Old theories, new contexts: extending operations management theories to projects

Welcome to this Special Issue (SI) and the World of Project Operations!

Operations and supply chain management (OSCM) is concerned with organizing work. This work spans a spectrum from novel to repetitive and from variety to volume. Projects are a particular kind of work – temporary and unique – that lie toward the novel and varied end of the spectrum. Organizing project work requires perspectives, approaches, methods, tools, and techniques that differ from those used in repetitive, ongoing operations. There will, however, also be areas of commonality between project-based and repetitive operations. It is these similarities and differences that will be explored here. We start with the background to this SI and then explore how scholars in the field have responded to the call for papers. Lastly, we present the eight papers comprising this SI and identify both the contributions and areas of the project-operations work landscape that remain relatively unexplored.

Background

Projects pervade organizations, being the prime operations process for many organizations in IT, R&D, engineering, construction, government, and innovation, and a key activity in many others (e.g. organizational change, strategy implementation, mergers acquisitions and divestments, and new product development). Economically, it is estimated that project activity comprises c.35 percent of GDP for some countries (Schoper *et al.*, 2018), an indication that this is a significant field of activity. Whilst ubiquitous, projects often suffer from "the performance paradox" where their importance is at odds with their performance (Flyvbjerg *et al.*, 2003).

Consistent with this importance, it is a rich context for research (Söderlund and Maylor, 2012; Browning, 2017). There are several dedicated journals (and many that serve specific project-based industry areas such as construction and information systems), but project management (PM) until recently has not captured the attention of the wider community of business and management academics, including those in OSCM. As we will show, this is changing, consistent with a recognition of ongoing "projectification" of work, first identified back in the 1990s (Midler, 1995).

From PM to project studies: a brief history

The genesis of modern approaches to managing projects is generally credited as being in the 1950s with the development of a set of tools and techniques for planning and scheduling tasks in a project. These "classic" tools, including work breakdown structures, critical path analysis, Gantt charts, and S-curves, became the standard fare of projects. Accompanying these was the emergence of full process sets, moving from an exclusive focus on tasks, to a wider consideration including governance and assurance, procurement, quality, cost, risk, and configuration management (e.g. PMI, 2017). Many of these approaches are now

embedded in software packages, frequently determining the approaches to be followed by those working on the project. In this are some of the distinctive features of the historic landscape of projects and their theorization, reflecting a "hard systems," rational, and deconstructivist perspective. Understanding such path dependence is an important feature of our discussions here, as we seek to broaden the consideration (see e.g. Beyond the Gantt Chart – Maylor, 2001; Critical Project Studies – Hodgson and Cicmil, 2006; Rethinking PM – Winter *et al.*, 2006; Project Society – Lundin *et al.*, 2015).

Many of the recent additions to the PM corpus have extended the consideration further beyond tools and processes, toward treating projects as wider systems of human activity (Söderlund, 2011). The term "project studies" is now widely used to incorporate organization-wide activities, including project, program, and portfolio management, and the role of the organization and its supply chain in these activities. Scholars have suggested alternative operationalisations of the concept of PM, representing an evolution from addressing solely tactical level concerns to include the integration of knowledge, resources, and benefits across organizations, the selection and prioritization of projects, and the linkages between strategy, organizational considerations, societal issues, and projects. With this wider brief, program and portfolio management have become central to the considerations of project studies.

We have witnessed an increasing number of scholars exploring linkages between the project context and established managerial disciplines, for instance, between strategy and projects (Morgan *et al.*, 2008), and between projects and innovation (Davies *et al.*, 2017). In the field of organization science, "Projects and Organizations" was the topic of the 2015 Winter Conference and a SI of *Organization Science*. Controlling complex projects was the topic of a 2015 SI of *Sloan Management Review*. No longer the "unfashionable end" of the volume-variety spectrum, the project context is now receiving a level of attention commensurate with its importance to managers, organizations, and economies. Our SI is an attempt to continue this from an OSCM perspective.

