

Innovation through implementation of a quality improvement method

A finnish public-sector case

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Abstract

Purpose – The purpose of this paper is to analyse the effectiveness of a quality improvement method in driving innovation in the public sector. The study expands on the concept of innovation and analyses the types and usefulness of the innovations observed.

Design/methodology/approach – The study utilizes an action research approach. The aim of the quality improvement method introduced is to generate innovations enhancing efficiency. An interventionist research method is required to produce the findings. Data collection methods include a preliminary question sheet, interview, workshops, observation and the examination of other material concerning the case organization.

Findings – The study supports the notion that innovations created with a quality improvement method can be more oriented towards process improvement, particularly in the public sector. Further, when the method enables professionals from different functions to participate in the process, the innovations created can be more comprehensively designed. Innovations can be classified according to their degree of novelty, type, resource consumption and the projected outcome. A project follow-up makes it possible to compare the projected outcome of the innovation against its actual outcome.

Practical implications – The method applied could be a viable option for practitioners considering public sector quality improvement and innovation capacity building. The paper provides guidelines for prioritizing innovations in terms of their resource consumption and usefulness.

Originality/value – Integrating quality improvement with innovation generation as a potential efficiency source for public-sector organizations has received relatively little research attention. Further, the paper provides a categorization for innovations in the public sector that provides guidelines for prioritizing innovations.

Keywords Public sector, Innovation, Quality management, Efficiency, Improvement

Paper type Research paper

Introduction

The Finnish public sector has undergone a series of developments over the last decade. At the societal level, municipalities and their service structures have been under constant scrutiny. This process has been taking place because many of the municipal organizations have been unable to meet their budgets or the required standards for quality of service. Moreover, central government has increased the task load and the services the public sector is required to deliver, while the relative amount of available resources has been reduced. Further, changes in the population structure, such as the ageing demographic, put further pressure on the Finnish public sector (Bailey *et al.*, 2016).

More generally, Pollitt (2010) states that public-sector organizations share the prospect of an extended period of public fiscal austerity, yet the demand for improved public services continues. This creates an imbalance between income, expenditure and expected quality of service. Imbalance between income and expense in the Finnish public sector has given rise to issues with



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long-term financial sustainability (Kork *et al.*, 2015) and forced the sector to seek savings in public services (Bailey *et al.*, 2016). These developments have focused public-sector attention on various improvement projects, the main target being to deliver more services with fewer resources (Kork *et al.*, 2015), that is, to be more efficient. Bysted and Jespersen (2014) argue that austerity in the current (public) economy has created the need for efficiency related innovations.

Nevertheless, Ter Bogt (2008) argues that private-sector inspired techniques, introduced to the public sector, have not realized their functional potential, that is, many of the recent management changes in the public sector have been perceived as unsatisfactory while the information generated by the projects is rarely used. Other critical voices include Adolffsson and Wikström (2007) who report on a case study on the Swedish school system; participants in their quality project indicated that they were unhappy about a quality system that did not include cost management as part of the implementation. Hartley (2005) has studied innovations in the public sector and argues that while the private sector may view innovation as a virtue in itself, public services can justify a focus on innovations only when it increases public value through quality, efficiency or fitness for purpose. Akgün *et al.* (2014) argue that quality management provides a way to increase innovativeness among employees and subsequently, organizational performance.

Importantly, employees of an organization are the source of innovations. Bysted and Hansen (2015) argue that the literature often presents public-sector employees as less innovative than their private-sector counterparts; however, their results reveal no significant difference between the innovative capacity of public-sector and private-sector employees. Nevertheless, the innovation context in the public sector is quite different, and includes goal ambiguity, a different organizational structure, and differing decision-making rationales (Demircioglu and Audretsch, 2017). Whereas private-sector innovations tend to be motivated by profit generation, public-sector innovations tend to be more efficiency focused (Bysted and Jespersen, 2014) and their creation motivated by more employee-specific factors (Demircioglu and Audretsch, 2017). Policies and organizational structures in public-sector organizations tend to be more constrictive. Accordingly, public-sector organizations need to invest in creating space for innovation development and permitting employees to create experimental solutions. Public-sector organizations should also emphasize the motivational side of innovation creation, which can be fostered by a bottom-up approach to improvement that helps individuals feel they are in control of their work (Demircioglu and Audretsch, 2017).

Brignall and Modell (2000) note that staff competence and satisfaction may be good indicators of quality and innovation in an organization, that is, competent and satisfied employees are likely to produce a higher number of innovations while the quality of their work also increases. Further, according to a study of innovations in the public sector (Gieske *et al.*, 2016), employees that regularly cross professional boundaries and possess the ability to absorb new information and alter existing insights are more likely to produce innovations in the public-sector context. Process innovations, in turn, are associated in the public sector with higher efficiency that may create further slack, enabling subsequent innovations to be created (Walker, 2014).

