Institutional complexities of smart maintenance purchasing in higher education institutes: setting the scene

Author(s)
Johannes, Koos; Voordijk, Hans; Wakkee, Ingrid; Aranda-Mena, Guillermo

Publication date
2022

Document Version
Author accepted manuscript (AAM)

Institutional complexities of smart maintenance purchasing in higher education institutes: setting the scene

Koos Johannes M.Sc., Amsterdam University of Applied Sciences, Built Environment.
Hans Voordijk Ph.D., University of Twente, Construction Management & Engineering.
Ingrid Wakkee Ph.D., Amsterdam University of Applied Sciences, Centre for Applied Research on Economics & Management.
Guillermo Aranda-Mena Ph.D., RMIT University, Melbourne, School of Property, Construction and Project Management

Summary
This paper analyzes the institutional context of maintenance purchasing in higher education. It aims to provide insights into the institutional complexities of smart maintenance purchasing in higher education institutes. In a case study, six external institutional fields and two internal institutional logics are identified. They create two types of institutional complexities that impede innovation if not treated correctly. Three ways are discussed to deal with those institutional complexities, 1) negotiating institutional field boundaries, 2) creating new institutional logics and practices, and 3) implementing institutional changes.

Keywords: maintenance, purchasing, institutional complexities, case study

Submission category: academic working paper

Introduction

Construction maintenance represents a substantial part of the purchasing expenditure of higher education institutions (HEI's). The digital transition to smart maintenance with its data driven approaches (e.g., Ram et al., 2019; Windapo et al., 2020) will complicate maintenance purchasing because data is used and valued differently by the actors involved. We will explore this problem using the concept of institutional complexity, defined as the situation in which incompatible institutional logics and their practices are in operation at the same time and in the same organization (Greenwood et al., 2011).

Two varieties of institutional complexity are distinguished. The first originates from the supplying construction industry-, known for its fragmented and institutionalized nature (Chan, 2018; Kadefors, 1995; Sminia, 2011; Oti-Sarpong, 2022). Multi-tiered delivery systems create parallel supply networks, each with its own rules of the game. The second variety of institutional complexity originates from facilities management (FM) organizations, that have evolved through the integration of two corporate functions: 1) the acquisition and delivery of property, and 2) the maintenance and operation of property (Jensen, 2008; Van der Voordt, 2017). Both functions have different expectations of and dispositions toward purchasing. While the first function traditionally aims at getting state of the art solutions for future occupants (Edum-Fotwe and McCaffer, 2000; Lindahl and Ryd, 2007), the second function prefers strong supplier relations in the outsourcing of maintenance that ensure business continuity with a minimum of disturbances (Tsang, 2002; Van Niekerk, 2010).

Gluch and Svensson (2018) and Svensson and Löwstedt (2021) discuss the tensions caused by institutional complexities in an FM organization. Tensions can be productive in changing organizations, but when they are not addressed in the right way, they can lead to inter- and intraorganizational conflicts and organizational inertia (Lounsbury and Crumley, 2007). Purchasing could have a role in addressing institutional complexities but

this requires an in-depth understanding of their nature. Therefore, the aim of this paper is to provide insights into the institutional complexities of smart maintenance management in HEI's. We define smart maintenance management (SMM) as the strategic process of directing, controlling, and monitoring of the supply and delivery of smart maintenance. Purchasing in this study refers to the operational supply and delivery of smart maintenance services (Van Weele, 2014; Murray, 2009).

The following section reviews relevant concepts from institutional theory. Then, the methodology section explains how the research was designed and operationalized using a case study approach. The results section describes the provisional findings: six institutional fields and two institutional FM logics are identified. We describe how these relate to SMM tensions that served as barriers for innovation. We subsequently discussion three ways for addressing institutional complexities and present some preliminary conclusions.

Theoretical motivation

While institutional theory has its origins in economics, political science, and sociology, it is increasingly being used for organizational research and management practice. In this paper, we use Shibutani's (1986 p16) definition of institutions as 'supraorganizational patterns of social life rooted in shared norms'. This definition acknowledges that human behavior in work situations is influenced by external norms rather than through internal organizational intentions (Scott, 1995 p42). In an attempt to improve our understanding of the complex environment for smart maintenance management in HEI's, this paper discusses institutional fields, institutional logics and practices, and institutional change.