Objective
The objective of this SI is to provide a forum for works at the nexus of OSCM and project contexts. Project contexts provide particular challenges for both theory and practice due to the variable levels of structural (scale, number of interdependent elements), socio-political (people, power, politics, agendas, relationships), and emergent (uncertainty and change) complexities (Geraldi *et al.*, 2011; Ramasesh and Browning, 2014). Moreover, these complexities are not stable but dynamic and therefore not entirely amenable to the logic of the manufacturing or service factory, for instance (Browning and Ramasesh, 2007).

Such a forum is clearly timely for our field. Projects have long been part of the OSCM canon and pedagogy. Yet there are many pervasive challenges that contribute to the performance paradox. For instance, how can projects be better planned such that performance is improved? How can we increase the efficiency of projects in turning investments into benefits? These have been significant topics in past research on projects, but with new constraints associated with increasing project complexities, they require constant revisiting: the context has not stood still and neither should the research bodies of knowledge. For instance, as OSCM academics, we recognize the challenge of waste and its elimination. Whilst progress is evident in waste elimination in many organizations and their supply chains in automotive, electronics, and retail, in projects this has received relatively little attention (Browning, 2003). Anecdotal evidence suggests that the costs of this waste are significant. There is clearly potential for research to explore the application of old theories in existing project contexts, as well as in emerging areas such as megaprojects (Flyvbjerg, 2017; Söderlund *et al.*, 2017). So far, much research has looked at the nature of these projects and how they differ from traditional conceptualisations of projects, but little has been said about the challenges they pose for OSCM.

A second reason why it is so critical to explore the linkages between OSCM and the context of projects is associated with the many difficulties of moving between projects and operations in practice. Numerous studies have shown the critical, yet oftentimes flawed, link between these two. The opening of London Heathrow Terminal 5 in 2008 is an object lesson. "The project" is considered to have been extremely successful, innovative with regards to the contracting and alliancing procedures, and completed on time and budget. But "operations" encountered a highly public and embarrassing failure when the terminal was opened – the asset was not ready for operation. In that respect, one might argue that this is fundamental to the *raison d'être* for projects, that benefits are realised not at project completion, but as a result of effective start-up and sustainment of operations. In times when more and more activities become projects and more projects need to be integrated into operations, this might prove even more challenging – project overload may certainly become a devastating effect (Zika-Viktorsson *et al.*, 2006) with implications for people and operational processes. The question is then: How may we improve the linkages between projects and operations? This is certainly not a unilateral challenge but a bilateral one. This SI contributes to establishing better linkages across the boundaries of what we have previously conceived as independent domains of projects and operations. Integration in practice as well as in research would clearly be beneficial.

We have sought to construct a sense of "an issue" with the eight papers we present here. The role of an SI is in "building knowledge" – and assisting in preventing the endless and pointless loops on conceptual reinvention that take place where such a focus is not enabled. An SI has a particular role of showing both what is complete in terms of investigations and arguments and what are the interesting areas for further development. With this SI, we have the opportunity to view a swathe of research being undertaken by colleagues in this context. This collective effort – shaped by the call for papers, the authors, and the reviewers – provides insights on several interesting topics of practical importance. In this regard, we hope that this is a spur to further conversations, contributes to the richness of our field, and also supports teaching.

OSCM and projects

Our point of departure for the SI was that projects have been a neglected context for OSCM research. However, whilst that is borne out in some accounts (e.g. the literature review of Walker *et al.*, 2015), the broader literature does not entirely support this finding. An overview of the landscape of OSCM literature on projects provides a more nuanced picture.

First, there is a substantial and well-developed literature on new product development, a project-based process. It continues to receive plenty of attention in a broad range of OSCM journals as well as specialist titles (e.g. *Journal of Product Innovation Management, R&D Management*). There is an evidence that work in this domain has influenced PM more generally, with for instance the stage-gate process (Cooper, 2001) now being ubiquitous.

Second, a significant literature continues the "hard systems" view of operations and projects, as was evident in the development of the early tools and processes for managing projects. The underlying belief is that of Klein and Mecklin's "Mr. Optimizer" (Klein and Meckling, 1958) – that there exists a state of optimal performance in any process, and it can be determined by calculation (e.g. Ballestin and Leus, 2009; Bendoly *et al.*, 2010). These are often evident in mainstream OM journals such as *Management Science* and *Production and Operations Management,* as well as *IEEE Transactions on Engineering Management*.

