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ORIGINAL RESEARCH

Benefits management and Information Technology work distribution

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Abstract

Organisations spend much money on Information Technology (IT) development and maintenance activities with the intention that these activities will create results that enable benefits for the organisations. This paper seeks to understand potential associations between IT development and maintenance activities and the adoption of benefits management practices to realise value for the organization. The aim is also to uncover potential differences between public and private organisations. We surveyed 86 Norwegian public and private organisations, including data collected in similar surveys every five years since 1993. For the period between 1998 and 2018, we observe a stable pattern of IT work distribution. We found that organisations that managed benefits put more effort into advancing functionality for the end-users than other organisations, and they realised more benefits. This advantage was particularly true for organisations that managed benefits beyond the early stages of the development lifecycle. Private organisations both managed and realised benefits to a larger extent than public organisations. Our findings can enable organisations to be evidence-based when choosing management practices to achieve a higher return on investments in IT development and maintenance activities.

1 | INTRODUCTION

Organisations have been striving to improve return on IT investments since the early days of professional use of IT. Several fields of research have been searching for ways to drive value from IT investments, including software economics [1, 2], value-based software engineering [3, 4], benefits management practices [5–10], project portfolio management [11] and various aspects related to IT project success and failure [12–14].

Boehm & Sullivan ([15], p. 937) write that 'Software is valuable when it produces information in a manner that enables people and systems to meet their objectives more effectively'. Achieving a sufficient return on IT investments can be challenging for many reasons, especially in volatile settings where needs and possibilities are in constant flux. Managers need to consider how to best evolve their IT resources in the face of, for example, technological change. Capabilities to guide such considerations might prove helpful [16].

Large changes in the underlying technology for information systems and how we develop information systems have been witnessed over the last 25 years. Over this period, the prevalent development methods, programming languages and general technological infrastructure have changed dramatically. In the early nineties, one went from mainframe solutions to a client-server and then to an Internet architecture for many applications. The year 2000 and the dot.com situation had a large impact on the development and maintenance of systems. Over the last 20 years, Service Oriented Architecture, cloud technology, outsourcing, mobile technologies and agile development have been adopted at a large scale and should be expected to have an impact. One would also expect the use of Artificial Intelligence, Big Data Analytics, IoT and 5G to soon affect how we develop information systems (see, e.g. [17]).

Given the rapid technological changes, researchers have stressed the importance of balancing effort on exploiting legacy systems and exploring new value-adding IT initiatives (see, e.g. [18, 19]). The purpose of both software development and maintenance activities is to ensure that information systems continue to be relevant to the organisation by contributing to the fulfilment of both current and upcoming organisational

needs and opportunities [20]. As stated in Ref.[21], all successful IT systems change over time; there is nothing detrimental about this per se. However, the nature of the changes varies; some changes do not add any immediate value to the end-users (e.g. replacement systems that only reimplement existing functionality on a new technical platform), while other types of changes add beneficial functionality, making it possible for the users to fulfil existing or new objectives in a better way. Changes that do not add immediate value (such as replacement systems without adding new functionality or other enhancements) may later enable further benefits by introducing opportunities for enhancing the functionality.

A benefit may be defined as 'an outcome of change, which is perceived as positive by a stakeholder' [[22], p. 23]. Projects can deliver outputs that create capabilities, which in turn are transformed into outcomes that can enable the realisation of benefits [23]. Benefits (ends) are linked with business changes (ways) and IT capabilities (means) [24]. Berg et al. [25] highlight that project output or project deliverables are sometimes presented as benefits. For example, 'a new IT solution' is not necessarily a benefit according to the UK Office of Government Commerce's definition [23] but may be a prerequisite for realising benefits, which will be the saved time, reduced cost, improved decision-making etc. This mix of project outputs/deliverables and benefits is a common problem, as pointed out by Aubry et al. [26]. IT development and maintenance activities typically produce outputs (for example, replacement systems or enhanced functionality for end-users), but we find limited research on how different activities relate to the realisation of benefits.

This paper uses the term 'IT work distribution' (or 'work distribution') for effort distributed between different IT development and maintenance activities. The kind of activities that we differentiate between is described in more detail in the next section. Several empirical studies have investigated work distribution divided into various categories of IT activities (e.g. [21, 27–32]). Several of these studies have measured the degree to which organisations can channel effort into evolving their application portfolio to provide valuable functionality (termed application portfolio evolution or functional development). Between 1998 and 2013, organisations' ability to prioritise application portfolio evolution appears to remain at the same relatively low level, according to the literature cited above.

Although the effort put into evolving the application portfolio might prove to be a good proxy for actual value creation, more sophisticated management practices have been developed to help organisations realise benefits from their IT investments. Ward et al. [5, p. 214] define benefits management as '(t)he process of organising and managing so that potential benefits arising from the use of IT are actually realised', which includes practices, such as IT project business case creation, benefits management during project execution, and post-project benefit harvesting. Benefits management practices have been subject to research for nearly 3 decades. However, the body of empirical research on the adoption and effects of such practices is still scarce [10].

While benefits management practices have been studied in several industries, a recent systematic review of the benefits management literature found that differences in the adoption and effects across different types of organisations had not been subject to much study [10]. A few studies exist, such as Ref. [33]. However, there is limited insight into potential differences between, for example, public and private organisations. Strategic management research has long recognised that organisations may have specific ways of creating value [34], which may further motivate studies of how types of organisations may differ in the extent to which benefits management practices are adopted, the types of output created from IT activities, and level of benefits realised.

Even though previous studies have made the distinction between the effort to improve valuable functional coverage and—for the end-user—less valuable upkeep of the application portfolio, we are not aware of previous research that has investigated associations between IT work distribution and the adoption of benefits management practices intended to improve value from IT-related work. From existing research over the last 3 decades [21, 27–32], we observe a tendency of relatively few resources to be used for the enhancement of functionality for end-users. We were interested in seeing if practices intended to help realise benefits relate to the extent of effort put into functionality enhancement. Motivated by a wish to help improve the value from IT-related activities, we established the following research questions.

RQ1 *How widespread is benefits management in organisations?*

RQ2 *Does the work distribution in our sample of organisations correspond to the findings in studies previously reported, with emphasis on functional development?*

RQ3 *Do benefits management practices relate to functional development activities and the realisation of benefits?*

RQ4 *Do the adoption of benefits management practices, time spent on functional development, and the level of realisation of benefits differ between the public and private sector?*

This paper reports the results from a survey investigation performed in Norwegian organisations at the end of 2018 and early 2019, following up a five-year cycle of similar investigations since 1993. This is a questionnaire survey that compares the responses with previously published related studies, acting in part as a replication study.

Given that stable patterns of IT work distribution have been witnessed for a long time, we would expect RQ1 to show similar results this time also. If this is the case it will make us more confident in the results that relate to RQ2 and RQ3.