Institutional fields

The institutional fields perspective provides insights in how HEI's are enacted upon by their external maintenance supplier environment and how, simultaneously, they may enact that external environment (Kaupi, 2013). Scott (1995) defines an organizational field as 'a community of organizations that partakes of a common meaning system and whose participants interact more frequently and fatefully with one and other than with actors outside the field'. Institutional fields can be seen as spaces of strategic action where actors vie for advantage (Fligstein, 2001). They may include governmental agencies, partners that exchanges services and goods (e.g., clients, wholesale, and retail suppliers), funding sources, special interest groups, trade organizations, professional associations, and the public (Wooten and Hoffman, 2017).

The exchange of goods, services and information in professional institutional fields can be analyzed from the regulative, normative, and cognitive perspective (Scott, 1995). The regulative perspective involves the sanctionable rules that are imposed on fields by laws. The normative perspective involves the norms and standards that field actors choose to commit themselves to, for example via accreditation and certification. The cognitive perspective involves the way individuals construct and negotiate social reality in an institutional field.

In purchasing, HEI's engage with supplier networks that form institutional fields. Kaupi and Luzzini (2021) discuss institutional pressures exerted on purchasing organizations. When purchasing organizations are deferred to pressures from multiple institutional fields this creates institutional complexity (Greenwood et al., 2011).

Institutional logics and practices

HEI's may influence discourse, norms, and practices in the institutional fields to which they are connected, but may not be able to simply impose new practices on them. For one

reason, because HEI's are not homogenous organizations themselves. Within HEI's, multiple actors are involved in smart maintenance management, each with its own field connections, methods, and practices. We use the institutional logics and practices concepts to analyze the internal HEI environment.

The concept of institutional practices is related to the concept of institutional logics, and both are important for understanding how organizations change over time. Institutional logics are encompassing sets of principles that prescribe how individuals in the organization interpret organizational reality, and what constitutes appropriate course of action and behavior (Thornton and Ocasio, 2008). They provide guidelines on how to interpret and function in social work situations and are cultivated by representatives that give voice to principles and the associated behaviors and courses of action.

When multiple conflicting or incompatible institutional logics and their associated practices are working at the same time in the same organization, institutional complexity develops (Greenwood et al., 2011). Vermeulen et al. (2016) and Greenwood et al. (2011) distinguish different options for dealing with institutional complexity: strategies can be aimed at compartmentalizing or subsuming different logics. While the traditional literature distinguishes two generic incompatible institutional logics (exploration and exploitation), more studies on multiple logics within the same organization become available (Svensson and Löwstedt, 2021). Multiple incompatible logics can generate tensions and managerial challenges, yet studies also indicate that such tensions could lead into innovations (Battilana et al., 2017; Jay, 2013). New logics can immunize the organization against external pressures of multiple institutionally derived logics and can give an organization a new identity.

Institutional change

HEI's may need to replace unwittingly adopted institutional practices by new practices if smart maintenance management is to be implemented. For example, because existing practices are not aligned with an HEI's asset management strategy. But because institutional practices are rooted in external normative standards, these changes may be difficult to implement. It may require the engaging with norms, values and beliefs that have determined daily work of professionals for a long time. Institutional microfoundations refer to the way that normative standards and value patterns become internalized among employees in routinary tasks (Parsons, 1951 p37; Scott, 2008; Powell and Rerup, 2017). To change institutional practices therefore means that managers must engage with those microfoundations.

Human agency refers to the role of individuals in institutional practices and environments (Battilana, 2006, Battilana et al., 2009). Fligstein (1997, 2001) discusses human agency as the social skill to motivate others to cooperate in changing microfoundations. In his view, all social change tactics in institutional environments have in common that actors are taking the perspective of other actors to persuade them to cooperate (Fligstein, 2001 p106). He defines social skill as the ability to induce cooperation among others, based on the intention of helping others attain their ends. Skilled social actors in this view, do not have fixed goals, but focus on evolving collective ends, which enables them to exercise some degree of agency as they draw on, interpret, and enact institutional logics through their intra- and interorganizational relationships with field actors (Fligstein, 2001 p113; Besharov and Smith, 2014 p368). In doing so, they can use and incorporate the knowledge and expertise of network actors in change initiatives.

Methodology

A case study design is chosen for this study because case studies can capture the complexities and richness of institutionalised maintenance practices (Yin, 2014; Gibbert et al., 2008). For the empirical analyses of institutional complexities, three case study questions guided the data collection and analysis. 1) Which institutional fields for maintenance purchasing can be identified? 2) How do the logics of projects and maintenance manifest themselves in SMM? And 3) Which tensions in SMM can be identified and how do they relate to institutional complexity?