Earlier discussion points to a need to study methods to deliver improvements in efficiency in the public sector that combine quality improvement and an avenue for innovation generation. One promising alternative could thus be a quality improvement method complemented with innovation creation. This study seeks to analyze the effectiveness of a quality improvement method as a potential source of innovations, specifically directed to improve organizational performance and to alleviate problems in organizational processes. Thus, this study asks: "How does a quality improvement method support innovation creation and how can the innovations created be analysed in terms of their type and usefulness?".

This paper analyses the concept of innovation and describes a case where various improvement innovations were generated. The study then analyses the type and novelty of those innovations and provides a classification intended to help conduct a similar analysis in other organizations. The classification created integrates an analysis of the benefits obtained from innovations vs the resources they consume. Practical implications are offered for public-sector managers interested in building an innovation capacity and conducting quality improvement.

The CAMP method

The method for quality improvement depicted here was created in a project funded by The National Funding Agency for Technology and Innovation (formerly known as TEKES) in Finland and reported in a study by Järvinen *et al.* (2000). The method was further refined in a study by Malmi *et al.* (2004). More recent research has reported on improvement projects conducted within public-sector functions in Finland (Mättö and Sippola, 2016; Mättö *et al.*, 2017).

In this paper, an implementation of the “collaborative approach for managing the project cost of poor quality” (CAMP) (see Järvinen *et al.*, 2000; Malmi *et al.*, 2004, p. 293) is illustrated with a project conducted in a Finnish municipally owned real-estate organization. Several authors have noted the need to involve the workforce of the organization in the improvement process (Radnor and Boaden, 2008; Hoozee and Bruggerman, 2010; Demircioglu and Audretsch, 2017). One feature of the quality costing method illustrated in this paper is the bottom-up perspective, which involves operational level workers from the outset. The reasoning is that the workshop participants possess experience and tacit knowledge of their own work that permit them to identify and evaluate operational issues. Another key element in the CAMP method is the use of workshops to save time and effort on data collection, to avoid going back and forth between different departments and the creation of a shared understanding between members of the organization (Malmi *et al.*, 2004).

The CAMP method starts from an initial questionnaire (see Appendix) that is sent to participating employees. Respondents are asked to indicate problems in their work environment, to estimate the effect of those problems on their daily work and finally to offer opinions on what caused them. Finally, respondents are asked to rank the problems identified. This stage involves assigning three points to the highest priority problem, two points to the second most important problem and one point to all other identified problems. In the project in question, the start-up questionnaire was sent to 16 people working in the municipally owned public organization that governs the real-estate holdings of the municipality. The staff were asked with identifying their operational work-related problems for further analysis.

In the CAMP method, questionnaire responses are then used to draw fishbone diagrams (Ishikawa, 1985, Figure 2) to represent cause-and-effect chains to aid root cause analysis. The arrows in the diagram (see Figure 2) represent the direction of the cause-and-effect chain, indicating the root causes that trigger other issues in the organization. For example, the closest problem to the centre line (e.g. “no working privacy” in Figure 2) is the identified effect of a given problem reported in the questionnaire responses (see Appendix). The effect is the result of the problem “noise”, which is said to be caused by the “open-office” environment. At this stage of analysis, problems should also be grouped under different classes, as the fishbone diagrams work best when separate diagrams for different problem classes are used; thus, this phase involves interpretative work by the researcher in the form of problem classification. However, the method described here increases the validity of the results by feeding the constructed presentations back to the organization’s members. This is achieved by conducting mutual workshops that place members of the organization into teams. These teams are then given the fishbone diagrams for possible modification or addition. Qualitative analysis proceeds from constructing the fishbone diagrams (Figure 2), which present the answers obtained from the initial inquiry in cause-and-effect chains. The method allows both the causes of the issues and their effect on the organization to be analyzed.

Alongside the creation of the fishbone diagrams, a Pareto graph (Ishikawa, 1985) is constructed. The Pareto graph (see Figure 1) is constructed by quantifying the problems through the classes they represent. For example, problems concerning lack of time or excessive waiting times can be classified under the time problem class. The size of these classes is then calculated by adding the ranking points from all the problems placed within the relevant class (Figure 1). For example, if one respondent evaluates a time-related problem to be the most pressing, that problem is allocated three points in the questionnaire. If another respondent allocates a time-related problem two points, the points are added together to calculate the size of the problem class.

The CAMP method also involves three separate workshop days held with different members of the case organization following the collation of the questionnaire answers and the creation of the fishbone diagrams and Pareto graph. All three workshops include tasks to be accomplished within them. In addition to workshops, the method consists of work phases for the researcher in the periods between the workshops. During the first workshop, operational level workers validate the fishbone diagrams by having the right to modify them if the interpretation of the researcher does not reflect their answers. Another aim of the workshop is to scrutinize problems labelled significant during the workshop. In the second workshop, improvement initiatives are created, utilizing all the material generated. Teams of employees examine the material and devise initiatives to address the most significant problems identified in the first workshop. Idea is to create a plan identifying key persons, estimated resource use, improvement obtained and an initial outline of implementation.