The remainder of this paper is structured as follows: The following section presents a background by introducing basic concepts and previous work. Then we present our hypotheses, followed by a description of the survey design and results. In the subsequent sections, we reflect on the validity of our results and discuss implications. Finally, we conclude our work and suggest future work.

2 | BACKGROUND

We will first present basic concepts related to IT work distribution and then overview benefits management.

2.1 | IT work distribution

Effort related to development and maintenance can be split into various types of activities. In this paper, we distinguish between the activity types shown in Figure 1. The activity types are well established in literature; they were initially defined by Swanson [35] and have been gradually refined [27, 36]. Maintenance activities relate to work on software in operation as follows (Figure 1): corrective maintenance (1a) is performed to identify and correct processing, performance, and implementation failures; adaptive maintenance (1b) is performed to adapt the software to a changing technical environment; non-functional perfective maintenance (1c), which includes preventive maintenance [37], is performed to improve the quality of the IT system and features that are important to the evolution of the system, such as modifiability; enhancive maintenance (1d) is performed to change or add new functionality [38]. Software development activities are divided into the development of replacement systems (2a) and the development of new systems with new functionality (2b).

To better distinguish between activities that have a potential direct impact on value for the end-users, we further distinguish between functional maintenance and functional development as initially introduced by Krogstie & Sølvberg [30].

- Functional maintenance is the effort needed to keep the existing application portfolio afloat by maintaining the existing functionality (1a, 1b, 1c and 2a). The term 'total application portfolio upkeep' is used when also taking user support (3) and IT operations (4) into account.
- Functional development consists of activities that help advance the IT portfolio by adding or enhancing functionality that is potentially valuable to the end-users (1d and 2b).

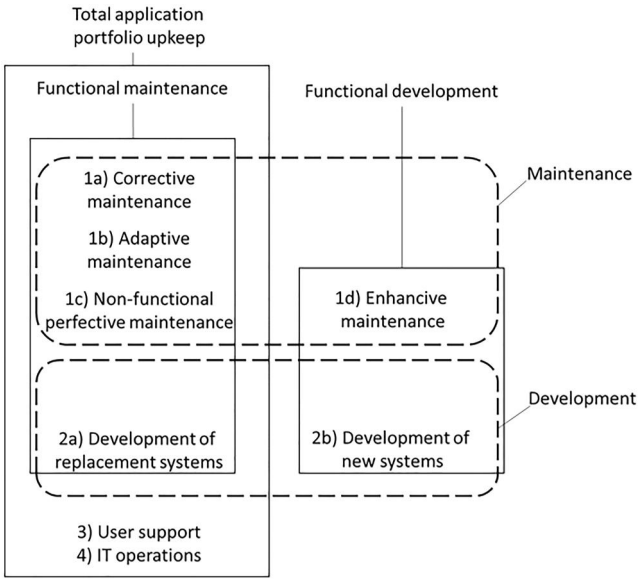

FIGURE 1 Types of development and maintenance activities

An important reason to look at activities across the traditional border between development and maintenance is that these activities have become increasingly blurred in modern system development and maintenance. For example, enhancive maintenance consists of value-adding activities enabling the users of the systems to perform new tasks. The development of this additional functionality on systems in operation is also often being organised as projects similar to how new systems are developed. However, a large proportion of the systems being developed are replacement systems, for the most part replacing existing systems in the organisation without adding much to what end-users can do with the overall application systems portfolio of the organisation, at least not in the first version. The need for closer interaction between the systems being developed and work done on systems in operation (maintenance) is witnessed by the increased focus on DevOps by integrating the work done by developers and system operations people [39]. We refer to Ref.[20, pp. 132–134] for further description of the activity types.

We will compare some of the results of this study with the results of similar investigations conducted previously. The most important investigations are reported in Ref.[21, 27–30]). These studies were carried out in 2013, 2008, 2003, 1998, and 1993, respectively. Older studies of the same kind include Nosek & Palvia [31] and Lientz & Swanson [32]. The studies mentioned above focussed mainly on assessing the work distribution and compared it with previous studies to uncover changing patterns in how IT-related activities are distributed across the various work categories. They have also looked at other characteristics of the system portfolio, which we will return to in Section 3. To a limited extent, they have sought an explanation of the various work distributions by, for example, trying to relate IT-work distribution to benefits management, which potentially might help foster an orientation towards improved value from IT-related activities.

2.2 | Benefits management

Ward et al. [5] presented a benefits management process model with five elements: (1) *identifying and structuring benefits* is concerned with identifying benefits and considerations of how to measure the benefits; (2) *planning benefits realisation* encompasses all activities needed to realise each benefit, including potential process and organisational changes; (3) *executing the benefits realisation plan* means implementing the benefits plan as an integral part of the project management plan; (4) *evaluating and reviewing results* is concerned with evaluating actual benefits delivered and identifying actions to recover missed benefits; and (5) *the potential for further benefits* is about further capitalisation on the investments made. Ward

et al.'s process model is one of the most cited models of benefits management and has been reported to be the only holistic approach to benefits management that has received considerable attention [40].

The process model emphasises the project lifecycle, that is, benefits management being a part of all phases of a software project (for a definition of the project lifecycle, we refer to Ref. [41]). The model includes pre-investment appraisal, post-investment evaluation, and the management of benefits during project execution. The dynamics of an organisation and its environment calls for a continuous review of projects through the lifecycle, and the progress of benefits realisation needs to be monitored on an ongoing basis against the business case (e.g. [42–44]). The ability to continuously review benefits realisation in projects may increase the probability of successful benefits realisation [45]. In a study investigating how 36 companies in Australia defined and measured the success of IT projects, Thomas & Fernandez [[46], p. 739] report, 'We found that companies that formally defined success, consistently measured success and acted on the results, had improved IT project outcomes and better utilised project resources'. Peppard et al. [24] and Maes et al. [47] stress the importance of a continuous focus on benefits throughout (and beyond) project execution; ongoing focus and commitment to the benefits are required for effective benefits realisation. Such attention should also be directed towards change management to ensure that actual benefits are realised [5, 48].

Organisations typically emphasise benefits management in the early phases of a project, that is, identification of benefits and business creations; the organisations lack a lifecycle perspective on benefits management where benefits are managed throughout and beyond the project (e.g. [5, 6, 49, 50]). Instead of a continuous and structured approach towards benefits management, ad hoc and fragmented approaches are common [51–53]. Conditions surrounding a project may change during the project lifecycle. In a case study of the UK National Health Service, Farbey et al. [54] suggest that evaluating benefits needs to take such changes into account. Rather than viewing benefits as static, Farbey et al. state that organisations should recognise unexpected and unplanned benefits that have emerged since the investments were planned. Evaluation for accountability, or a summative evaluation approach, makes sense in stable environments where people can be held accountable based on a static plan. However, as Farbey et al. [54, p. 249] put it, 'In an environment where structures and values are changing what is required is a process which includes a proactive search for unexpected benefits'. The Cranfield process model [5] accommodates such a hunt for further benefits in the 'potential for further benefits' process element. The Cranfield model is cyclical and allows for interactions between the process elements, which might help cope with emerging benefits during project execution. Linear process models for benefits management may not cope well with emerging benefits (see [55] for examples of linear models).