Research design and case selection

An FM organization, operated as a shared service centre for two HEI's was selected for this study (Figure 1). The FM organization is responsible for approximately 65 buildings on multiple campuses and at the time of the study, a new university building was delivered by a temporary project organization. This FM organization provides a suitable case for exploring ways for purchasing to navigate institutional complexity of smart maintenance purchasing for several reasons. First, the HEI environment itself is complex with actors involved in separate roles. Second, all maintenance was outsourced to external main contractors and specialised 2nd and 3rd tier contractors allowing the interaction with external institutional fields to be included in the analysis.

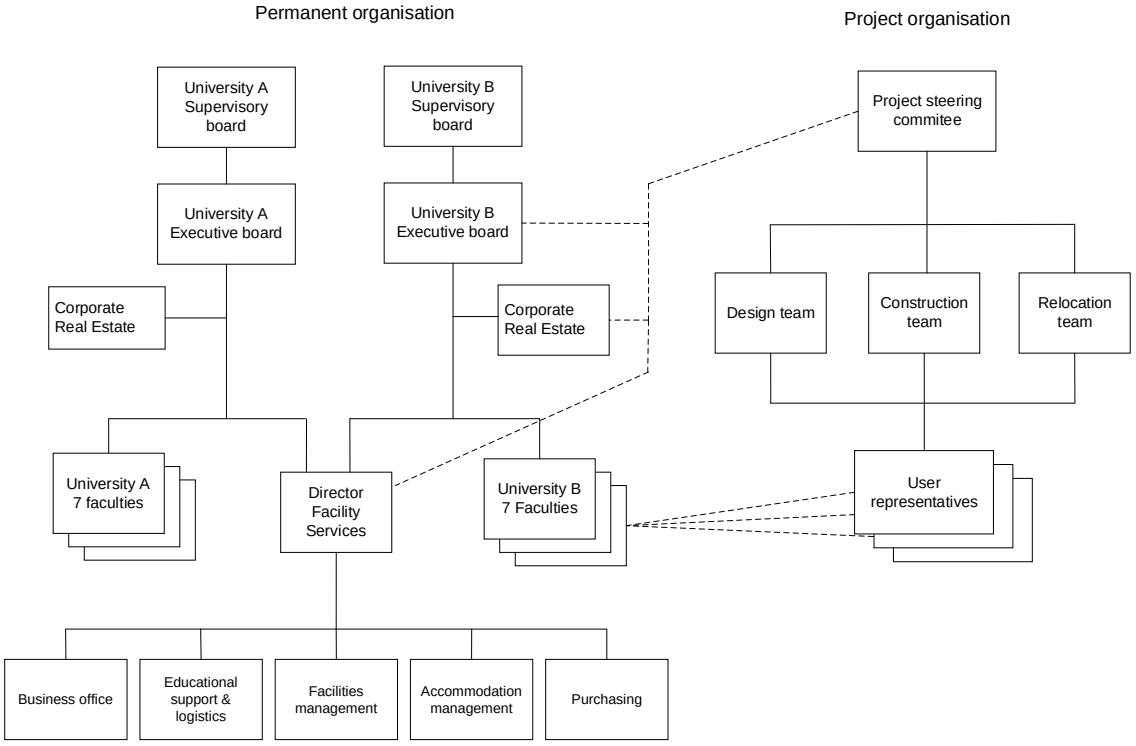

Figure 1. Organizational structure of the FM organization in the case study

Data collection and analysis

Data were collected through 28 semi-structured interviews and analyzing case-related documentation. The respondents were selected for their involvement in SMM. They were identified with the assistance of a key informant and recruited from the FM organization, main contractors, and subcontractors (Table 1). All interviews were recorded, transcribed, anonymized, and sent to the respondents for comments.

The case studies were also informed by case documentation. The documents collected included, among others, contracts, information system documentation, and minutes of contract governance meetings. The first researcher was given access to contractual documentation and to the online file sharing platform used to store and share drawings and technical data on the buildings. The contract documentation included, but was not limited to, requests for expression of interests, program of requirements, pricing formats, and maintenance implementation plans. The information management documents included site-related technical log file structure, data hub structure, and building passport design. Organizational policy documents included, but were not limited to, organizational charts and the contract governance structure. Secondary data was used via three case specific student reports on 'innovation and sustainable maintenance practices', 'impact of building modifications on data quality' and 'data ownership in maintenance contracts'.

During the overlapping periods of data collection and analyses, notes from informal and occasional conversations were used to interpret the data and adjust the interview questions. Finally, a draft version of the case study report was discussed with four key participants and informants.