Third, an emerging "soft systems" view of projects accepts their inherent complexities without trying to "solve" them as a linear problem or even as a set of linear problems (e.g. Ramasesh and Browning, 2014; Maylor and Turner, 2017). This is consistent with the view of complex systems as requiring resolution rather than solution (Roth and Senge, 1996). The complexity exists not just because of the scale of the endeavor, but also because it

is socially rather than objectively constructed, and it is dynamic rather than existing in a static, closed environment. Further, this conceptualization facilitates considerations at strategic as well as tactical levels.

In addition to these three areas, there is the specific PM literature. OSCM today makes up relatively little of the recent PM literature, despite common roots. Over the past 20 years, it is arguable that PM has reduced its focus on optimization and critical success factors, to a position consistent with organizational studies, which we describe as "project studies" (following Geraldi and Söderlund, 2018). This has been evident in its main journals (*International Journal of* PM, PM *Journal*, and *International Journal of Managing Projects in Business*). Concurrently, there has been a struggle for academic legitimacy by those whose research interest is in projects. The low rankings of the PM journals has contributed to this. Furthermore, project studies has risked becoming a multi-disciplinary field "stuck in the middle" – being perceived as insufficiently theoretical to "cut it" in the academy, whilst viewed by practitioners as being too theoretically focused to contribute to the understanding or solution of problems they face. Such a danger clearly remains and is one that the current considerations of impact research will need to address. However, in legitimacy terms, the significant level of interest generated by this SI is just one piece of evidence that perhaps legitimacy has been at least partially established.

This discussion of the landscape of the literature shifted our view of the SI. It did not discount the opportunity – as we believe the selected papers will show – but it made us re-evaluate our context of interest (projects) and its role in our discipline (OSCM). In addition to the broad contribution of the collective endeavor presented here, it is to the more specific considerations of the third of the above areas that this SI contributes. The opportunity then is to open up the context to a broader range of discussions by OSCM and other scholars through consideration of the totality of project systems, in hard, soft, and dynamic terms.

The call for papers for this SI sought innovative research with the potential to advance the field of OSCM, significantly, theoretically, and practically. The process of refining the submissions took place through both formal reviews and our combined reflections as guest editors. We also asked each of the author teams to reflect on the pedagogical implications of their work. Our aim was to encourage the process of generating impact from each paper.

The ordering of the papers

The papers themselves fall under two broad themes. The first concerns the perennial OSCM predilection for processes. As the first two papers make clear, the traditional classification of projects as singular operations processes characterized by high variety and low volume requires further development. This is most useful as it opens the context to the full range of OSCM consideration. The second theme concerns the extension of core concepts from Supply Chain Management into this "new" context of projects. Within this second theme, the issues of segmentation, inter-organizational relations, coordination, and complexity all receive focus, yet with many common elements. Most notable is the move beyond purely structural considerations to recognize the role of social capital (as Amoako-Gyampah *et al.*, 2018). The final paper considers the impact for OSCM, and projects in particular, of crowdsourcing. As an innovation in obtaining the resources of production, it clearly has merit but also presents a new set of challenges for managers.

The papers

Paper 1: Project and processes: a convenient but simplistic dichotomy
(Harvey and Aubry, 2018)
This first article in the SI uses a legalistic courtroom approach for the two authors to present their cases for whether a new initiative in an organization is a project or a standard

OM process. The paper clarifies the gray areas between these two constructs by exploring the commonalities and differences between projects and OM processes, and thus, between PM and OM process management. For each of these fields they compare their different tools, techniques, and respective literatures, followed by various examples to bring out similarities and differences. The authors then challenge this apparent dichotomy and propose better ways to classify and manage new initiatives.

The authors note that new initiatives that involve complex processes tend to be managed as projects, using the PM body of knowledge. But because each initiative takes a somewhat different form, it is treated as a one-of-a-kind undertaking, thereby losing many of the opportunities for learning and continuous improvement associated with process management. The article makes the case that two research and practice communities that are evolving independently have much to gain by adopting a unified model and integrating their respective bodies of knowledge.