Target benefits are found to be effective when they are specific, attainable and comprehensive by reflecting the view of stakeholders [56]. Ul Musawir et al. [9] found benefits management to have a significant positive correlation with project success measured in terms of project management success (cost, time, and quality/scope), project ownership success (project owner's success in realising the business case) and project investment success (actual value generated from the investment). Some researchers have found the use of benefits management to be positively related to confidence in successful benefits delivery [57]. Other researchers have found various patterns of management practice adoption to indicate increased success in benefits delivery. Jørgensen [58] found the successful delivery of client benefits to be associated with applying benefits management practices during project execution, avoiding fixed-price contracts, focussing less on low price when selecting providers, and using core agile practices. Jørgensen et al. [59] found similar characteristics: different project outcomes were associated with different contract types, variations in how the provider is selected, how the client is involved in the project, agile practices, and benefits management during project execution.

Ward et al. [6] explain how benefits management relates to other processes and methods such as programme and portfolio management, project management, investment appraisal, system development methods, change management methods and risk management techniques. The depth and breadth of organisation-wide integration of benefits management have been found to indirectly enable organisations to achieve planned strategic goals by reinforcing project portfolio management processes. The alignment of business and IT has been found to increase this effect [60]. Both project management and benefits management practices have been reported to be required for ensuring project investment success [61].

Benefits management has been reported to be perceived as having high effectiveness but being hard to implement [62], and Ashurst et al. [49] suggest that benefits management illustrates well the gap that often exists between management theory and practice. Terlizzi & Albertin [63] found several barriers to benefits management adoption: benefits seem hard to quantify [63, 64] and difficult to isolate from other initiatives; benefits management appears hard to adopt in agile settings due to continuous value delivery; the process can be slow and bureaucratic; controlling costs and benefits constitutes a non-mandatory task; there is a lack of knowledge of benefits management; tools and techniques have been found difficult to use, such as calculating the Net Present Value; and there is resistance from managers in implementing necessary controls to make sure benefits are identified and assessed.

Having people with responsibility for benefits realisation has been reported to help achieve benefits realisation [44, 61, 65]. However, many organisations seem not to assign responsibility for benefits realisation [6]. Ahlemann et al. [66] present core aspects of effective benefits management, one being related to accountability for benefits realisation: 'Stakeholders should be held accountable for the benefit realisation of the organisational area in which they practice (1st order ownership). If benefits can only be realised via complex

cause–effect chains, spanning multiple areas of responsibility, additional stakeholders may be held accountable for benefit realisation (2nd order ownership). In any case, 1st order owners are responsible for the ultimate benefit realisation and have to coordinate benefits realisation across organisational units (downstream of the cause-effect chain)'. The lack of benefits ownership in combination with the practice of overstating benefits can be problematic. Overstating benefits have been reported in several studies, for example, [6, 53]. A potential explanation of why organisations do not assign responsibility for benefits realisation might be that overstating benefits has been institutionalised, and nobody is eager to be set up for failure by being accountable for achieving unrealistic goals. Such a hypothesis would need to be tested through further studies.

3 | HYPOTHESES

We formulated the following hypotheses to answer the research questions 3 and 4 presented in the introduction.

H1a *(related to RQ3): There is no difference in the percentage of time spent on functional development between organisations that differ in the degree to which they adopt benefits management practices.*

H1b *(related to RQ3): There is no difference in the level of realised benefits between organisations that differ in the degree to which they adopt benefits management practices.*

The rationale is that many studies have shown positive effects of benefits management practices on actual benefits delivery, some are introduced in Section 2 *and others include Refs.*[67–69]. Positive effects on benefits realisation have been found by identifying and structuring benefits [6, 58, 61], planning benefits realisation [45, 58, 60], applying benefits management practices during project execution [58–60], and evaluating and reviewing realised benefits [5, 45, 46, 58, 60]. Empirical evidence indicates that organisations that adopt benefits management practices reap higher levels of benefits for the business. Therefore, one might expect that organisations with attention to benefits realisation from IT activities would try to channel more of their resources towards value-adding activities, such as functional development, compared with organisations without attention to realising benefits from IT activities. Activities that help advance the IT portfolio by adding or enhancing functionality are likely to enable business results more than activities that preserve the status quo (for example, development of replacement systems). We would thus expect H1a and H1b to be rejected.

H2a *(related to RQ4): There is no difference in adopting benefits management practices between public and private organisations.*

H2b *(related to RQ4): There is no difference in the percentage of time spent on functional development between public and private organisations.*

H2c *(related to RQ4): There is no difference in the realisation of benefits between public and private organisations.*

The rationale is that some studies have found differences in cost performance between public and private organisations (see, for example, [70]). However, we have not found much evidence in the literature to suggest differences in the realisation of benefits. Holgeid & Jørgensen [33] found no significant variations of benefits realisation between the sectors. However, a systematic literature review of benefits management [10] suggests that benefits realisation may differ between different types of organisations because they may have different value-creation logics. Holgeid et al. [10] call for further study of variations across types of organisations. Public sector organisations need to do benefits analysis to have funding for projects. Important aspects may be time saved for citizens and quality improvements made and cost saved for the public organisation. As benefits management practices have been shown to relate to the realisation of benefits (see Section 2 and the rationale for expecting H1a and H1b to be rejected), and the level of benefits realisation appears to not differ between the sectors, we expect H2a, H2b and H2c not to be rejected.

Potential associations between management practices should be interpreted cautiously, as they can be affected by how the practices are adopted. For example, although benefits management practices reach beyond project borders, prior research has found that benefits management practices are rarely performed in the post-project period (see Section 2). Therefore, benefits management practices concerning maintenance activities that are not organised in projects might be rare. Further, we recognise that there might be many reasons for an organisation's IT work distribution in a particular year. Thus, potential associations with one single management practice need to be interpreted cautiously.

4 | SURVEY DESIGN AND DEMOGRAPHIC DATA

We conducted an online survey using the tool SurveyGizmo (now Alchemer) during the late fall of 2018/early winter of 2019 (last reminders sent in January 2019) aimed at Norwegian professionals representing a wide array of private and public organisations. Since the first Norwegian survey of this kind in 1993, the population has been based on the list of member organisations of the Norwegian Computer Society (approximately 1000 member organisations primarily in the private sector) and a list of approximately 800 Norwegian public sector organisations. The questionnaire was sent to a random selection of 735 unique organisations from this population of approximately 1800 organisations. A total of 684 organisations received the questionnaire as 43 of the emails bounced and eight were not delivered. We requested the survey to be

completed by senior IT managers or individuals that were knowledgeable about IT investments and related practices in their organisation. The organisations and respondents were anonymous.