The CAMP method also addresses efficiency-seeking concerns by assigning costs to identified problems. This is done in the third workshop by way of an evaluation conducted by organizational members who are knowledgeable about the processes involved. This process usually involves middle management with knowledge of the costs attributable to the problems identified. The cost impact of the problems will be assessed by considering costs such as working hours lost, equipment or material costs and so forth. This third workshop completes the CAMP method, adding the identified costs as a prioritization base for improvement initiatives. After the project has been conducted, senior management chooses the initiatives to be implemented based on the material obtained from the project.

Chiarini and Bracci (2013) suggest that implementing a statistics-based improvement method (e.g. Six Sigma) might not be applicable in all settings. For example, in some contexts process standardization might be more problematic to conduct. This issue may be more pressing in project-based organizations where standardized outputs are hard to define, as in the case organization in question: its operations cover a range of different functions that vary from one project to another. It is noteworthy that the CAMP method does not contain any statistical analysis beyond the categorization of problems into different problem classes.

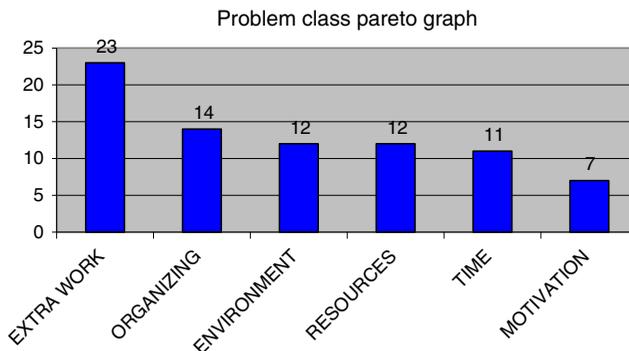


Figure 1.
Problem class
Pareto chart

However, a qualitative approach also has its limitations. Malmi *et al.* (2004) point out that the CAMP method is based on the assumption that an organization's employees are aware of the problems inherent in work processes. However, in complex organizations with multiple interactions between individuals, this might not always be the case. Further, this method identifies problems that are linked to the work process of the employees. Problems pertaining to organizational outcomes, like loss of goodwill or lost sales might not be found. Accordingly, this limitation is more likely to have an influence if the method is used in the private sector than in the public sector. Malmi *et al.* (2004) also emphasize the need to ensure the employees in the workshops represent all critical functions (e.g. billing).

Innovations and quality

In the private sector, application of quality management has been associated with increased business innovativeness and ultimately, better financial performance (Akgün *et al.*, 2014). Similarly, Kafetzopoulos *et al.* (2015) find that quality management in the private sector is associated with increased innovativeness; however, the study relies on its respondents to operationalize innovativeness. Indeed, according to de Vries *et al.* (2016), many studies on innovation have failed to clearly define innovation.

Rogers (2003, p. 12) defines innovation as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” and the recent study by Demircioglu and Audretsch (2017) emphasizes this point in stating that innovation must be new to the organization, although similar solutions might have been developed or adopted by others. However, Brown (2010) notes that definition of innovation should include a presupposition that there is a clear discontinuity with past practices. Brown's approach tries to differentiate between incremental change and true innovation. Osborne and Brown (2011) also raise this issue and argue that public-sector studies often fail to differentiate incremental public-service development from innovative change. According to their tighter definition, developments can be called innovations if they affect the definition of the service provided or increase the skills or competences of the employees. Finally, de Vries *et al.* (2016) also address the concept of innovation and categorize innovations into process innovations (either administrative or technological), product or service innovations, governance innovations and conceptual innovations. Although there are earlier categorizations of innovations available (e.g. Osborne and Brown, 2011), this study utilizes the categorization of de Vries *et al.* (2016) as it is based on a systematic and extensive review of earlier literature on the subject.

de Vries *et al.* (2016) have noted the need for identification of innovation stimulating antecedents. According to Gieske *et al.* (2016), creation of innovations in the public sector may be supported by the building of innovation capacity and that innovation capacity is fostered by boundary spanning activities, in which actors engage with each other outside their usual domain of expertise. One feature of the depicted CAMP method is to create work groups for quality improvement where members from different areas of expertise discuss the potential for new improvement ideas and innovations. Gieske *et al.* (2016) describe the second feature of a public organization with high innovation capacity as the ability to absorb new information and alter existing insights. The CAMP method uses a feedback-loop in which data from earlier phases of the project are forwarded to workshop participants to facilitate learning and modification of the material where necessary. That is, if the interpretation of the researcher conflicts with that of the employee, the employee has the opportunity to correct such misinterpretations. Finally, Gieske *et al.* (2016) note that organizations should combine the improvement of existing routines or services with innovation in order to utilize “ambidextrous capacity”. This in turn, will increase the innovation capacity of the organization (see also Andriopoulos and Lewis, 2009). It is in the nature of many quality management techniques to improve on the existing processes, including the CAMP method. It identifies the quality problems present in the organizational

processes and provides ideas on addressing the identified problems. These improvement ideas, constructed by the employees, are argued in this paper to be a type of (potential) innovation that spans intra-organizational boundaries through engagement of employees from multiple professional domains.