Paper 2: It takes two to tango: product-organization interdependence in managing major projects (Artto and Turkulainen, 2018)

In addition to its process, a project's result and the temporary organization used to produce it represent two more, important domains or subsystems in projects. This study explores relationships between these two subsystems in terms of their constituent elements. Connecting to the classic volume-variety matrix, the study explores the uniqueness and reuse of these elements across projects. The study looks empirically at four global, renewable fuels refinery projects implemented by Neste Oil from 2003 to 2011. Each project is unique, although all four are based on the same technology. The authors find instances of both diagonal and off-diagonal positions in the volume-variety matrix, such as the reuse of common organizational units across unique projects to obtain differentiated results. Common product or result components also appear across unique projects. The study demonstrates that even in distinct projects, managers need not design everything from scratch, and projects contain some elements of repetitive operations.

Paper 3: Coordination in temporary organizations – formal and informal mechanisms at the 2016 Olympics (Fernandes et al., 2018)

In this paper the authors explore the evolution of operational coordination within temporary, project organizations by examining the case of the 2016 Summer Olympic Games Organizing Committee. Their longitudinal immersion in the case study organization allowed them to observe real-time operational coordination. Supported by that evidence (and other sources), they capture the use of formal and informal coordination mechanisms, selected depending upon the specific challenges of each phase of work. Along with other papers in this SI, they find that project organizations contain a hybrid of temporary and enduring elements, as well as centralized and decentralized elements, both of which evolve dynamically over the course of the project. Appropriate coordination strategies and mechanisms are contingent upon the project phase as well as other characteristics. The authors also explore the concept of "venueization," the tailoring of a standard operational approach to a specific time and place, which helps planners and managers capture and apply enduring knowledge across project instances – thereby orienting and connecting temporary projects within a larger context of ongoing operations.

Paper 4: Lean leadership in major projects – from "predict and provide" to "predict and prevent" (Holweg and Maylor, 2018)

The fourth paper applies lean thinking to a major project context. The term "Lean leadership" is used, providing an integrative heading for alternative approaches, systems,

and tools to the performance challenges of projects. Two systems for dealing with these performance challenges are outlined. The first is where cost and duration overrun data from previous projects are used to determine the level of optimism bias inherent in estimates, which guides the level of uplift that needs to be applied to future estimates to increase their chance of "success." This is "predict and provide": it predicts that a new project will overrun by a certain amount and thus requires the overrun to be funded from the outset. It is like a factory that expands its rework areas to handle large numbers of defects, rather than paying attention to the causes of the problems. Applying an OSCM lens to major projects requires examining the systems involved in major projects to root out the causes of overruns. This alternative is termed "predict and prevent."

From an illustrative case study, the paper demonstrates the utility of considering a multi-level view of processes from the leadership level down to the task level. This facilitates the integration of a variety of approaches to process improvement, including lean, agile, theory of constraints, and the wide body of knowledge that exists on managing projects. The paper then identifies seven wastes from the case, as the focus of the "prevent" strategy. Lastly, the paper highlights the role of the leader as an important differentiator in performance, and proposes principles for lean leadership.

Paper 5: Creating relational capital through socialization in project alliances (Aaltonen and Turkulainen, 2018)

This is the first of four papers considering issues related to project supply chains. The authors extend the current knowledge of the role of relational capital in supply chains to project-based operations with a focus on alliances. These alliances are of interest because alliance firms are required to collaborate but may elsewhere be competitors with little history of prior collaboration. In addition, whilst there may be formal means for communication and governance, it is often through informal rather than formal channels that resolutions to inevitable problems are found. Obtaining timely resolutions relies on relational capital, which is associated with trust, respect, and effective interaction across organizational boundaries. Whilst in principle, alliance organizations have a shared interest in the successful completion of the project, this in itself cannot be relied upon to incentivise the behaviors or practices necessary by all the members of the joint organization.

The creation of relational capital occurs through socialization interventions, both formal and informal: workshops, co-location, specific training, social time away from the workplace, etc. How these mechanisms evolve over the project life-cycle, and build, enhance, and maintain relational capital, is explored through analysis of two case studies. The insights include a restatement of the importance of informal mechanisms, the co-existence of collaboration and conflict, and insights as to how this process can be explicitly managed in future projects. Further, and consistent with the theme of the previous paper in this issue, the importance of the leadership provided by the client is noted.