The questionnaire had four main parts. Part I asked for demographic information, such as years of experience and sector (private/public). Part II included questions related to IT work distribution (see Figure 1), in line with the investigations reported by Davidsen & Krogstie [28] and Krogstie & Veld [27]. Part III asked questions regarding the adoption of benefits management practices. The questions were based on previous studies [5, 6]. Part IV included questions related to business performance. Questions used as basis for the result presented in this paper can be found in the Appendix. The full questionnaire will be made available to interested readers upon request.

The sample of respondents had the following characteristics:

- Valid responses were collected from 86 unique organisations, which is 13% of the 684 organisations that received the questionnaire. The number of respondents is higher than the other Norwegian studies that we compare with, and the valid response rate is within the range of previous studies (11%–22%); Krogstie & Sølvberg [30] received 52 valid responses (15%), Holgeid et al. [21] 53 (11%), Krogstie et al. [29] 54 (22%), Davidsen & Krogstie [28] 67 (22%), and Krogstie & Veld [27] 68 (18%).
- Of the respondents, 19 (22%) were from organisations in the public sector (of which 11 were municipalities, two human services organisations, two central healthcare organisations, one customs department, one ministry, one university, and one shared services centre) and 67 (78%) were from the private sector (including financial services, pharmaceutical, energy, industrial goods, consumer goods and professional services).
- Most of the respondents had worked for several years at their current organisations: 30 (35%) had 11–20 years of experience; 46 (53%) had 5–10 years; 9 (10%) had 2–4 years; and 1 (1%) had 0–1 year.
- The organisations' IT departments had between 6 and 150 employees (mean 31.3, median 25.0, and std. dev. 39.7) and employed between 1 and 40 consultants (mean 7.2, median 4.0, and std. dev. 8.9).
- The organisations had between two and ten IT systems that were considered their core systems (mean 5.9, median 5.0, and std. dev. 5.7). The age distribution of the 494 core systems was as follows: 233 (47%) were more than 10 years old; 145 (29%) were 7–10 years old, 58 (12%) were 4–6 years old; 53 (11%) were 2–3 years old; and 5 (1%) were 0–1 year old.

We analysed the survey responses using the non-parametric Mann–Whitney tests of SPSS, not assuming normality of the response variables, since we, in earlier investigations, found that many of the variables were not normally distributed. Non-parametric tests are weaker than parametric tests such as *t*-test in the sense that differences need to be bigger to be significant, since they do not assume normality of the variables. We further used the non-parametric Spearman's rank correlation coefficient technique. We also performed multivariate item analyses of various benefits management practice variables, and we performed principal component analyses to establish components to represent groups of management practices. As erroneous conclusions can be drawn if the effect sizes are not considered in addition to statistical significance [71], we report mean values and mean ranks to represent the effect sizes where relevant.

5 | RESULTS

5.1 | RQ1: How widespread is benefits management in organisations?

Table 1 presents results from this and previous surveys on project and programme methods and benefits management practices.

Table 1 shows that 2018 had record high values in all three categories. The use of predefined methods and management practices increased from 2013 to 2018. To investigate how widespread benefits management is, we asked the respondents to which extent they adopt the various benefits management practices (Figure 2).

Figure 2 shows a pattern of high levels of benefits management adoption in the early project lifecycles and less adoption in the later stages. Such a pattern is in line with previous research presented in Section 2 [5, 6, 49, 50].

5.2 | RQ2: Does work distribution in our sample of organisations correspond to the findings in studies previously reported, with emphasis on functional development?

Table 2 and Table 3 summarise the descriptive results on the distribution of work in the categories in our investigation (2018) and in previous investigations. Forty percent of the total work among the responding organisations in 2018 is maintenance activities and seventeen percent is development activities. Table 2 shows that the work distribution from the 2013 study is in line with ours on all variables. However, if we 'zoom out' and look across all studies, we observe a downward-sloping tendency of functional development between 2003 and

TABLE 1 Use of predefined methods and management practices (percentages of organisations)

Category	1998	2003	2008	2013	2018
Project mgmt.	42	35	37	33	100
Programme mgmt.	Not included			8	21
Benefits mgmt.				9	30

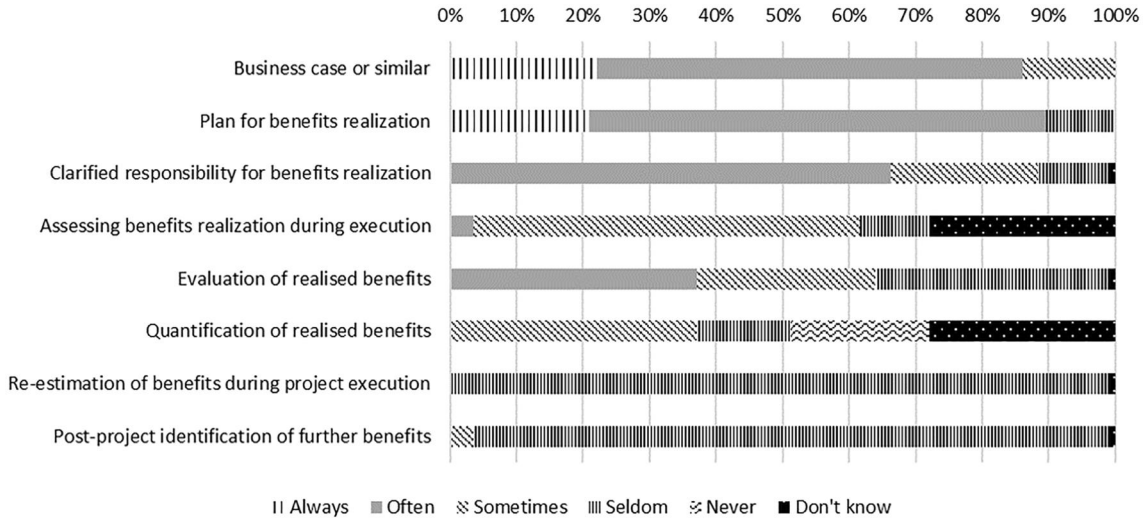

FIGURE 2 Adoption of benefits management practices (The benefits management practices were scored between 1 = never and 5 = always)

TABLE 2 IT work distribution (percentage of work; total (sum) values in bold)

Category	1993	1998	2003	2008	2013	2018	Mean
Corrective	10	13	9	8	10	11	10
Adaptive	4	8	7	6	10	9	7
Enhancive	20	15	13	11	13	12	14
Perfective	5	5	8	9	8	8	7
Total maintenance	**40**	**42**	**37**	**35**	**41**	**40**	**39**
Replacement	11	8	10	10	8	9	9
New dev.	18	10	12	11	8	8	11
Total development	**30**	**17**	**21**	**21**	**17**	**17**	**21**
IT operations	NA	23	24	24	23	22	23
User support	NA	19	17	20	19	21	19
Other	**30**	**42**	**41**	**44**	**43**	**43**	**41**

2013. Our 2018 study found the same low level of functional development as that of the 2013 study. Between 1998 and 2018, functional development was between 39% and 35%.