Table 1 – Data collected

Data collection method	Specification
Interviews	Senior manager AM[a]: 1 Maintenance management: 5 Purchasing: 1 Facilities management: 2 Property management 2 Energy & sustainability: 1 Main contractor: 7 Subcontractor: 9
Case documents	contracts, information systems, on-line file share platform, meeting minutes
Secondary data	student reports, news articles, company websites

Note: [a]: AM = Accommodation management.

Data analysis

The data were coded using NVivo and hand coding in a 3-stage approach according the three case study questions mentioned above. In the first stage, the lens used for coding was finding institutional fields of SMM. In this stage, the data from the main contractor and subcontractor transcripts were screened for text fragments related to the regulative, normative, and cognitive elements (Scott, 1995) of institutional fields. In operationalizing the regulative element, we focused on coercive phenomena related to legislation and procurement rules. In operationalizing the normative element, we focused on professional industry related certification and accreditation. And in operationalizing the cognitive element, we focused on interpersonal phenomena related to the use of information.

The second stage of coding was aimed at analysing the HEI-internal projects and maintenance logics, using the four dimensions of institutional logics defined by Ocasio and Thornton (2008). In operationalizing 'sources of collective identity' (1st dimension), for both the projects and maintenance logics, the analysis was focused on how the respondents' identity was influenced by their membership of internal and external professional communities. In operationalizing 'determinants of power and status' (2nd

dimension), the analysis was focused on how the respondent's status and power was defined by perception of professional success. Systems of social classification (3rd dimension) refers to institutionalized categories of activity that are taken for granted as being socially constructed. In operationalizing this dimension, the analysis was focused on finding key characterizations of working practices that are taken for granted in both the projects and the maintenance logics. Allocation of attention (4th dimension) refers to the allocation of attention by decision makers. In operationalizing this dimension, the analysis was focused on identifying values that order the legitimacy and importance of solutions, and motives for action (Ocasio, 1997).

In the final third stage of coding, data was screened for text fragments related to absent or underdeveloped asset digitalization. This produced 15 tensions for SMM that could be related to the institutional complexities imposed on maintenance managers.

Results

Institutional fields identified (HEI external)

Six distinct institutional fields were identified as networks of actors that share common practices unique for a particular industrial sector (Table 2). In some instances, a field could be identified around a particular subcontractor, for example the steel construction field. But not all subcontractors were part of an institutional field. In The institutional fields were analyzed according to the regulative, normative, and cognitive pillars of Scott (1995).

The data suggests that producers and subcontractors, use accurate asset data (number of items supplied, specifications, inspection data etc.) for commercial purposes to protect or develop markets. As one respondent argued: 'in fact, we are not supplying clients, but we are supplying buildings'. By keeping actual records of installed components on various HEI sites and using his social network, the supplier institutionalized his technical solution in the market. By this we mean that the supplier used asset data strategically, to exert pressure on new main contractors to replace air filters with filters from the same supplier. Another example of strategic use of asset data by the supplier is through exerting normative pressure on HEI's by providing information on distinct types of air filters installed, directing attention toward improvement potential of higher specification filters.

Table 2 – Institutional fields of smart maintenance management

Field	Actors in the field	Regulative field mechanisms	Normative field mechanisms	Cognitive field mechanisms
Steel construction work	• Contractor • Structural engineering consultants • Steel supplier • Locks and hinges supplier • Metal recycling plants • Paint shop • Royal metals industry employers association	• Building decree • Monuments legislation	• Certified contractor for safety, health, and environment • Certified for execution of steel and aluminium structures • Certified apprenticeships for vocational education in steel construction	• Social exchanges in networks for other clients • Tacit building site knowledge • Social network amongst client caretakers and janitors
Glazing	• Glazing installer • Glass producer • Glass wholesale businesses	• Building decree • Monuments legislation	• Certified for professional glazing • Certified contractor for safety, health, and environment	• Tacit building site knowledge • Social exchanges in networks for other clients