Paper 6: Using project demand profiling to improve the effectiveness and efficiency of infrastructure projects (Masi et al., 2018)

This paper explores the applicability of supply chain segmentation to improve the effectiveness and efficiency of infrastructure projects by identifying different types of project demand profiles. A three-stage research design was adopted. Stage 1 explored the applicability of supply chain segmentation, through demand profiling, to the portfolio of infrastructure projects in a utility company. Stage 2 then involved an iterative process of "theory matching" to the portfolio, program, and PM literatures. Then in stage 3, propositions were formulated to outline how supply chain segmentation through project demand profiling could improve both the effectiveness and the efficiency of

infrastructure projects. The resulting four propositions involved recognizing the importance of identifying the different demand profiles of projects and groups of projects in the portfolio to identify potentially repeatable projects. This could then lead to economies of repetition involving not only reduced costs but also improved time and quality. This work fills a gap in the portfolio management literature, suggesting that the initial screening, selection, and prioritization of project proposals should be expanded to recognize not only the project type, but also each project's demand profile.

Paper 7: A framework for understanding managerial responses to supply chain complexity (Turner et al., 2018)

This paper examines the nature of supply chain complexity by synthesizing ideas from the study of the complexity of projects with those from supply chain management. This is an important nexus: supply chains play an important role in project efficiency, and projects are the vehicle for organizations' attempts to transform their supply chains. The notion of supply chain complexity is clearly a concept that may facilitate such integration. Highlighting how managers cope with supply chain complexity, the authors rely on the notion of ambidexterity – the ability to both explore and exploit knowledge – to analyze managerial responses to such complexity. The authors demonstrate that this approach is particularly relevant for studying how managers cope with strategic and operational challenges.

The authors present findings from case-study research with six UK-based organizations identifying the managerial responses to three complexities: structural, socio-political, and emergent. The findings indicate that managers faced with these complexities use a wide range of responses, in some cases to accommodate and/or reduce the complexities faced. This suggests, the authors argue, that they were strategically important issues and not necessarily deleterious – that complexity could be beneficial. Finally, the authors use the perspective of ambidexterity to make a more explicit assessment of whether existing solutions were considered or if novel methods were required in response to the complexities.

Paper 8: Crowdsourcing: a contemporary form of PM with linkages to open innovation and novel operations (Wilson et al., 2018)

Recently, two important themes, both for OSCM and in practice, have been crowdsourcing and open innovation. Crowdsourcing is a central element of open innovation processes with far-reaching implications for how projects are managed and delivered. Crowdsourcing is widely practiced and, in particular, crowdsourcing-centric firms have capitalized on growing global labor crowds. These have prompted novel ways of recruiting and deploying crowd-based resources for creative, developmental, testing, and production activities. This has also led to a surge in scholarly interest in how such operations contrast with more traditional approaches.

As emphasized by the authors, crowdsourcing holds considerable promise in terms of how it fits into more sophisticated macro understandings of where project society is headed. It may also be considered a new development in the ongoing trajectory of projectification. Two research questions are addressed:

    RQ1. How well does crowdsourcing extend traditional and align with developing conceptions of PM?

    RQ2. How does crowdsourcing, as a novel form of operations management, improve outcomes?

The authors draw on five case studies to highlight how firms use large, productive crowds to obtain high speeds while mitigating the conventional tradeoffs with costs, levels of collaborative focus, and levels of service/product-tailoring. As the paper demonstrates, such

output is produced through an unusual and unprecedented "value chain stakeholder": the crowd. It comprises many thousands of members working in highly client-responsive tasks, which calls for novel perspectives on the role and practice of management in such operations.

Insights from the papers
The section above highlighted a few of the most important findings in each of the papers. In this section we look across the papers to see their collective contribution to our understanding of the linkages between projects and OSCM. Some key themes emerge that are of relevance to both project studies and OSCM.