Table 3 shows that maintenance activities constitute 70% and development activities 30% when disregarding other work than development and maintenance. The numbers are similar to previous investigations. The table shows that 35% of development and maintenance work are functional development. This percentage is almost the same as in 2013, 2008, 2003 and 1998, which is different from the situation in 1993 where functional development amounts to 56% of the work. When considering all the work on IT (including operations and user support), only 20% is used for providing new functionality, which is at the same level as what has been reported in earlier investigations since 1998.

Sixty-one percent of the systems that were under development in the 2018 investigation are categorised as replacement systems, which is at the same level as in previous investigations (2003: 60%; 2008: 66%; and 2013: 60%). The most important reason for replacement is the need for integration (this was also the top reason for replacement systems in 2003, 2008, 2013 and 2018) and standardisation. The burden to maintain, use and operate existing systems is gradually becoming less important.

5.3 | RQ3: Do benefits management practices relate to functional development activities and the realisation of benefits?

To help answer this research question and associated hypotheses, Table 4 presents correlations between benefits management practices and functional development and realised benefits. Based on previous studies presented in Section 2, positive associations are expected. Four of the seven practices presented in Table 4 have positive correlations with both functional development and realised benefits. Two of the practices with negative correlations are practices that are typically implemented early in the lifecycle of a project: the practices of having a business case and a plan for benefits realisation. These practices are adopted largely across the organisations; the two practices are adopted 'always' or 'often' by 86% and 90% of the organisations, respectively (Figure 2). The third practice with negative, but not significant, correlation (with realised benefits) is the post-project identification of further benefits. This practice is adopted to a minimal extent (see Figure 2).

We generate a benefits management index (BMI), which is calculated as the mean value of the adoption rates of the studied benefits management practices. We split the respondents into two groups based on median BMI (3.17) and compare the distributions of IT work variables and realisation of benefits, respectively, using the Mann–Whitney *U* Test (Table 5).

TABLE 3 IT work distribution: disregarding other work and functional effort (percentage of work)

Category	1993	1998	2003	2008	2013	2018	Mean
Disregarding other work							
Development	41	27	34	34	27	30	32
Maintenance	59	73	66	66	73	70	68
Functional effort							
Functional development	56	38	39	36	35	35	40
Func. dev. as part of total	39	25	25	23	21	20	26

TABLE 4 Correlation between realised benefits, functional development and benefits management practices

	Functional development	Realised benefits	Business case or similar	Plan for benefits realisation	Clarified responsibility for benefits realisation	Assessing benefits realisation during exec.	Evaluation of realised benefits	Quantification of realised benefits
Realised benefits	0.453**							
Business case or similar	−0.658**	−0.414**						
Plan for benefits realisation	−0.655**	−0.485**	0.937**					
Clarified responsibility for realisation	0.340**	0.884**	−0.186	−0.143				
Assessing benefits during execution	0.019	0.455	0.372**	0.550**	0.666**			
Evaluation of realised benefits	0.545**	0.838**	−0.151	−0.267*	0.770**	0.252*		
Quantification of realised benefits	0.658**	0.986**	−0.466**	−0.565**	0.780**	0.105	0.950**	
Post-project identification of benefits	0.294**	−0.164	−0.333**	−0.043	0.132	0.541**	−0.228*	−0.097

Note: Re-estimation of benefits not included due to lack of variability (85 of 86 organisations had seldom adopted re-estimation).

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

The median split results in a different number of respondents in each group as several respondents have identical BMI profiles. We find that organisations with a high BMI have a significantly higher level of functional development and realised benefits and a significantly lower level of functional maintenance and maintenance than organisations with low BMI. Also, looking at total upkeep, including user support and operations as part of upkeep, we find a significantly lower amount of upkeep for those organisations with a high BMI. However, the difference in mean upkeep is only one percentage point.

One can argue that the calculation of BMI comes with weaknesses and that the analysis would benefit from more sophisticated methods for reducing dimensionality. Therefore, we also perform a multivariate item analysis of the benefits management practices. A Cronbach's alpha value of 0.69 is close to the recommended threshold for internal consistency of 0.70 [72]. Researchers have indicated that, for exploratory research, lower levels of alpha values may be acceptable [73, 74].

We conduct a principal component analysis of the benefits management variables, excluding the re-estimation of benefits, which lacks variability (Figure 2), and generated a component representing positive loadings from all the selected practices (PC_BMI; data from 62 organisations used; data for 24 organisations contain missing data). Table 6 shows the extent to

TABLE 5 Pairwise comparisons: Work distribution in organisations with low versus high benefits management index (BMI)

	Low (<3.17)			High (≥ 3.17)			
Response variable	**N**	**Mean**	**Mean rank**	**N**	**Mean**	**Mean rank**	**p (2-sided)**
Functional development	30	31%	31.7	56	37%	49.9	**<0.01**
Functional maintenance		69%	55.4		63%	37.2	**<0.01**
Development		15%	37.8		18%	46.6	0.11
Maintenance		46%	61.1		36%	34.1	**<0.01**
Total application portfolio upkeep		81%	54.4		80%	37.7	**<0.01**
Realised benefits		0.4[a]	15.9		1.96	58.3	**<0.01**

[a]The realised benefits were scored on a scale −2 (low) to +2 (high). This is the same scale used by for example, [33].

TABLE 6 Principle components: explanation of variation in the data and loadings

	PC_BMI	**PC_BMI_Early**	**PC_BMI_Late**
PC's explanation of variation in the data	41%	67%	49%
Business case or similar	0.13	0.64	-
Plan for benefits realisation	0.31	0.70	-
Clarified responsibility for realisation	0.58	0.31	-
Assessing benefits during execution	0.47	-	0.13
Evaluation of realised benefits	0.45	-	0.70
Quantification of realised benefits	0.33	-	0.68
Post-project identification of benefits	0.11	-	−0.13

which the component explains variation in the data and respective loadings of the practices. We find that PC_BMI has a significant positive correlation with functional development ($p < 0.01$, $r = 0.481$) and realised benefits ($p < 0.01$, $r = 0.725$). The implication is that the component may be useful for predicting the level of functional development and benefits realisation given the adoption of the included benefits management practices.

Although the most frequent practices for benefits realisation, business cases, plan benefits realisation and clarified responsibility (Figure 2), may be relevant throughout the lifecycle, in our studied organisations, they appear to be practiced mostly at the beginning of the lifecycle. One indication of the lack of adoption later in the lifecycle emerges from the fact that practices typically needed to make continuous adjustments in the business case, benefit plans and responsibilities appear to be practiced to a limited extent: the practices of assessment of benefits realisation during project execution, re-estimation, quantification and evaluation of benefits.