	• National professional glazing association • Glass recycling plants		• Glazing related technical professional standards	
Roofing	• Roofing franchisor • Roofing franchisee • Centralised purchasing organization roofing products • Bitumen and EPDM roofing producers and suppliers • Bitumen recycling organization	• Franchisor-franchisee regulations	• Certified contractor for safety, health, and environment • DAKMERK* insurance certified (technical, financial) • Groenkeur* landscaping certified (BRL 2016) • No-roof-to-waste* certified (Bitumen reclaiming and recycling) • Certified apprenticeships for vocational education in roofing • Roofing process certification (BRL 4702)	• Social exchanges in networks for other clients • Informal exchanges with HEI maintenance staff • Regular technical committee meetings franchisor • Regular product presentations by producers
Ventilation filters	• Air filter producers • Installation companies • Mechanical engineering consultants	• Building decree • European union procurement guidelines • National framework agreements between producers and installation companies	• EUROVENT* air ventilation certification	• In-company training and education of mechanics by filter producer • Technical advice by filter producer in case of in-situ problems • Product support for HEI maintenance staff
Heating and cooling	• Various equipment component producers • Installation company (main contractor) • Installation companies (subcontractors) • STEK certified chiller maintenance companies • Heat pump engineering companies • Geothermal energy engineering companies • MEP engineering consultants • Building management system suppliers	• Building decree • Preferred (OEM) suppliers appointed by HEI	• Certified contractor for safety, health, and environment • Standard for condition assessment (NEN 2767) • Technical norms and standards for geothermal energy systems • STEK* certification for chillers • Various technical equipment norms and standards	• Tacit building site knowledge • Social network amongst client caretakers and janitors • Monthly toolbox meetings for site mechanics
Fire safety	• Producers of fire detection and extinguisher products	• Building decree • Governmental fire safety product certificates • Fire insurance liability conditions	• Firesafe operation of buildings certification (BRL K21016) • REOB* certification for maintenance on	• Social exchanges in networks for other clients • Regular technical meetings for field mechanics

	• Importers and resellers of fire alarm systems • Fire extinguisher wholesale businesses • Fire safety inspection and audit consultancies • Installation companies • Local fire safety enforcement authorities	• GDPR legislation on information privacy	fire extinguisher products • Standard for testing fire alarm systems (NEN 2654) • Building decree related fire safety norms and standards	

Note: MEP = mechanical electrical and plumbing; OEM = original equipment manufacturer; NEN = Dutch standards institution; BRL = technical assessment guidelines; GDPR = general data protection regulation *: certificate brand name

Institutional logics identified (HEI internal)

The institutional logics of projects and maintenance within the FM organization are identified using the four dimensions of Ocasio and Thornton (2008). The projects and the maintenance logics are in some respects each other's opposites (Table 3).

Table 3 – Comparing projects and maintenance logics

Institutional logics dimension*	Projects logics	Maintenance logics
Dominant sources of collective identity	• Internal membership identification with clients (managerial level), budget holders and financial controllers • External membership identification with project management practitioners designers, consultants	• Internal membership identification with caretakers, janitors, building occupants (shop floor level) • External membership identification with maintenance engineering practitioners, specialised subcontractors, and suppliers
Determinants of power and status	• Creating striking results (new buildings, renovations etc.)	• Keeping assets in top condition • Internal customer satisfaction
Systems of social classification characterized by	• Distinct large transactions • Short-term focus • Temporary organization • Change • Working toward peak	• Repeated smaller transactions • Long-term focus • (More) permanent organization • Continuity • Steady workflow

Allocation of attention	• Value system:
	  • New products
	  • Improved specifications
	  • Risk management
	• Interests/motive for action:
	  • State-of-the-art facilities that meet newest requirements
		• Value system:
		  • Proven technology
		  • Evidence based reliability
		  • Risk averse
		• Interests/motive for action:
		  • Predictability in safe building operation and maintenance

*: from Ocasio and Thornton (2008)

Tensions in smart maintenance management

In the case data, 15 tensions could be found in SMM that served as barriers for innovation. In a provisional analysis (Table 4) they are linked to institutional complexities caused by multiple institutional fields (Type 1 complexities) or by opposing logics within the FM organization (Type 2 complexities).

Table 4 – Tensions related to institutional complexity

Institutional complexity	Tensions in SMM
Type 1: Tensions related to multiple institutional fields	5: Excessive dependence on tacit knowledge of suppliers and subcontractors 8: Negotiating different versions of asset register 9: Information asymmetries contractor and client 10: Adversarial relationship maintenance-contractor 12: External locus of control over data flow 13: Data loss or leakage during contractor transitions
Type 2: Tensions related to opposing internal logics of projects and maintenance	1: Fragmented maintenance budgets 2: Fragmented client-contractor communication 3: Poorly understood project handover process 4: Information management based on personal ad-hoc trouble shooting 6: Engineering dominant role perception of clients' maintenance managers 7: Undocumented asset criticality 11: Adversarial relationship maintenance-projects 14: Inability to understand each other's information needs 15: Lack of commitment and ownership among individuals

