, S., Powell, D.: The Lean Sensei. 1st edn. Lean Enterprise Institute, Inc (2019).
12. Womack, J.P.: Gemba Walks. Expanded 2nd edn. Lean Enterprise Institute, Inc (2013).

13. Anderson, J., J. Morgan, and S. Williams.: Using Toyota's A3 Thinking for Analyzing MBA Business Cases. Decision Sciences Journal of Innovative Education 9(2), 275-285 (2011).
14. Tang, L.C., Goh, T.N., Lam, S.W., Zhang, C.W.: Fortification of Six Sigma: Expanding the DMAIC Toolset. Quality and Reliability Engineering International 23(1), 3-18 (2007).
15. Saaty, T.L.: How to make a decision: The analytic hierarchy process. European Journal of Operational Research 48(1), 9-26 (1990).
16. Samarakoon, S.M.K. and R.M.C. Ratnayake.: Strengthening, modification and repair techniques' prioritization for structural integrity control of ageing offshore structures. Reliability Engineering and System Safety 135(1), 15-26 (2015).
17. Saaty, T.L.: Decision making with the Analytic Hierarchy Process. International Journal of Services Sciences 1(1), 83-98 (2008).
18. Rocco S, C.M. and E. Hernandez.: Robustness and sensitivity analysis in multiple criteria decision problems using rule learner techniques. Reliability Engineering & System Safety 134(1), 297-304 (2015).
19. Angelis, A., P. Kanavos, and G. Montibeller.: Resource allocation and priority setting in health care: A multi-criteria decision analysis problem of value?. Global Policy 8(1), 76-83 (2017).
20. Bernroider, E.W.N. and P. Schmöllerl.: A technological, organisational, and environmental analysis of decision making methodologies and satisfaction in the context of IT induced business transformations. European Journal of Operational Research 224(1), 141-153 (2013).
21. Bryman, A. and E. Bell.: Business Research Methods. 3rd edn. Oxford University Press Inc. (2011).
22. Smith, S.: Improving Governance Through Gemba Walks. Healthcare Executive 34(2), 50-51 (2019).
23. Cuoghi, K.G. and A.B. Leoneti.: A group MCDA method for aiding decision-making of complex problems in public sector: The case of Belo Monte Dam. Socio-Economic Planning Sciences 68(1), 100625 (2019).
24. Asadabadi, M.R., E. Chang, and M. Saberi, Are MCDM methods useful? A critical review of Analytic Hierarchy Process (AHP) and Analytic Network Process (ANP). Cogent Engineering 6(1), 1623153 (2019).
25. Ishizaka, A. and S. Siraj.: Are multi-criteria decision-making tools useful? An experimental comparative study of three methods. European Journal of Operational Research 264(2), 462-471 (2018).