According to de Vries *et al.* (2016) most studies on innovation fail to follow-up on the adoption of innovations. That is, research has thus far omitted the identification and analysis of what happens after the innovation has been adopted. Accordingly, actual outcomes and improvements stemming from innovations have rarely been addressed (de Vries *et al.*, 2016). This study reports on a follow-up process conducted a few months after the project had ended, which investigated whether the improvement initiatives (innovations) had been carried out and identified the ultimate outcome of the initiatives.

Methodology

The CAMP method utilized in this study presupposes the selection of interventionist research for methodology. This is because the CAMP method addresses problem solving through employee participation and cooperation between researchers and practitioners (see Coughlan and Coughlan, 2002; Jönsson and Lukka, 2005). Interventionist research is necessary in this study to produce directly applicable results (see e.g. Malmi and Granlund, 2009). Simply observing organizational life would not have led to the implementation of the quality improvement method and the innovations central to this study. The chosen form of interventionist method in this study is action research (AR). The concept of AR was established by Kurt Lewin (1946) and variants of it are widely used in the social sciences (see Coughlan and Coughlan, 2002; Jönsson and Lukka, 2005).

The CAMP research process has a number of fixed characteristics, such as workshops, tasks attributed to workshops, identification of quality costs, a procedure to identify quality failures and an improvement ideas procedure. Other work phases such as analyzing and prioritizing the data are conducted between data generation phases.

The data informing this study were gathered through the triangulation of sources, a situation fairly typical in a qualitative case study (Eisenhardt and Graebner, 2007; Jönsson and Lukka, 2005; Malmi and Granlund, 2009). The CAMP method involves the use of a preliminary question sheet, workshops and observation. Further, a follow-up interview was conducted to gain insight into the eventual outcome of different innovations. Data source triangulation helps to counter threats to validity (McKinnon, 1988; Malmi and Granlund, 2009). Moreover, the use of the CAMP method involves the research findings being fed back to the members of the organization for validation several times. This is done after each workshop phase to ensure possible changes to the data can be introduced at the start of the next workshop. This feedback of the findings to research subjects also serves to enhance the validity of findings (Otley, 1980). This study investigates the innovations that a public-sector organization may create through the implementation of a quality improvement method. Empirical data gathered through this study are used to analyze and identify the types of innovations created. As such, results and typologies emerge from the gathered empirical data (cf. Yin, 2017).

Research reliability deals with the possibility of obtaining similar results through repetition of the research (McKinnon, 1988). Although in case research every instance is unique in terms of the problems raised and initiatives created during the improvement project, the detailed description of the method allows replication of the method itself in other similar contexts, thus making the method potentially generalizable.

Labro and Tuomela (2003) note that in interventionist research, the internal validity of the research is ensured through understanding the topic at hand and utilizing this knowledge in the creation of solutions. Labro and Tuomela (2003) also point out that to increase internal validity, interventionist research should discern whether the improvements (or innovations)

devised were implemented in the organization. This case study applied a quality improvement method based on the research literature (see Malmi *et al.*, 2004; Mättö and Sippola, 2016) in a public-sector organization to stimulate innovations. This study also includes a follow-up phase to identify the improvement initiatives implemented. Labro and Tuomela (2003) point out that interventionist research obtains external validity through an evaluation of the generalizability of the results. Discussion on the results and the associated analysis tool is offered in the discussion section of the study.

The case

The case organization is a Finnish municipally owned public organization situated in a medium-sized Finnish city. It governs the real-estate holdings of the municipality. It is in charge of public premises, their maintenance, productivity, rental and the occasional construction of new buildings including both public housing and municipal buildings such as schools or health-care centres. Its 2017 annual budget was €58m, and it had real-estate holdings worth around €300m that were managed by 24 permanent personnel supported by temporary personnel in summer. The staff manage construction projects with outside contractors, the bidding processes for various maintenance and construction tenders, the contracts between different parties, and also operate a customer service centre, bill tenants and inspect the municipally owned buildings.

The project was conducted in 2007, starting with an initial questionnaire sent to 16 respondents, of whom 14 provided answers. The responses mentioned 38 different problems, and all contained thoughts about the effect of the problems on working conditions as well as an evaluation of the causes of those problems. The problems were categorized by the researcher, in line with Malmi *et al.* (2004) into six different problem classes (see Figure 1).

The problems identified from the responses dealt with extra work, problems centred on the organization of work activities, problems in the work environment, lack of resources, time constraints and lack of motivation. The Pareto graph depicts the relative size of each problem class, which was elicited by asking respondents to award three points to the highest priority problem, two points to the second most important, and one point to all other problems. The final value of the problem class was obtained by summing all the points awarded, thus all problem categories are ranked both in terms of the problems they contain and on the evaluation of their importance.