Discussion

Negotiating institutional field boundaries

Six institutional fields were identified, around specialized subcontractors. Institutional fields are networks of actors that operate according to the same logic, share working practices, and are regulated by common professional values and legislation. The delivery of maintenance services is compartmentalized along these institutional fields (Greenwood et al., 2011). Compartmentalized fields operate parallel without much interference and interaction. The fire safety institutional field for example is separated from the glazing institutional field. Operational practices in both fields are isolated from each other. From an operations management perspective this makes sense because mechanics and engineers can optimize practices according to the rules of the game in a particular institutional field. From HEI perspective however, compartmentalization of institutional fields creates demarcation and boundary issues (Greenwood et al., 2011). In the case study, these related to the physical integrity of the assets-in-use. It might appear that contractors from different institutional fields must work on assets that are physically or digitally attached and connected, requiring coordination. Another boundary issue is the creation of work packages for subcontractors and the allocation of coordination roles. A key issue is here how much control the HEI wants to exercise over the work of main contractors and subcontractors and by what means this control can be exercised. The tensions related to poor asset data governance (e.g., information asymmetries, different asset registers) suggest that gaining control of information flows for SMM might require other capabilities from HEI's, and another kind of smart maintenance maturity (Johannes et al., 2021).

Creating new institutional logics and practices

In several fields of the case study, suppliers put high value on asset data for market protection and market development purposes. Because of these institutional pressures from suppliers, implementation of smart maintenance practices by HEI's may get compromised due to unwittingly imposed products, services, and practices. HEI's may need to develop their own vision on data driven practices to counterbalance external

institutional supplier pressures (Kaupi, 2013; Kaupi and Luzzini, 2021). This may require the development of practices that put high value on asset data from HEI perspective. HEI's may need to develop an institutional logic and associated working practices that integrate internal project and maintenance logics with external institutional fields from where services are purchased. In the purchasing literature, service triads are used to describe the collaboration between buyer supplier and end-user of services (Van Weele, 2014). The SMM context in HEI's might require an adaptation of the service triad concept. It might also require purchasing to get involved in smart maintenance purchasing in a new way. (Johannes et al., 2022).

Institutional change

Various studies on institutional change have suggested that in dealing with tensions between competing logics, certain competences are required from managers (Battilana, 2006; Vallaster et al., 2021). Multiple logics can be integrated or differentiated, and studies suggest that there is not one best way to deal with complexity (Greenwood et al., 2011; Besharov and Smith, 2014). The tensions in SMM, found in this case study, strongly relate to the cognitive pillar of institutions (Scott, 1995). They involve the way individuals construct and negotiate social reality in their everyday work with asset data. Changing practices that have been internalized through years of education, training and experience is disruptive and can arouse feelings of excitement or uncertainty amongst individuals, depending on their role enactment (Petrou et al., 2018). Implementing institutional changes therefore requires special attention and coaching from senior leaders because values and beliefs of different microfoundations must be reconciled. Managers can frame situations in a way that reduces institutional complexity (Battilana et al., 2009; Dahlmann and Grosvold, 2017). The ability to understand and connect to individuals from other cultures appears to be crucial in this respect (Fligstein, 2001).

Provisional conclusions

This paper analyzes the institutional context of maintenance purchasing in HEI's and aims to provide insights into the institutional complexities of SMM in HEI's. In a case study, preliminary data analyses identified six institutional fields and two institutional logics. In a provisional analysis, the complexities of multiple institutional fields (type 1 complexity) and opposing projects and maintenance logics (type 2 complexity) are linked to 15 tensions that form barriers for innovation. A more in-depth analysis is required to investigate the specific nature of these tensions.

Three ways for purchasing are discussed to deal with the institutional complexities. The first way is by managing the boundaries between the institutional fields of the various supply networks. The second way is by creating new logics and practices that link the internal HEI logics to the external institutional fields from where services are purchased. A third way for purchasing to deal with institutional complexity is by implementing institutional changes. These three ways for addressing institutional complexities are provisional and will be further elaborated to investigate how they relate to both type 1 and 2 complexities.

Acknowledgements

This research was financially supported by the Netherlands Organization for Scientific Research (NWO) under project number 023.007.046 and by the Amsterdam University of Applied Sciences. This research has been approved by RMIT's Human Research Ethics Committee, reference number 20747.

References

Battilana, J. (2006). Agency and Institutions: The Enabling Role of Individuals' Social Position. *Organization*, *13*(5), 653–676. https://doi.org/10.1177/1350508406067008

Battilana, J., Besharov, M., & Mitzinneck, B. (2017). On hybrids and hybrid organizing: A review and roadmap for future research. In R. Greenwood, C. Oliver, T. B. Lawrence, & R. E. Meyer, *The Sage Handbook of organizational institutionalism* (2nd edition, pp. 128–163). SAGE Publications Ltd., London.