System design and project processes
A key theme that runs through all of the papers, though not necessarily explicitly framed in the same terminology, is that there exists a range of choices available in the design of systems to deliver projects. In core OSCM, the options for process choice and resource configuration are treated as a one-time event when processes are established. In the context of projects, due to task uncertainties and the project life cycle, this may be an ongoing and emergent activity rather than a one-time event. Furthermore, the papers illustrate a significant range of options for systems design, and there appear to be many options available for process analysts and designers. In some of the papers, the very nature of processes is considered in detail, which informs our knowledge of the process challenges in the context of projects. Moreover, it is demonstrated that there is not a single process, but multiple processes unfolding at multiple levels of analysis. This requires design choices to be made within the overall system of systems in major projects. These design choices extend beyond the traditional OM consideration of technologies and processes. Project designers should explicitly consider at least five major subsystems in projects: results, process, organization, resources/tools, and goals, plus the project's context (Browning, 2017). The consideration of supply chains, the participants in the supply chain, and their relationships are certainly also key design choices for any supply chain, and also critical for the context of projects. Several of the papers presented in this SI point out this "forgotten" dimension in PM which paves the way for a revitalization of the linkages between creating supply chains that contribute to project success and project efficiencies. New forms of sourcing, such as crowdsourcing, are certainly calling into question what tomorrow's supply chains will look like. In that respect, we envision on the one hand increasingly stronger alliances and partnerships among firms in the supply chain, yet simultaneously a larger number of participants involved in the supply chain.

Extending the scope of process choices
We observe that the insights presented in this issue emphasize the importance of extending the traditional concept of process choices along two key dimensions, the scope and the duration. In principle, the choices made should support project performance requirements, and should evolve in response to learning and change in the project. In terms of the scope of process choice, process analysis – common in OSCM – can also facilitate a better understanding of the range of processes available to the designer and their implications for performance. In duration, too, there are considerable implications that extend beyond narrow notions of the project life cycle. For instance, the design, construction, and hand-over of an airport terminal is complex because of the difficulties in designing and implementing new processes for the operation of the final asset. Understanding how project processes and operational processes are interrelated, how they conflict, and how they may unfold synergistically (or otherwise) is a critical concern for both contemporary OSCM and PM scholars. The number of examples of projects that fail to realize their intended benefits, because of failed transition to an operational state, is far too great not to take this matter seriously. This would also require a better grasp of all subsystems

involved in a project (consistent with the arguments presented by Ramasesh and Browning, 2014) and how these subsystems interrelate with operational processes of the delivered system. Attaining such outcomes, however, requires thorough planning and flexibility throughout the life of the project.

Linking projects with process

Projects frequently share many of the concerns of manufacturing and service operations, including coordinating the activities of supply chains, managing schedules, sustaining quality improvement, and cost and inventory management. In this respect, there is a strong overlap with several core domains in each of these disciplines and much to learn from each other. The key idea with linking projects with processes is that all work (both project work and repetitive operations) occurs in processes. The idea of a project process is certainly not new. Activity networks have been a central construct in PM since the 1950s. Since the 1990s, software and aerospace industries have focused on establishing "standard processes" (for instance, for risk management) across many projects in a multi-project organization (Dahlgren and Söderlund, 2010). Such initiatives are important for at least two reasons. First, standard processes provide better frameworks for ensuring continuous improvements. Second, they offer better ways to disseminate best practices and thereby save each new project from "reinventing the wheel." But the pressure of getting any one project done may sometimes compete with the longer-term benefits of standardizing across projects and capturing best practices for use in future projects. For these reasons there is sometimes a need for dedicated organizations, such as a PM Office, to ensure that projects stick to the rules of the game. In that respect, it is important to address not only the design of project processes but also how they are maintained and followed. The use of standard processes across projects also opens the question of how much standardization is appropriate: too little causes projects to fail to benefit from prior learning and best practices, while too much puts a straitjacket on projects and limits their flexibility (Browning, 2017).