We test for differences between practices with high and low adoption rates. We generated a BMI for the highly adopted practices associated with the 'early' project lifecycle activities (BMI_Early), that is, the mean value of the adoption rates of a buiness case or similar, plan for benefits realisation and clarified responsibility for benefits realisation. Further, we generate an index for the less adopted 'later' project lifecycle activities (BMI_Late), that is, the mean value of the adoption rates of assessing benefits realisation during execution, evaluation of realised benefits, quantification of realised benefits, re-estimation of benefits during project execution and post-project identification of further benefits. We split the respondents into groups based on median BMI_Early (4) and median BMI_Late (2.33) and compare the distributions of functional development, total application upkeep, and realised benefits, respectively, by using the Mann–Whitney U Test (Tables 7 and 8).

We find that organisations with high BMI_Early have a significantly lower level of functional development and a significantly higher level of upkeep than those with low BMI_Early. However, those with high BMI_Early have a significantly higher level of realised benefits than those with low BMI_Early (influenced by the strong correlation between clarified responsibility for benefits realisation and realised benefits, see Table 4).

The 12 organisations with low BMI_Early have significantly lower BMI_Late than the rest of the organisations ($p = 0.002$, mean rank = 23.50 vs. 46.21), that is, the organisations that do not adopt the practices of having a business case, planning benefits realisation, and clarified responsibilities for benefits realisation also adopt the rest of the benefits management practices to a less extent than other organisations. As expected, these organisations, with limited adoption of benefits management practices, have a low level of realised benefits. 11 of the 12 organisations with low BMI_Early are public organisations, and they are over-represented by municipalities (9 of the 11 municipalities included in this study have low BMI_Early). We find that organisations with high

TABLE 7 Pairwise comparisons: Work distribution in organisations with low versus high BMI_Early

	Low (<4)			High (≥ 4)			
Response variable	**N**	**Mean**	**Mean rank**	**N**	**Mean**	**Mean rank**	**p (2-sided)**
Functional development	12	41%	64.2	74	34%	40.1	**<0.01**
Total application portfolio upkeep		75%	21.2		81%	47.1	**<0.01**
Realised benefits		1.0	25.5		1.5	46.4	**<0.01**

TABLE 8 Pairwise comparisons: Work distribution in organisations with low versus high BMI_Late

	Low (<2.33)			High (≥ 2.33)			
Response variable	**N**	**Mean**	**Mean rank**	**N**	**Mean**	**Mean rank**	**p (2-sided)**
Functional development	27	29%	25.9	58	38%	51.0	**<0.01**
Total application portfolio upkeep		84%	59.2		79%	35.5	**<0.01**
Realised benefits		0.3	14.7		1.9	56.2	**<0.01**

BMI_Late have a significantly higher level of functional development as well as realised benefits than those with low BMI_Late. We will look further into this connection along with the principal component analysis presented below.

We perform a multivariate item analysis of the groups of variables in BMI_Early and BMI_Late and find that the Cronbach's alpha values are 0.71 and 0.64, respectively. A principal component analysis generates the component PC_BMI_Early dominated by a business case and plan for benefits realisation, and PC_BMI_Late dominated by evaluation of realised benefits and quantification of realised benefits. We find that PC_BMI_Early has a significant negative correlation with functional development ($p < 0.01$, $r = -0.667$) and realised benefits ($p < 0.01$, $r = -0.419$) and that PC_BMI_Late has a significant positive correlation with functional development ($p < 0.01$, $r = 0.671$) and realised benefits ($p < 0.01$, $r = 0.983$). These results support the apparent importance of the adoption of benefits management practices during and after project execution. We find PC_BMI_Early to be negatively correlated with PC_BMI_Late ($p < 0.01$, $r = -0.477$). This indicates that the organisations that claim to have business cases and benefit plans most frequently tend not to follow through by applying the other practices later in the lifecycle. Although PC_BMI_Early, dominated by the practices of having business cases and benefit plans, is negatively correlated with the realisation of benefits, the results should not be interpreted as these practices are not valuable. Indeed, these practices can be seen as prerequisites for the rest of the benefits management practices; for example, without identified benefits, it may be of less meaning to assign responsibility to the benefits, to evaluate or quantify benefits etc.

Based on the results presented above, H1a and H1b are rejected. Organisations with a higher degree of benefits management adoption have significantly higher percentages of functional development (the pairwise comparison in Table 9 shows a difference of 6% points, $p < 0.01$) and realised benefits (difference: 1.56 on a scale from −2 (low) to 2 (high), $p < 0.01$) than the other organisations. Organisations that focus their benefits management efforts beyond the early stages of the lifecycle (i.e. beyond crafting a business case and plan the benefits realisation) seem to do more functional development and realise more benefits (Tables 5, 7 and 8).

5.4 | RQ4: Do the adoption of benefits management practices, time spent on functional development, and the level of realisation of benefits differ between the public and private sectors?

Table 9 presents comparisons between public and private organisations concerning benefits management practices, functional development and realisation of benefits. Overall, the 19 public organisations included in our study adopt benefits management practices to a lesser extent than their private counterparts (see BMI and PC_BMI in Table 9). All but two practices are adopted less in public organisations than in private ones. The two practices are re-estimation of benefits during project execution (which was seldom adopted by any of the organisations, see Figure 2) and post-project identification of further benefits for which public organisations have higher levels of adoption. As private organisations have significantly higher levels of adoption of benefits management practices than public organisations (0.4 difference in BMI, $p < 0.01$), H2a is rejected.

We find that public organisations have slightly higher levels of functional development than private organisations (Table 9). However, the difference is small and not significant (on average, two percentage points difference, $p = 0.14$). Therefore, H2b is not rejected.

The private organisations have a significantly higher level of realised benefits than the public organisations (0.7 difference in mean realised benefits, $p < 0.01$). Therefore, H2c is rejected.

6 | DISCUSSION

As introduced in Section 1, benefits management is the process of organising and managing so that benefits from IT can be realised [5] and is a process that extends throughout—and beyond—the project lifecycle. Although we do not claim causal relationships, our findings suggest that organisations that leverage such processes and practices of organising and managing tend to be able to put more effort into functional development than organisations with less emphasis on benefits realisation. The organisations that practice benefits management seem to realise more benefits than others.

Practical implications of our results include the following: First, organisations should be aware of their use of benefits management practices; most seem to have a potential for a more widespread adoption of such practices (RQ1). Few of the studied organisations have a predefined benefits management approach (only ca 30%). As also found by previous research (Section 2), we found that organisations typically craft business cases and plan benefits realisation, but the rest of the practices are less frequently adopted.