Battilana, J., Leca, B., & Boxenbaum, E. (2009). 2 How Actors Change Institutions: Towards a Theory of Institutional Entrepreneurship. *Academy of Management Annals*, *3*(1), 65–107. https://doi.org/10.5465/19416520903053598

Besharov, M. L., & Smith, W. K. (2014). Multiple Institutional Logics in Organizations: Explaining Their Varied Nature and Implications. *Academy of Management Review*, *39*(3), 364–381. https://doi.org/10.5465/amr.2011.0431

Chan, P. (2018). Change and Continuity: What Can Construction Tell Us About Institutional Theory? In D. J. Sage & C. Vitry (Red.), *Societies under Construction: Geographies, Sociologies and Histories of Building* (pp. 151–184). Springer International Publishing, Cham. https://doi.org/10.1007/978-3-319-73996-0_5

Dahlmann, F., & Grosvold, J. (2017). Environmental Managers and Institutional Work: Reconciling Tensions of Competing Institutional Logics. *Business Ethics Quarterly*, *27*(2), 263–291. https://doi.org/10.1017/beq.2016.65

Edum-Fotwe, F. T., & McCaffer, R. (2000). Developing project management competency: Perspectives from the construction industry. *International Journal of Project Management*, *18*(2), 111–124. https://doi.org/10.1016/S0263-7863(98)90075-8

Fligstein, N. (1997). Social Skill and Institutional Theory. *American Behavioral Scientist*, *40*(4), 397–405. https://doi.org/10.1177/0002764297040004003

Fligstein, N. (2001). Social Skill and the Theory of Fields. *Sociological Theory*, *19*(2), 105–125. https://doi.org/10.1111/0735-2751.00132

Gibbert, M., Ruigrok, W., & Wicki, B. (2008). What passes as a rigorous case study? *Strategic Management Journal*, *29*(13), 1465-1474. http://dx.doi.org/10.1002/smj.722

Gluch, P., & Svensson, I. (2018). On the nexus of changing public facilities management practices: Purposive and co-creative actions across multiple levels. *Construction Management and Economics*, *36*(5), 259–275. https://doi.org/10.1080/01446193.2017.1381751

Greenwood, R., Raynard, M., Kodeih, F., Micelotta, E. R., & Lounsbury, M. (2011). Institutional Complexity and Organizational Responses. *Academy of Management Annals*, *5*(1), 317–371. https://doi.org/10.5465/19416520.2011.590299

Jay, J. (2013). Navigating Paradox as a Mechanism of Change and Innovation in Hybrid Organizations. *Academy of Management Journal*, *56*(1), 137–159. https://doi.org/10.5465/amj.2010.0772

Jensen, P. A. (2008). The origin and constitution of facilities management as an integrated corporate function. *Facilities*, *26*(13), 490–500. https://doi.org/10.1108/02632770810914253

Johannes, K., Voordijk, J. T., Adriaanse, A. M., & Aranda-Mena, G. (2021). Identifying Maturity Dimensions for Smart Maintenance Management of Constructed Assets: A Multiple Case Study. *Journal of Construction Engineering and Management*, *147*(9), 05021007/1-05021007/15. https://doi.org/10.1061/(ASCE)CO.1943-7862.0002112