The analysis of the responses made it clear that the personnel of the case organization considered problems centred around extra work to be the largest issue. Problems in this class included various maintenance related issues such as constant changes to maintenance projects creating extra work, unclear responsibilities complicating seeking information, extra inspection activities resulting from missing maintenance logs or changes in the reporting protocol causing extra reporting work for the field personnel. The organizing problem class included problems around organizing project work, the large number of meetings disrupting work and unclear maintenance priorities creating uncertainty around future projects. The environment problem class included issues connected to working in an open-office environment such as constant interruptions to the respondent's work. The resources, time and motivation classes incorporated more straightforward problems centred on resource consumption, lack of proper equipment, or lack of funding, lack of time, schedule constraints, a constant feeling of urgency and finally, problems centred around anxiety, work motivation or stress.

Figure 2 illustrates the above-mentioned problems displayed in cause-and-effect chains, also called a fishbone diagram (cf. Ishikawa, 1985). The form offers a way to easily display problems categorized under different classes (see Figure 2 below illustrating the environment classification as an example). The problems are placed in the fishbone diagram according to the cause-and-effect path elicited; for example, the open-office environment leads to noise, which in turn can make it difficult to concentrate on work.

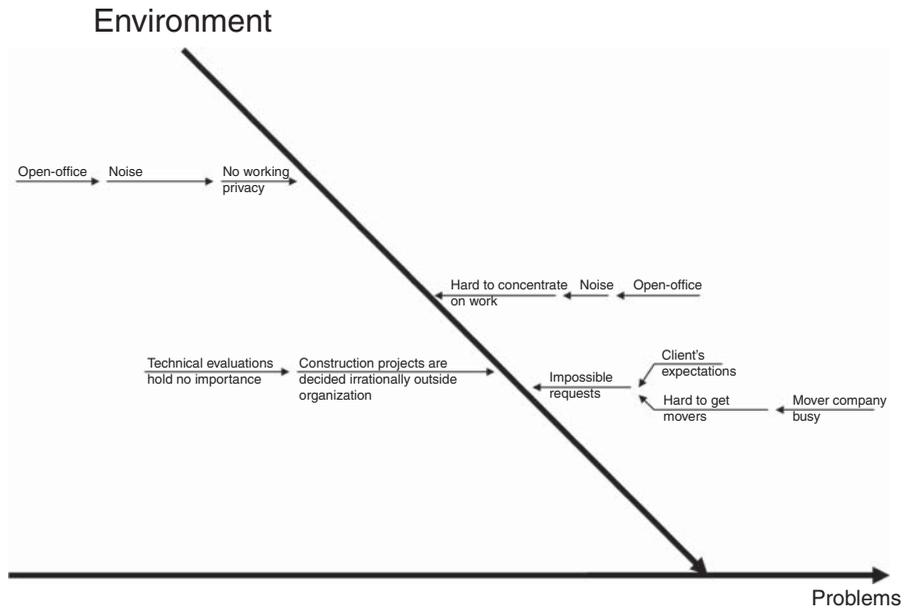


Figure 2.
Example of fishbone
diagram from the
case organization

The Pareto graph (Figure 1) and fishbone diagrams were taken into the first whole-day workshop held with the participants from the organization. All 16 people invited to attend the workshop did so. The aim was to go through all the data generated and make modifications where necessary, to identify the most important problems through team-based discussion, enrich the data with new problems or insights and finally present the findings for all participants at the end of the workshop. All participants had received the preliminary fishbone data in advance so that less time would be spent familiarizing themselves with the data during the actual workshop. The 16 participants were divided into four teams of four members, each with designated parts of the fishbone data. This was done to ensure that there was no parallel teamwork taking place. Some participants had no prior knowledge of fishbone diagrams, so the researcher spent the first hour of the workshop explaining how to read and understand them and also outlining the workshop structure. The researcher also circulated among the teams during the workshop to ensure the process was understood, to offer clarification where necessary and to observe the discussions. Following their discussions, the teams presented their findings to the group as a whole and invited further discussion. Among the problems illustrated in the fishbone diagrams, participants ranked the open-office working environment, increased reporting requirements, unclear quality standards, the lack of monetary and staffing resources and a lack of time as the most problematic issues. While the role of the first workshop was mainly to prioritize the problems in the diagrams and validate the researcher's interpretive work, some new additions were also made to the diagrams by the teams. After the presentations, the annotated diagrams were collected by the researcher for transcription. The researcher also had access to notes on the discussions taken during the presentations. Following transcription, the researcher sent the material to the participants for review and to elicit feedback.