Second, organisations should be aware of the apparent lack of improvement over the years in functional development (RQ2). For 20 years, the level of functional development has been between 39% and 35% (1998–2018). In a way, this is disappointing considering the long-time search for ways to increase value from investments in IT, as presented in the introduction. On the other hand, in the light of the increased complexity of the underlying infrastructure and the number and variety of end-user to systems, it is a positive sign that the amount of effort used on operations and user support has been stable since 1998. Neither has the expected increase of work on maintenance as predicted by Jones [75] taken place. We suggest that organisations consider using their level of functional development as an indicator to measure progress towards putting more effort into activities that can bring value to end-users. Given the long historical tendency of lack of improvement of functional development, we propose that organisations need to move resources towards functional development to enable potentially more benefits for the end-users. We deliberately use the word 'potentially' as functional development activities obviously do not necessarily translate into benefits.

Third, organisations may benefit from an evidence-based approach to select effective benefits management practices. We found that organisations that implemented benefits management practices spent significantly more time on functional development than others and realised more benefits (RQ3). The benefits management practices of having a business case, a plan for benefits realisation, and a clarified responsibility for the realisation of benefits appear not to be sufficient to contribute to the realisation of benefits. Benefits management practices during project execution and in the post-project period are found to be related to the realisation of benefits to a higher degree. Researchers have pointed to several potential reasons why seemingly effective benefits management practices are not adopted beyond the early stages of the lifecycle [10]. One reason may be that such practices are hard to implement [62, 63]. Further studies are needed to help organisations increase adoption and bridge the gap between '*knowing*' which practices may be effective in realising benefits and '*doing*' [49, 76].

TABLE 9 Pairwise comparisons: Benefits management practices, functional development and realisation of benefits: public and private organisations

	Public			Private			
Response variable	**N**	**Mean[a]**	**Mean rank**	**N**	**Mean[a]**	**Mean rank**	**p (2-sided)**
Benefits management practices							
BMI	19	2.7	24.6	67	3.1	48.9	**<0.01**
PC_BMI	19	−1.0	29.3	67	0.3	47.5	**<0.01**
Business case or similar	19	3.7	30.3	67	4.2	47.2	**<0.01**
Plan for benefits realisation	19	3.4	32.8	67	4.2	46.5	**<0.01**
Clarified responsibility for benefits realisation	18	2.8	23.3	67	3.8	48.3	**<0.01**
Assessing benefits realisation during execution	17	2.7	25.3	45	3.0	33.8	**0.02**
Evaluation of realised benefits	18	2.3	23.0	67	3.2	48.4	**<0.01**
Quantification of realised benefits	17	1.9	23.6	45	2.4	34.5	**0.02**
Re-estimation of benefits during project execution	18	2.0	43.0	67	2.0	43.0	1.0
Post-project identification of further benefits	18	2.2	48.6	67	2.0	41.5	**<0.01**
Functional development and realised benefits							
Functional development	19	37%	50.9	67	35%	41.4	0.14
Realised benefits	19	0.9	25.7	67	1.6	48.5	**<0.01**

[a]The benefits management practices: scored between 1 = never and 5 = always. Functional development: percentage of work. Realised benefits: scored on a scale between −2 (low) and +2 (high).

Fourth, the public sector organisations that took part in our study have the largest potential for increasing the adoption of benefits management practices (RQ4). One explanation of the differences in realised benefits is that private organisations adopt benefits management practices to the largest extent. Public sector organisations may be less aware of the effectiveness of the practices or this may be due to more sophisticated differences between the sectors. For example, public IT projects may be required to provide transparency to the public on costs and benefits. Sometimes the failures of public IT projects are visible in the media, are subject to public scrutiny, and can result in political consequences. Such transparency, including the transparency of who is responsible for realising benefits, may potentially disincentivise the adoption of practices. Holgeid et al. [10] suggest further studies into such potential connections between the transparency that comes with benefits management and adoption of the practices.

7 | VALIDITY OF RESULTS

This section presents some of the limitations of our study. Construct validity has been defined, respectively, as: "A concept that is not directly measurable, and therefore is represented by indicators at the operational level. The extent to which a concept definition is adequate, and the indicators represent the concept is the issue of construct validity" [77]. In our survey, there is a risk that the respondent had a different understanding of the terms used. One study found that respondents sometimes used their own definitions even when the definitions were presented at the outset of the survey [78]. To some extent, we consider this risk to be mitigated by using well-established questionnaires for both work distribution practices and the adoption and effects of benefits management. However, there is still a risk that the respondents answered questions they did not understand or could not really answer. For example, respondents with good insights into how their organisations manage benefits may provide better scores on benefits adoption than respondents with limited insights. From the data, we observe that several respondents from different organisations gave similar scores of work distribution and benefits management adoption, which may be explained by the respondents not having deep insights into the matters. We did not measure the extent of insight of each respondent, so this remains a weakness of our study design that should be taken into consideration when interpreting the results.

Another threat to construct validity is underrepresentation of the studied concept, that is, the set of variables are too narrow to represent the construct accurately [79]. A special case of such underrepresentation is when variables overlap, that is, they essentially measure the same thing [77]. We found several variables to be strongly correlated; for example, the practice of quantifying realised benefits ($r = 0.986$, $p < 0.01$). Such a high degree of correlation may indicate that the variables represent the same thing, that is, organisations realising benefits tend to quantify them—and when benefits are quantified, they are realised. Another example is the correlation between quantification of benefits and evaluation of benefits ($r = 0.950$, $p < 0.01$); organisations that quantify benefits appear to perform some form of evaluation, and the evaluations seem to involve quantification. While there is a risk of construct underrepresentation in our study, we found that the internal consistency of the benefits management practices was not very high; our alpha values were not above the threshold of 90, which may reflect duplication of the same measures and indicate underrepresentation [80].

Internal validity threats are present in this study. The relations between functional development, benefits management practices, and benefits realisation may be due to factors not included in this study. For example, an organisation's level of competence in project management and benefits management, which are factors not included in this study, may affect the ability of an organisation to realise benefits. Comparisons related to benefits realisation across public and private organisations should be done with caution as there may be differences outside of our study that affect the correlations between benefits realisation and types of organisations. For example, the public sector may not measure revenue increase as their private counterparts would. Our findings only show associations between the studied variables; we do not claim causal relationships.

The results from the tests of H2a,b,c must be interpreted with caution as few public organisations were included in the study. Also, the low number of organisations with low BMI_Early may explain the rather surprising result that these organisations have a relatively high degree of functional development.

External validity is concerned with the generalisability of results [81]. We surveyed a population of Norwegian public and private organisations, which might affect the generalisability of our results to other countries. A multi-country study could thus be of interest, also potentially to uncover additional aspects. That said, we have chosen an appropriate population for analysis since several previous studies were performed on similar populations in Norway. Several of the organisations that received a survey form in the 1993, 1998, 2003, 2008 and 2013 studies also received the invitation to fill out the form in 2018, and many of the same questions have been asked. The methods that are used are also similar, enabling us to present a replication study, although the overlap among actual respondents to the survey is limited to only a few organisations across different instalments of the survey. Even if the population selection process has been similar, the actual organisations in these populations have changed a lot over the period of 25 years, both because of changed focus on IT and because of the volatile business environment, with a number of acquisitions, mergers and bankruptcies, and because of reorganisations of the public sector. The survey is comprehensive and needed input from people typically at a CIO-level, which is challenging, particularly in an Internet survey. We received 86 responses from a variety of Norwegian organisations, as presented in the survey design section. Although the number of responses is higher than most of the studies we compare with and above the thresholds to make it acceptable for statistical

analysis as suggested by Galtung [82], consider that the external validity of our study would benefit from a higher response rate.

