Business Ecosystem Definition in Built Environment Using a Stakeholder Assessment Process

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Actors and their relationships are core elements of the business ecosystem concept, a trending model of business collaboration emphasizing organizational diversity, relationship dependency and joint evolution. This study approaches a built environment business ecosystem to structure the acknowledged complexity of ecosystem definition by applying a three-step stakeholder assessment process. The process is based on a stakeholder network diagram, Mitchell, Agle, and Wood's (1997) well-recognized stakeholder salience model and a two-dimensional stakeholder matrix. The assessment process is applied to a school campus case study to define a built environment business ecosystem and the salience of the ecosystem actors. Results, including salience score calculation, validate the applicability of the proposed process. The findings provide novel insights for ecosystem researchers into how stakeholder theory concepts can be applied to broaden the understanding of business ecosystem dynamics.

Key words: business ecosystem, business in built environment, salience model, stakeholder assessment

Introduction

'Business Ecosystem' is becoming an established term in business and management science (Moore 1993; 1998). The adaptive nature, unclear boundaries and complexity of interactions are apparent as a lack of a single, clear definition of 'Business Ecosystem' amongst scholars (Iansiti and Levien 2004; Gobble 2014). As self-organized, evolving entities, the ecosystems have analogies with

meta-organizations and social networks, inheriting from organizational theories (Gulati, Puranam, and Tushman 2012). Many recent studies (e.g. Ceccagnoli et al. 2012; Dass and Kumar 2014; Gawer and Cusumano 2014; Gobble 2014) conclude that ecosystems are formed around a certain project, innovation or service that is being operated by the ecosystem's *central actor*.

Business ecosystem actors in general are all organizations involved – either directly or indirectly – in the ecosystem value co-creation process orchestrated by the central actor. Actors share a common system-level goal and are mutually dependent in performing value against the goal (Iansiti and Levien 2004; Gossain and Kandiah 1998). As they are unique, multi-organizational and dynamic business entities, defining ecosystems is a complex, case-specific activity (Aaltonen and Kujala 2010; Iansiti and Levien 2004). A lack of an unambiguous business ecosystem definition process decreases opportunities to compare ecosystem research results.

A project stakeholder is defined by Bryson (2004) as an individual or a group who has an interest or some aspect of right or ownership in the project, can contribute to the project or be impacted by the project. Therefore, 'business ecosystem actor' as a term has similarities to a stakeholder in project business literature, with higher emphasis on ecosystem definition through actors. Stakeholder theory attracts attention in academic research, since maintaining an appropriate balance among stakeholder interests and gaining their support includes potential benefits for the focal firm (Mok, Shen, and Yang 2015).

A business ecosystem's actors feed the achieved benefits back to the business ecosystem through the stakeholder network (Post, Preston, and Sachs 2002). This study contributes to the academic discussion on business ecosystems by identifying the ecosystem actors and their dependencies, using a three-step stakeholder assessment process initiated from stakeholder management literature.

The Public-Private-Partnership (PPP) model introduces long-term co-operation and co-evolution into built environment projects, enabling them to be discussed as business ecosystems (Leviäkangas, Kinnunen, and Aapaoja in press; Pongsiri 2002). Increased interaction between customer and other built environment stakeholders leads to higher expectations of the value delivered throughout the project life. Aapaoja, Kinnunen, and Haapasalo (2013) suggest that under these conditions, the ecosystem's focal actors should put more emphasis on stakeholder management, making the built environment more customer- and stakeholder-driven. The stakeholder

assessment in this study is done during the operations phase of a built environment project, complementing the construction project research field findings focusing mostly on the project planning and building phases (Mok, Shen, and Yang 2015).

As presented in this study, one possibility in approaching the complexity related to the ecosystem definition task is to model the ecosystem actors and their relationships as a stakeholder network. The study aims to broaden the understanding of built environment dynamics in the operations phase and to shed light on the underlying business ecosystems with the following research questions:

Q1 *How is the business ecosystem mapped as a stakeholder network?*

Q2 *How is the business ecosystem actors' salience defined?*

Research question 1 is outlined through a literature review and case study, where a school campus PPP ecosystem is described as a stakeholder network. Research question 2 is answered by evaluating the case study ecosystem actors' salience, using Mitchell, Agle, and Wood's (1997) salience model. The process of the ecosystem description introduces an applicable framework within which to research built environment business ecosystems. The framework decreases complexity related to the business ecosystem concept definition discussed amongst scholars (Dass and Kumar 2014; Gawer and Cusumano 2014), and it contributes to project business literature by elaborating stakeholder roles in the built environment project operations phase. Through these contributions, we aim ultimately to provide practitioners a methodology by which to initiate and orchestrate business ecosystem activities.