The second workshop was scheduled to last for 8 h and set out to review all the material gathered previously and construct initiatives to address the problems identified. The same 16 participants who attended the first workshop were invited to the second workshop and all attended. The workshop material included fishbone diagrams constructed from the responses to quality problems questionnaire and modified according to feedback in the first workshop, the

problem class Pareto graph and the discussion material were also revisited. The participants again formed four teams of four members, and as in the first workshop the different fishbone diagrams and cause-and-effect problem statements contained in them were distributed to the teams so as to ensure there was no parallel work. Therefore, for example, one team received time and motivation, while another received extra work. Teams were able to choose which problems they would address and were expected to create several improvement ideas complete with a basic description of the initiative, rough plans on implementation costs, associated risks, estimated timescales and staff required. As in the previous workshop, the teams presented their results for group discussion at the end of the workshop. During the team-working process, the researcher observed the teams and offered advice on the material when requested.

In total, the teams devised seven different improvement initiatives based on the problems found in the earlier phases. The improvement plans were, as requested, complete plans outlining the initiative and featuring estimated costs, people responsible for the implementation, associated risks and estimated timescales.

A fairly typical problem facing the case organization was that customers often added requests after contracts had been signed, which caused a coordination challenge to include the modifications in project schedules. The initiative addressing this problem targeted a 0.5 per cent reduction of costs for larger projects, and a 2 per cent reduction for smaller projects. The initiative also included better coordination of project work, which would entail the coordination of various extra tasks into construction projects and the budgeting of resources for such tasks. However, a related initiative acknowledged that acting upon customer requests to change plans would require guidelines for acceptance of these extra requests. In certain cases, schedules would overrun or the costs incurred would be prohibitive if the customer's late request were to be accepted. Accordingly, guidelines for declining a request were also outlined. This would prevent high-cost inclusions and would help achieve the project schedule. The third initiative, also related to construction projects, was the aim to clarify project responsibilities. Construction projects of the organization were handled by several teams, depending on the stage of the project. For example, while a construction foreman's team would oversee the actual construction, quality assurance would be handled by another team. The initiative aimed to include meetings between the project managers associated with the project, which were not a feature of the transfer of project responsibility at that time. The workshop participants estimated that such meetings would require only approximately 1 h of the project managers' time, making it a low resource initiative that could facilitate the smooth transfer of a project to the next team and accordingly a reduction in wasted time and resources.

A fourth initiative covered the creation of new quality standards for service. The quality standards had become obsolete following new rules for project procurement and construction legislation. For example, asbestos was no longer allowed in the buildings, cleaning standards had been changed and new legislation mandated better accessibility for physically impaired people. The participants noted that new standards were required but recognized that the extent of the regulatory changes would require a full year to incorporate into new standards. Nevertheless, such changes were expected to trigger customer satisfaction improvements, improve work efficiency by reducing time spent seeking and confirming information and to ensure the quality of work met requirements.

Another problem identified by the personnel was the noise and disruption associated with the open-office environment. One of the initiatives sought a reduction of noise while another targeted creating codes of conduct. The workshop participants suggested movable walls and other technological solutions (e.g. active noise control devices) to resolve the issue of office noise interfering with work. Another solution offered was personnel meetings to agree codes of conduct. The workshop participants aimed to improve work efficiency and motivation by reducing disruptions and background noise. The proposed codes of conduct also entailed better sharing of information between different teams and between management and employees.

Finally, after the second workshop, the personnel involved presented a mutual improvement initiative to address the increasing reporting demands which the field personnel saw as interfering with their other responsibilities. As a solution, they recommended hiring a new office worker specifically to handle the increased reporting. The workshop participants thought the researcher might act as a mediator between them and the management to reinforce the request for increased resources.

The third workshop, held a few months after the project had started, addressed the costs of the problems identified in the questionnaire responses and the first workshop. In this workshop, five senior members of the organization with well-developed project management expertise joined the group to help estimate the costs of different issues. At the start of the workshop, the researcher presented the outline of the day and stated the purpose of the workshop. The aim was to quantify existing quality failure costs that were linked to a particular problem presented in the cause-and-effect diagrams or fishbone diagrams. These costs were evaluated in terms of lost working hours, materials and other quantifiable costs. Quantification aimed at creating a knowledge base to prioritize the improvement initiatives. The quality costs estimated to arise from the different problems ranged from minor costs of few thousand euros to larger problems that could cost hundreds of thousands of euros due to lost working hours, idle equipment or material losses. After 4 h of deliberation in the workshop, the researcher was tasked with transcribing the results to an electronic form that could be circulated to the participants to elicit feedback.

Unclear project responsibilities were estimated to affect three persons for large projects and one person for smaller projects. Quality costs were ascribed to the time lost arising from unnecessary familiarization with projects. The quality cost was estimated at around €35,000 across the affected projects. Regarding the disruptions caused by the open-office environment, this was evaluated as affecting all operational level employees each day and stated to reduce work efficiency. The estimated annual quality cost was around €160,000. Additional requests from customers resulted in lost working time due to the requirement to clarify liability and was estimated to incur around €15,000 in quality costs. However, the costs of extra constructions would have to be added to that estimation and that sum varies considerably from project to project. Problems with quality standards were not quantified as this was a new conceptual quality issue and thus hard to evaluate. These evaluated quality costs were used as one prioritization base for the selection of improvement initiatives. However, a recent study by Love *et al.* (2018) notes the difficulties in evaluating quality costs in the construction industry. The study reports that estimated quality costs range from less than 1 per cent to 20 per cent of the projects' contract value. While the potentially different contexts are reflected in this, it also illustrates the difficulties in planning for all eventualities. Consequently, costs estimated in this project should be taken as the identified part of potentially larger quality costs.