We chose the organisation as the unit of analysis, and we deliberately kept our analysis consistent with this unit throughout to enable relevant comparisons across previous studies of work distribution that also have used the organisation as the unit of analysis. Several studies of benefits management (e.g. [5, 6]) have also used the organisation as the unit of analysis. However, some studies have selected a single project as the unit of analysis, for example, by asking respondents to select a recent project and answer questions with this in mind (e.g. [33, 58]). We recognise that a project-level study could give a richer understanding of the inner workings of the fabric of the organisation. However, we made a trade-off against the benefits of performing a comparison between previous studies that used the organisation as the unit of analysis.

Reliability is concerned with the measures' consistency [83]. There is a risk that the respondents want to overstate the level of benefits realisation to make a perception of success. We consider this threat to be partly mitigated as the respondents and their organisations were promised anonymity.

8 | CONCLUSIONS AND FURTHER WORK

Vast resources are spent on IT development and maintenance activities. Therefore, even minor improvements in return on these investments may yield substantial benefits for organisations. Our results indicate that organisations may benefit from implementing benefits management practices throughout the lifecycle of the investment and increasing the effort of functionality-adding IT activities to benefit end-users. Over the last couple of decades, our analysis shows that organisations have not improved much in channelling their IT resources towards activities that will benefit the end-users. However, the few organisations that do it appear to outperform their peers in benefits realisation. Although both public and private organisations can improve the degree to which they realise benefits from IT investments, the public sector seems to have the largest improvement potential.

Future studies are needed to uncover causal relationships between our studied practices and effects on realised benefits. Further research is encouraged to study the tendency of organisations to spend much time on application portfolio upkeep instead of value-adding functional development. We welcome research that takes additional management practices into account when studying the effects of benefits management (such as project management, programme management, change management). We also encourage studies with larger samples of organisations to investigate the differences we found between public and private organisations regarding IT work distribution, functional development and benefits realisation. Not all IT development and maintenance is performed in projects. Future research is welcomed to investigate differences in benefits realisation across various forms of organising development activities (e.g. development in projects vs. development in the line organisation). Finally, much research in benefits management seems to focus on whether practices are adopted, not so much on how the practices are adopted. Future studies should address how practices can be adopted in ways that maximise benefits realisation.

CONFLICT OF INTEREST

The author declares no conflict of interest.

DATA AVAILABILITY STATEMENT

Anonymised data that support the findings of this study are available from the corresponding author upon reasonable request.

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APPENDIX

Questionnaire: Benefits management and IT work distribution

How many years working experience do you have in your current organisation?	Years: - 0–1 - 2–4 - 5–10 - 11–20 - >20
Which sector is your organisation operating in?	Alternatives: - Private - Public
In which industry does your organisation belong?	<list of industries>
On the basis of total number of hours worked in the IT-department during a year, how much (in percentage, in total 100%) is used for: a) Fixing errors in IT systems in operation b) Adapting IT systems (in operation) to changed technical architecture c) Implement new functionality in IT systems in operation d) Improve non-functional attributes (f.ex. performance and security) in IT systems in operation e) Implement new IT systems that functionally overlap, or replace, existing IT systems f) Implement new IT systems to cover new functionality g) Operations h) User support i) Other	<percentage for a – i, summarised to 100%>
Your answer to the question above is: a) Reasonable accurate, based on good data b) A rough estimate, based on minimal data c) A best possible guess, not based on any data	Alternatives: - a - b - c

(Continued)

What is the share of work (in percentage) done by other organisations (i.e. outsourced)? a) Fixing errors in IT systems in operation b) Adapting IT systems (in operation) to changed technical architecture c) Implement new functionality in IT systems in operation d) Improve non-functional attributes (f.ex. performance and security) in IT systems in operation e) Implement new IT systems that functionally overlap, or replace, existing IT systems f) Implement new IT systems to cover new functionality g) Operations h) User support	<percentage for a – h>
How many employees (full time equivalents) are employed in the IT department?	<number>
How many consultants (full time equivalents) are engaged by the IT department?	<number>
How many main IT systems is currently in operations in your organisation?	<number>
What is the age distribution of the main IT systems, measured in number of years after first installation? (Number of systems should correspond with your answer to the question above)	Number of systems per category of years: - 0–1 - 2–3 - 4–6 - 7–10 - >10
How many IT systems are currently under development?	<number>
Of the total number of IT systems under development, how many are replacement systems (i.e. systems developed with the main purpose of covering functionality already covered by existing systems)	<number>
What is the distribution of the age of the systems being replaced? (Number of systems should correspond with your answer to the question above)	Number of systems per category of years: - 0–1 - 2–3 - 4–6 - 7–10 - >10
What are the most important reasons to develop replacement systems? a) Very difficult to maintain existing system b) Very difficult to operate existing system (operations) c) Very difficult to use existing system d) Existence of alternative off-the-shelf systems e) Migration to new technical architecture f) Standardisation across the organisation g) Integration with other new or existing systems	Alternatives: - 1 = not important - 2 - 3 - 4 - 5 = important
In which parts of the IT system lifecycle do your organisation use a predefined method (you can select more than one answer)	Alternatives: - Planning - Analysing - Requirement specification - Design - Development - Testing - Roll-out - Operations - Maintenance - Project management - Programme management - Benefits management
Benefits management in relation to IT-projects: To what extent are the following practices present in your organisation? a) Develop business case or similar before start of IT project b) Plan for benefits realisation before start of IT project c) Clarified responsibility for benefits realisation d) Assessing benefits realisation during project execution e) Evaluation of realised benefits after project completion f) Quantification of realised benefits g) Re-estimation of benefits during project execution h) Post-project identification of further benefits after project completion	Alternatives: - Always - Often - Sometimes - Seldom - Never - Don't know

(Continues)

(Continued)

Who is responsible for realisation of benefits from IT projects in your organisation? a) Project lead b) Line manager (business) c) Line manager (IT-department) d) Top management (C-suite) e) Business resources f) Others	Alternatives: - Always - Often - Sometimes - Seldom - Never - Don't know
Based on your experience from your organisation, the following is true for IT projects in your organisation: a) The benefits for the client/end user is .. b) The cost control is .. c) The time control is .. d) The technical quality of the deliverables is.	Alternatives: - Very good - Good - Acceptable - Bad (problematic) - Very bad (very problematic - Don't know