Linking supply chains with projects, and repetitive operations with temporary organizations

The supply chains for projects may be more quickly formed and transient than for repetitive operations but, as is documented in this SI, projects frequently have continuing lives in other forms, or later projects are not always that different from earlier ones (as argued by e.g. Prencipe and Tell, 2001). Linking operations with projects might thus better address the aspects of projects that are repetitive, and of operations that are unique. Perhaps project scholars have tended to emphasize uniqueness too much, which has hindered the transfer of best practice and lessons learned across projects because of the process associated with "extraordinization" (Lindgren *et al.*, 2014). Likewise, perhaps OSCM has tended to focus on the repetitive issues and failed to recognize opportunities for learning and improvement within and across non-repetitive processes.

Clearly, we have much to learn about the reuse of project knowledge (including standard processes) across projects. Again, starting with a standard process and tailoring it is much quicker than starting each project from scratch. This includes using standard/general and predetermined "networks of commitments" among suppliers and stakeholders that can be rapidly renegotiated and reconfigured with each new instance (as also argued by Browning and Ramasesh, 2007). This is a key to enable agility in projects as well as in operations (Spear and Bowen, 1999).

Processes and complexities

This SI offers evidence for the need to better understand different kinds of complexities. Complexity is a central issue in management and organization studies in general. Indeed, it

is a topic that has attracted scholars in both project studies and OSCM. However, research on projects seems to be more concerned with generating explanations about the design and evolution of PM. As several of the papers in this SI point out, this might be an area in which OSCM can benefit from studying not only projects as a context but also theories generated within project studies (e.g. Ramasesh and Browning, 2014). Most notably, this could lead to better addressing the way that different complexities interact to generate challenges for operations managers as well as the requirements for operations managers to respond to ever-changing project complexities. The papers in this SI provide ideas on how such bridging efforts might look. Perhaps complexity as an empirical domain and theory might provide openings where these two fields may learn from each other (also argued by Davies *et al.*, 2017). There are also avenues that OSCM scholars may take to learn from project studies by explicitly focusing on complexity issues more generally, given that, in project contexts, managers may create and reshape complexity as part of their assignment, and in that respect work both to promote and reduce it. The current attention to complexity of and in supply chains is a step in a good direction, and indicates the potential of a broader consideration of complexities.

The challenges of coordination in temporary organizations

Coordination is essential for both OSCM and project studies. There are numerous challenges associated with coordination in complex projects and "temporary organizations," especially when considering the range of complexities of contemporary projects and the need for managers to respond to emergent complexities. In that respect, one might argue that insights from both these fields are necessary to ensure that operations are coordinated satisfactorily, but also that coordination continues to evolve and change. There might be certain elements of coordination that remain unchanged throughout the life of a project, but many other elements, including the need for special kinds of meetings needed to move the project forward, the level of detail in plans, and so on, will change. Changes may themselves be on a regular "drumbeat" and so be regularized, as happens in Agile software projects during "sprints." More generally, the frequency of progress meetings might remain unchanged whatever else is happening in the project. Again, OSCM and PM provide complementary insights to shape insightful coordination, particularly where there is the problem of dynamics. The optimum organizational structure is evolving as key activities change, and the integrative and coordination mechanisms will need to change as well.

Responding to technology advances and project scale

A consequence of rapid technological evolution is that projects are growing bigger and faster than our ability to learn how to manage them. Projects may need to be carried out at scale to take advantage of the complementarities associated with technologies, yet they also need to stay small to remain flexible and quickly responsive to new technologies and market volatility, such as changing client demands. There is a tension between these two states, though again this is a matter for systems design and process choice. Beyond consideration of project scale, the papers recognize the need to develop a better understanding of how both repetitive and project operations will be affected by new technologies. Perhaps herein lies an opportunity for the two fields to work closer together and generate a better common understanding and language to more fully reap the benefits of new technologies.

Moving forward

For the development of OSCM, this SI represented an opportunity for theory development, testing, and extension. We asked the question at the outset, "how well do OSCM theories (Pilkington and Meredith, 2009; McCutcheon and Meredith, 1993) translate into the

projects domain?" On the basis of the eight papers presented here, we are clear that with suitable amendments, the translation is useful; we are able to glean insights into the context that we would not have been able to otherwise. Moreover, whilst these insights are a good step in a helpful direction, there is still plenty of scope left for scholars to work with. The research tradition of "answering one question with ten" means that there are more avenues for research after this SI than before.