Business Ecosystem Roles and Value Co-Creation

The central actor's role is the starting point in modelling a business ecosystem. In a business ecosystem, the long-term wealth is determined by relationships rather than transactions (Gossain and Kandiah 1998). Relationships imply continuity, conflict and collaboration (Post, Preston, and Sachs 2002). All actor roles in an ecosystem belong to the list of stakeholders. They are impacting or are being impacted by the ecosystem value co-creation and the achievement of system-level goals (Moore 1996; Letaifa 2014). In a business ecosystem, the system-level value co-creation process is set to create more value for the ecosystem's end users, together, than the individual players could generate as independent actors (Gawer and Cusumano 2014). Value capture defines how the customer accepts

the value created for it (Letaifa 2014). Inside the ecosystem, the participants may have different perceptions of the customer and the goals (Gossain and Kandiah 1998; Winch and Bonke 2002). Clarification of the system-level value co-creation and capture is done in this study through defining the ecosystem actors and their relationships.

Every relationship of a business ecosystem contributes to the value co-creation either positively or negatively (Ramaswamy and Gouillart 2010). In a case where the ecosystem actors' incentives are not aligned, the ecosystem will not become successful in the long term (Letaifa 2014). The ecosystem dependencies increase the risk for actors, as the success is not controlled by their own effort (Adner 2006). This is likely to happen in a case where an actor has critical capabilities for the value co-creation, but the targets do not support the system-level goals. Actors and goals are interdependent in a business ecosystem (Adner and Kapoor 2010).

Stakeholder Assessment

Stakeholders of an ecosystem include organizations not directly involved in the value co-creation (Davis 2014; Donaldson and Preston 1995). Stakeholders can be divided into internal or external (e.g. Clarkson 1995) or viewed in a wide sense or a narrow sense (Freeman 1984), depending on whether they are acting within the identified system or hold critical capabilities with respect to the system functions. Internal stakeholders are considered critical for the central actor to survive (Clarkson 1995). The stakeholder interaction may also happen at a higher level between business networks and ecosystems (Majava et al. 2014). These definitions set interactions, goals and the resource exchange process as central elements in stakeholder management, making stakeholder theory applicable to business ecosystems research.

Clear roles and responsibilities ensure that every stakeholder has access to relevant information and that the actor most capable of performing a specified task is identified, adding up to the prosperity of the business ecosystem. For an actor, the alignment between expectations and performance illuminates the opportunities to benefit from the surrounding relationships (Adner 2006). It helps in directing attention, for example, in changes. Modelling the stakeholder network and assessing the stakeholder impact contribute to the sustainability of the ecosystem, increase flexibility and provide a baseline for the ecosystem's successful renewal (Gobble 2014; Iansiti and Levien 2004).

Stakeholder network modelling builds on the Industrial Purchas-

ing and Marketing (IMP) group's approach in that the relationships should be analysed as networks, not as dyadic nodes, as the relationships are interconnected (Ford 1990). The Activities, Resources, Actors (ARA) model defined by Håkansson and Johansson (1992) describes how a network can be analysed through individual substance levels. Bryson (2004) similarly utilizes different relationship types to characterize how the stakeholders contribute to the value co-creation process.

The network and relationship analysis starts by identifying the organizations with which the central actor interacts and modelling them as a stakeholder network diagram (Fassin 2008; Freeman 1984). The identified stakeholders are categorized using resource dependency relationships to formulate their roles in value co-creation and to identify relevant stakeholders for further assessment (Donaldson and Preston 1995; Aapaoja and Haapasalo 2014). Aapaoja, Kinnunen, and Haapasalo (2013) and Aapaoja and Haapasalo (2014) refine the Clarkson (1995) stakeholder grouping in more detail, categorizing the stakeholders as primary, secondary, key supporting participants, tertiary and extended. Primary, secondary and key supporting stakeholders belong to internal stakeholders, while tertiary and extended belong to external stakeholders (Clarkson 1995).

Defining the relationships between the stakeholders extends the stakeholder network from a central actor-specific view to the business ecosystem view (Moore 1998). The business model description of the stakeholders characterizes the ecosystem's value co-creation process through the interaction web and clarifies whether the actors' incentives are aligned with the system-level goal (Aaltonen and Kujala 2010).