Johannes, K., Voordijk, J. T., & Aranda-Mena, G. (2022). Meaningful involvement of purchasing in smart maintenance management in higher education institutes. *Built Environment Project and Asset Management (under review)*.
Kadefors, A. (1995). Institutions in building projects: Implications for flexibility and change. *Scandinavian Journal of Management*, *11*(4), 395–408. https://doi.org/10.1016/0956-5221(95)00017-P
Kauppi, K. (2013). Extending the use of institutional theory in operations and supply chain management research: Review and research suggestions. *International Journal of Operations & Production Management*, *33*(10), 1318–1345. https://doi.org/10.1108/IJOPM-10-2011-0364
Kauppi, K., & Luzzini, D. (2021). Measuring institutional pressures in a supply chain context: Scale development and testing. *Supply Chain Management: An International Journal*, *ahead-of-print*(ahead-of-print). https://doi.org/10.1108/SCM-04-2021-0169
Lindahl, G., & Ryd, N. (2007). Clients' goals and the construction project management process. *Facilities*, *25*(3/4), 147–156. https://doi.org/10.1108/02632770710729737
Lounsbury, M., & Crumley, E. T. (2007). New Practice Creation: An Institutional Perspective on Innovation. *Organization Studies*, *28*(7), 993–1012. https://doi.org/10.1177/0170840607078111
Murray, J. G. (2009). Towards a common understanding of the differences between purchasing, procurement and commissioning in the UK public sector. *Journal of Purchasing and Supply Management*, *15*(3), 198–202. https://doi.org/10.1016/j.pursup.2009.03.003
Ocasio, W. (1997). Towards an Attention-Based View of the Firm. *Strategic Management Journal*, *18*(S1), 187–206. https://doi.org/10.1002/(SICI)1097-0266(199707)18:1+<187::AID-SMJ936>3.0.CO;2-K
Oti-Sarpong, K., Pärn, E. A., Burgess, G., & Zaki, M. (2021). Transforming the construction sector: An institutional complexity perspective. *Construction Innovation*, *22*(2), 361–387. https://doi.org/10.1108/CI-04-2021-0071
Parsons, T. (1951). *The Social System*. Free Press, New York.
Petrou, P., Demerouti, E. and Schaufeli, W. B. (2018), Crafting the change: the role of employee job crafting behaviors for successful organizational change. *Journal of Management*, Vol. 44 No. 5, pp.1766–1792. https://doi.org/10.1177/0149206315624961
Powell, W. W., & Rerup, C. (2017). Opening the Black Box: The Microfoundations of Institutions. In R. Greenwood, C. Oliver, T. B. Lawrence, & R. E. Meyer, *The SAGE Handbook of Organizational Institutionalism* (pp. 311–337). SAGE Publications Ltd., London.
Ram, J., Afridi, N. K., & Khan, K. A. (2019). Adoption of Big Data analytics in construction: Development of a conceptual model. *Built Environment Project and Asset Management*, *9*(4), 564–579. https://doi.org/10.1108/BEPAM-05-2018-0077
Shibutani, T. (1986). *Social Processes: An Introduction to Sociology*. Berkeley, CA: University of California Press, Berkeley CA.
Scott, W. R. (1995). *Institutions and organizations*. Sage, Thousand Oaks CA.
Scott, W. R. (2008). Lords of the Dance: Professionals as Institutional Agents. *Organization Studies*, *29*(2), 219–238. https://doi.org/10.1177/0170840607088151
Sminia, H. (2011). Institutional Continuity and the Dutch Construction Industry Fiddle. *Organization Studies*, *32*(11), 1559–1585. https://doi.org/10.1177/0170840611425724

Svensson, I., & Löwstedt, M. (2021). Navigating the logics of changing public facilities management. *Facilities*, *39*(11/12), 737–758. https://doi.org/10.1108/F-06-2020-0069

Thornton, P. H., & Ocasio, W. (2008). Institutional logics. In R. Greenwood, C. Oliver, K. Sahlin, & R. Suddaby, *The SAGE Handbook of Organizational Institutionalism* (pp. 99–130). SAGE Publications Ltd., London.

Tsang, A. H. C. (2002). Strategic dimensions of maintenance management. *Journal of Quality in Maintenance Engineering*, *8*(1), 7–39. https://doi.org/10.1108/13552510210420577

Vallaster, C., Maon, F., Lindgreen, A., & Vanhamme, J. (2021). Serving Multiple Masters: The role of micro-foundations of dynamic capabilities in addressing tensions in for-profit hybrid organizations. *Organization Studies*, *42*(6), 911–947. https://doi.org/10.1177/0170840619856034

Van der Voordt, T. (2017). Facilities management and corporate real estate management: FM/CREM or FREM? *Journal of Facilities Management*, *15*(3), 244–261. https://doi.org/10.1108/JFM-05-2016-0018

Van Weele, A. J. (2014). *Purchasing and supply chain management* (6th ed.). Cengage Learning EMEA, Andover United Kingdom.

Van Niekerk, A. J., & Visser, J. K. (2010). The role of relationship management in the successful outsourcing of maintenance. *South African Journal of Industrial Engineering*, *21*(2), 79–90. https://doi.org/10.7166/21-2-51

Vermeulen, P. A. M., Zietsma, C., Greenwood, R., & Langley, A. (2016). Strategic responses to institutional complexity. *Strategic Organization*, *14*(4), 277–286.

Windapo, A. O., & Moghayedi, A. (2020). Adoption of smart technologies and circular economy performance of buildings. *Built Environment Project and Asset Management*, *10*(4), 585–601. https://doi.org/10.1108/BEPAM-04-2019-0041

Wooten, M., & Hoffman, A. J. (2017). Organizational Fields: Past Present and Future. In R. Greenwood, C. Oliver, T. B. Lawrence, & R. E. Meyer, *The SAGE Handbook of Organizational Institutionalism* (pp. 55–75). SAGE Publications Ltd., London.

Yin, R. K. (2014). *Case study research: Design and methods*. Sage, Thousand Oaks CA.