Whilst this SI demonstrates the application of OSCM approaches to projects, the contribution of practices from major projects to OSCM is less well developed. For instance, behavioral considerations in projects (e.g. optimism bias identified by Tversky and Kahneman, 1992) have been well studied, but the implications for repetitive operations are less clear. This seems particularly interesting in contexts where project investments are compared with operational improvements and continuous improvements. If over-optimism is primarily an issue observed in project contexts, what then are the implications for investments in continuous improvements? Will projects win at the expense of operations? Will projectification continue and operational improvements lose? These are questions with rather fundamental implications on the projectification of society and operations that certainly could be promoted by project scholars, but a topic that underscores the contribution of operationally oriented scholars to provide nuance to this problem complex. This certainly also points out the criticality of highlighting the value of projects, what value is created by projects, and how this value is evaluated and realized (Browning, 2017).

This also underscores the importance of looking beyond projects, of looking at the linkages between projects and the importance of "connecting the dots." There are numerous initiatives implemented to improve the strategic value and strategy execution through projects. OSCM has a central role to play here. We need to better understand project portfolio issues, we need to better understand the PM office and its functions in creating and shaping better projects, and we need to better understand the coordination across projects such as the role of program management, coordination mechanisms, platform management, commonality issues, etc. that have all been addressed in the automotive industry (Cusumano and Nobeoka, 1998) but so far are still ignored in a project context, where projects are treated as isolated islands. In that respect, "no project is an island" (Engwall, 2003), and we need to understand how projects relate to their environments.

The emergence of the project-based organization is clearly an area where insights from PM and OSCM scholarship need to be explored and exploited. Project-based organizations struggle with a number of challenges (Whitley, 2006; Browning, 2017) which are associated with the problems of coordinating across a landscape of projects, of learning across projects, and of mastering innovation. For all these challenges, insights from OSCM can certainly play a key role. For instance, how can we identify early signs that things are not working properly? How can we better transfer learning and insights across a spectrum of complex and autonomous projects? What methods and tools might be helpful in guiding such processes?

In the improvement of performance, whilst Deming (1982) exhorted managers to "fix the system," this has been limited to the consideration of "formal process" in project systems and has largely been exhausted. Systemically, there are many greater opportunities for "design," for instance, to include strategy, structure, people and rewards (Galbraith, 1973). This generally also highlights the importance of bringing "process" to the table of projects – of improving operations in projects. This is a topic that used to have a clear role, but which receives surprisingly little attention in current project studies (Geraldi and Söderlund, 2018). Instead, current project studies have become increasingly influenced by meta-theories, critical scholarship and organizational theory (Davies *et al.*, 2017; Geraldi and Söderlund, 2016), and with relatively little input from OSCM. The result may well be that the premises that started in our combined fields – those of optimizing design, structure and

order – remain under-developed in projects? This might prove the importance of revisiting the use of design structure matrix thinking (Eppinger and Browning, 2012), systems dynamics (Van Oorschot *et al.*, 2013), and planning approaches (Williams, 2017) in contemporary project environments.

Similarly, the challenges of performance measurement go beyond the typical quality-cost-delivery of repetitive operations, and are amplified by time-dependence, perception, focus, uncertainty, risk, opportunity, and value in the project context (Browning, 2014). Would such a broader conceptualisation assist in repetitive operations? With the recent widespread adoption of "agile" principles and practices in IT projects, what are the interfacing operational conditions necessary for this, and are these more flexible approaches useful more generally in information-intensive operations? In that respect, one might argue that a stronger focus on linking projects with OSCM might also add to the general issue of improving the strategic performance of projects, at the same time as improving their tactical performance (Pinto and Slevin, 1987). This is a classic tension between efficiency and effectiveness with wide ranging implications on new forms of organizing projects, new kinds of projects being implemented, as well as new approaches to managing projects.

This SI, as a forum, is a timely starting point for productive and impactful work on OSCM in projects, opens up many useful avenues for inquiry, and itself contributes to our discipline. We hope that these papers will influence the future of OSCM and project studies, and provide avenues in demonstrating how the linkages between them can be explored and exploited in future scholarship and practice.

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