Stakeholder impact information in the network enables prioritization. The stakeholder salience model introduced by Mitchell, Agle, and Wood (1997) is a widely used description of how the stakeholders and their relationships contribute to a project, or similarly, to a business ecosystem. The correlation between the salience and allocated management priority was validated via the case study analysis of Agle, Mitchell, and Sonnenfeld (1999).

The salience model is based on three attributes – *power, legitimacy* and *urgency* (Mitchell, Agle, and Wood; Poplawska et al. in press). *Power* is the attribute of purposefully impacting decision-making (Mitchell, Agle, and Wood 1997). *Legitimacy* can be defined as an attribute that impacts the decision making with respect to socially acceptable claims such as a contract, a legal right or a moral concern

(Agle, Mitchell, and Sonnenfeld 1999). *Urgency* is the stakeholder attribute of having an immediate impact due either to the time sensitivity or to the criticality of the issue. Power and legitimacy are considered as the core attributes and urgency as a dynamic or catalytic attribute. A stakeholder's total salience is the sum of the attributes it possesses. It is context-specific and is a relative measure valid only in the ecosystem or project under investigation (Fassin 2008; Mitchell, Agle, and Wood 1997).

Stakeholders can form alliances or coalitions to combine salient attributes for stronger impact, especially if the coalition is formed with a more powerful or legitimate partner (Fassin 2008; Savage et al. 1991; Aaltonen, Kujala, and Havela 2013). Coalitions can be used to push through challenging decisions in the network and are identifiable via stakeholders' relationships in between (Newcombe 2003).

Johnson and Scholes (1999) visualized the stakeholder's power with impact probability (impact interest) in a two-dimensional power-interest matrix (Johnson and Scholes 1999). The two-dimensional stakeholder assessment model has been applied by several scholars with stakeholder strategies (Olander and Landin 2005; Aapaoja and Haapasalo 2014). The matrix format presents the stakeholder groups as dynamic entities, allocates suitable stakeholder management strategy and extends the applicability of group typology to different cases (Aapaoja and Haapasalo 2014).

Built Environment Business Ecosystem

A built environment project is a complex system producing highly customized, engineering-intensive products that require several producers to work together (Hobday 1998). Size and complexity create challenges to the project management, as follows: (1) a large number of stakeholders lead to a complex stakeholder network, (2) dynamics and several interfaces increase uncertainty and (3) a high public profile increases pressure and the possibilities for controversy (Mok, Shen, and Yang 2015). The stakeholder's role for project success through the life cycle is being emphasized in the academic literature in the 21st century, especially with complex projects and their networks (Davis 2014).

Built environment projects driven by the public sector are considered fragmented systems where participants' goals are not necessarily aligned and central governance is inefficient. External stakeholders like local residents, financing agencies, regulators and community groups create pressure. Many stakeholder research designs in built environments address planning and building phases, yet the

operations phase is not deeply covered. Traditionally, the ownership of the facility is transferred from a private constructor to a public owner once the building phase is completed. This transfer increases complexity in projects and leads to changes in the stakeholder network (Mok, Shen, and Yang 2015).

PPP is a collaboration model where the public sector – like the state or government – initiates a facility project, but private sector actors finance, build and operate it on behalf of the public sector actor against leases, rents or other financial compensations (Leviäkangas, Kinnunen, and Aapaoja in press). PPP covers planning, building and operations of the facility to overcome the costs and risks involved in ownership transfer in a traditional project. The partnership between the stakeholders is based on long-term contracts that empower the private investors to construct the facility and to provide services to the public users (De Schepper, Dooms, and Haezendonck 2014).

The uniqueness of the projects and the irreversibility of the decision-making are project business-specific characteristics leading to a lack of routines and established processes. This complicates the project scope definition similarly to the ways identified with business ecosystems (Cleland 1986; Aaltonen and Kujala 2010; Artto and Kujala 2008; Gobble 2014). Projects take the basic operation principles, goals and resources from the ecosystem actors and feedback the deliverables, experiences and benefits (Yang et al. 2011). This is supported in De Schepper, Dooms, and Haezendonck's (2014) proposal that in a PPP initiative, a detailed stakeholder assessment, including the relationships between stakeholders, contributes positively to the project's success.

At any given lifecycle phase, certain stakeholders are more salient due to their capability of satisfying phase-specific critical needs (Jawahar and McLaughlin 2001). The official role of a stakeholder may differ from the stakeholder's practical impact. A difference between an official role and performed practice can be caused by expectations not being clear or by a low level of involvement in the built environment-planning phase (Gobble 2014; Aapaoja, Kinnunen, and Haapasalo 2013). The central actor is to ensure that the stakeholder's performance and expectations are balanced (Adner and Kapoor 2010).