While the researcher's part in the actual quality cost management project ended at this stage, the researcher went on to interview the CEO of the organization a few months after the project had ended. The aim was to find out if the improvement initiatives had been implemented. The CEO reported that the discussion on open-office issues had resulted in some sound management work being undertaken, although not all the noise that was a consequence of an open-office environment could be eliminated. Discussions with the staff had clarified information distribution channels, addressed open-office working guidelines and unclear project management responsibilities. Updating the quality standards was an ongoing issue at the time. However, the CEO had rejected hiring a new person dedicated to reporting on the grounds that, "[the] resources of the organization do not permit it" and that "[the] municipality would not agree". The subtext behind this reasoning seemed to be that hiring new personnel would run counter to the organization's key goal of saving on resources and improving efficiency. It is worth noting that this suggestion by employees did not qualify as an innovation as it merely represented a decision on whether to hire a new employee for predetermined (reporting) duties.

Discussion and conclusions

Building on the ideas of Brown (2010), Rogers (2003) and de Vries *et al.* (2016), this study categorizes innovations according to their type and degree of novelty. Smaller improvements that might build on existing practices can be labelled limited (or incremental, see Osborne and Brown, 2011) innovations, while new concepts, services or ways of doing things might be called true innovations. Rogers (2003) notes that innovation is an idea, practice or object that is new to the unit or organization adopting it, although it might not be new in other contexts. Brown (2010) further differentiates between incremental change and true innovations. Osborne and Brown (2011) seem to emphasize the external influence and wider context of the innovations. They also argue that to be called innovations, change must either address the service being provided or build the skills and competences of the employees. Following Rogers (2003), innovations existing outside an organization but absent within the organization, can be thought of as limited innovations if the resulting innovation does not result in substantial changes in the operations of the focal organization. However, utilizing a solution from outside the organization usually involves customization and may result in true innovation. The categorization offered by de Vries *et al.* (2016) further divides innovations into process improvements (administrative or technological), product or service innovations, governance innovations and conceptual innovations.

Hartley (2005) and Walker (2014) note the need for innovations in the public sector to address efficiency concerns. To do so, innovations should also be evaluated on the resources they consume vs the benefits they grant. It is suggested that complementing the integrated categorization of innovations with quality cost savings or other benefits obtained from the innovations created and the resources they consume (Table I) permits an organization to analyze benefits vs costs for the different types of innovation. While the

	Category	Degree of novelty	Projected result	Resource consumption
1. Better coordination of project work	Administrative process innovation	Limited innovation	Savings of 0.5% in large projects, 2% in small projects	Planning time; projected to be fairly low
2. Clarification of project management responsibilities	Administrative process innovation	Limited innovation	Small savings in project responsibility transfers	Approximately 2 h per project
3. Quality standard update	Conceptual innovation	True conceptual innovation. New standards created	Avoidance of too high/low quality work. Customer satisfaction, efficiency	Intermediate; projected to take one year
4. More controlled approval of customer demands	Administrative/ service innovation	Limited innovation	Project schedule holds, no high-cost inclusions	Minimal
5. Sound management	Technological process innovation	Limited innovation with local customization	Better work motivation, efficiency	Movable walls, other technologies. Ca €5,000
6. Agreement on mutual rules for conduct	Administrative process innovation	Limited innovation	Better work motivation	Minimal; time used for meetings
7. Hiring of a new employee	Not applicable as innovation	Not applicable	Savings through consultancy fees, perceived by employees as equaling hiring costs	Yearly salary

Table I.
Project innovations categorized by type, degree of novelty, outcome and resource use

CAMP method provides a way to stimulate innovation in an organization, Table I can be used as an analysis tool for the innovations created. Table I offers an organization a way to prioritize innovations through their projected result, the resources they would absorb, and the type and novelty of the innovation, and it could thus be helpful when undertaking innovation management.

This study contributes to the discussion on the characteristics of innovations, particularly in the public-sector context (Brown, 2010; Rogers, 2003; de Vries *et al.*, 2016). It also analyses the capacity of the CAMP quality improvement method (Malmi *et al.*, 2004) to produce innovations and provides an analysis tool to evaluate public-sector innovations in terms of their contribution to the overall efficiency of the organization.

The initiatives offered in this project covered a range of different problems and aimed to achieve better coordination of project work, to clarify the responsibilities of project management, to update quality standards in maintenance and construction, to tighten control over customer demands and their acceptance, to address sound issues of the open-office environment through mutual rules and technological solutions and to improve the sharing of information.

The innovations reviewed in this study are mostly of the process innovation type and both administrative and technological innovations are evident. It may be that the bottom-up nature of the CAMP method influences this finding, in that having operational level workers identify work process issues might result in more process-oriented innovations. Quality standard updates can be categorized as a conceptual innovation as they can be thought of as a new frame of reference (see de Vries *et al.*, 2016). Along with improvement number four (Table I), such updates also directly affect the services being provided to the case organization's service users (Osborne and Brown, 2011). Changes to services are, depending on the point of view, either an administrative or a service innovation. If the improvements developed in this study are evaluated through their influence on the skills, competences or services provided (Osborne and Brown, 2011), improvements one, two and six (Table I) would probably be labelled incremental changes rather than innovations. Although this distinction is open to debate, it is based on the premise that they affect the operational efficiency of the organization rather than its service or competence base. The innovations prompted by this study could (mostly) be called limited innovations, although some of the innovations are quite substantial in terms of their timeframe or projected result. For example, better coordination of project work aims for 0.5 per cent savings in large project costs and 2 per cent savings in smaller project costs, thereby constituting a sizable amount given the organization's size. An example of true innovation, the quality standard update was estimated by the workshop to take approximately a year to complete, which would constitute a long-term undertaking. Sound management is a known solution, although according to Rogers' (2003) more narrow view, it could qualify as true innovation in terms of the organization utilizing it. Several of the innovations prompted by this study contribute to employee satisfaction, which Brignall and Modell (2000) state is an antecedent of greater innovativeness. Such improvement innovations have the potential to increase the capacity for innovations in the organization (see also Gieske *et al.*, 2016). Moreover, as noted by Walker (2014), public-sector process innovations resulting in efficiency gains create further slack that can then be used to produce more innovations. Finally, encouraging the crossing of professional boundaries could spur more comprehensively designed innovations as employees with different professional backgrounds and expertise participate in the innovation creation process.

This paper depicted a quality cost management technique implemented in a public-sector organization. With the aid of workshops and various presentations, the organization was able to identify problems in its work processes, create improvement innovations to solve those

problems and prioritize them through cost evaluations. The outcome was practical solutions, some of which were implemented within the organization. The project follow-up exercise revealed that sound management had been introduced in the organization to alleviate acoustic issues inherent in an open-office environment, although not all the noise could be eliminated. Discussions with the personnel clarified information distribution channels, addressed open-office working guidelines and addressed unclear responsibilities in project management. Further, creating new quality standards had begun and was ongoing at the time of the follow-up. This study illustrates the necessity of adding a follow-up phase to innovation projects, as noted by (de Vries *et al.*, 2016). The follow-up enables the separation of projected outcome from the actual outcomes by revealing those innovations that were implemented in the organization, albeit often with varying degrees of success, as in the example of the sound management in the open-office environment mentioned above.

Several practical inferences can also be drawn from the case illustration; the improvement method should focus on issues deemed relevant by those working in targeted organizations. Otherwise, the decision making influence of the method will remain small and in the worst case, will remain an administrative level of bureaucracy with only added costs as a result (Chiarini and Bracci, 2013 p. 366). The CAMP method has the potential to increase practical orientation in that it involves the organization choosing the problems to be resolved.

Second, the chosen method should contain a way to address the economic or financial consequences of different choices, otherwise the financial impact of those choices is impossible to judge, which can lead to project participants feeling that the method did not address their practical concerns (cf. Adolfsson and Wikström, 2007). Third, worker participation in the project will ensure that staff influence the project's outcomes, meaning that the staff are motivated by those outcomes and feel accountable for them (Radnor and Boaden, 2008; Hoozee and Bruggeman, 2010). It also enables the feeling of control over one's work (Demircioglu and Audretsch, 2017). Fourth, the feedback-loop of the project's data into the organization for validation is an important part of the improvement effort to ensure that the data generated is not biased.

Malmi and Granlund (2009) point out that the results and relevance of a given technique are dependent on the organizational context in which it is applied. As is typical of a case study, this limits the options to generalize. The findings of this study are tied to the public sector, although the analysis tool created (Table I) can be tested in different contexts.

Earlier research has illustrated the use of the CAMP method in a range of different functions (Malmi *et al.*, 2004; Mättö and Sippola, 2016; Mättö *et al.*, 2017). This method has also been used to improve the functions of the public sector in numerous different projects. The depicted method is suggested to be a viable and cost-effective option for public-sector operational improvement and the generation of innovation.

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Project question sheet

Provide short descriptions of problems in your work. Describe how the problem affects your work and express your opinion on the cause of that problem. Prioritize the problems by assigning points to them: 3=biggest problem, 2=second biggest problem 1=all others.

Description of problem:	Importance:
Effect on work:	
Cause of the problem:	

Description of problem:	Importance:
Effect on work:	
Cause of the problem:	

Description of problem:	Importance:
Effect on work:	
Cause of the problem:	

Description of problem:	Importance:
Effect on work:	
Cause of the problem:	

Description of problem:	Importance:
Effect on work:	
Cause of the problem:	

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