A built environment project implements the underlying business ecosystem. Modelling of the ecosystem is challenging, but as the ecosystem actors are analogous to stakeholders in project business, the hypothesis of this study states that the stakeholder assessment process can be used to define a built environment business ecosys-

tem. The assessment process steps defined, based on the literature review, are the following.

1. Map the stakeholder network using a network diagram.
2. Define stakeholder impact using Mitchell, Agle, and Wood's (1997) salience model.
3. Group and prioritize the stakeholders using the stakeholder assessment matrix.

Methodology

This study applied the stakeholder assessment process in a school campus case study in Oulu, Finland. The campus building was finalized and the project ended in 2013, and the building is now in the operations phase in the PPP model. A single case study is a suitable method by which to conceptualize topics not widely studied, and this method has been applied in a number of research contributions to project business, stakeholder and business ecosystem theories (e.g. Savage et al. 1991; Mitchell, Agle, and Wood 1997; Adner and Kapoor 2010; Yang et al. 2011). It illustrates characteristics of a unique environment such as a business ecosystem. It can expand the emergent theory, but it has limited generalization opportunities due to its small sample size (Eisenhardt 1989).

The study was initiated with a literature review on business ecosystems and stakeholders in project business. Secondary data like newspaper articles and public documents about the campus were assembled to gather general knowledge. The construction company who is now responsible for the campus PPP operations was selected as the case study central actor.

Semi-structured interviews of campus stakeholders as ecosystem actors were used as a data collection method (Thomson et al. 2012; Metcalfe and Sastrowardoyo 2013). The interview process started with the central actor. The snowball sampling technique (Goodman 1961) was used to identify the campus stakeholders and to model the interactions between them. In snowball sampling, the interviewee names the next stakeholders to be interviewed. The sampling process was repeated until no new names came out, that is, until the process was saturated. In total, eight interviews were conducted, following the campus steering group organization available in the public documents. The interviewed sample of stakeholders represents 45% of the identified ecosystem of 18 stakeholders. Interviewed persons who represent organizations using and maintaining the school campus are listed in table 1, with the ecosystem central actor in bold.

TABLE 1 Interviewed Stakeholders

Organization	Actor
Constructor/Operating company	Head of maintenance team (remote)
Facility management company	Facility manager
Facility maintenance company	Maintenance responsible
High school management	Principal
Primary school management	Principal
High school operations	Attendant
Cleaning and catering company	School campus team leader
Oulu City estate management	Head of facilities and PPP initiatives

Questions in the interviews focused on the respondents' views about their main stakeholders, their perception of their importance and their contribution to the campus. The list of questions was modified during the interview process to seize new data opportunities (Eisenhardt 1989). Interview sessions were recorded. The voice recorder files were transcribed into a textual format, and the answers were grouped according to the questions. The final list of questions is below:

1. Describe your and your team/organization role in the school campus.
2. How would you characterize the current phase and how the campus has reached it?
3. What are the most important goals for the campus, and who defines them?
4. Who are your key stakeholders in the campus?
5. What are your expectations for the stakeholders?
6. How is stakeholder interaction and co-operation reflected in the campus goals?
7. What are the stakeholder interactions between the stakeholders?
8. How are the ecosystem goals reflected in the stakeholders' incentives?
9. Is there a defined process in your organization for stakeholder management? (If yes, can you elaborate more?)

Scoping the study during the operations phase builds on Jepsen and Eskerod's (2009) practical challenges in applying a stakeholder assessment for the whole project due to stakeholder network evolution. The assessment process used applies network and matrix analyses from Winch and Bonke (2002). Relationships between the

stakeholders were drawn as a network diagram, using resource dependency where connections represent information or resource transaction (Bryson 2004). The diagram was drawn for the first time after the first central actor interview and was updated after subsequent interviews.

The central actor prioritized the stakeholders using the Analytical Hierarchy Process (AHP), a pair wise comparison method introduced in project management by Al-Subhi Al-Harbi (2001). The central actor evaluated the *power, legitimacy* and *urgency* of each stakeholder as compared to every other, using a 1–9 scale when the evaluated stakeholder had a stronger position compared to the target stakeholder, and a 1/9–1 scale when the position was weaker. The result was an eight-parameter matrix. The total score of each salience attribute per stakeholder was calculated by multiplying the scores and taking the second square root of the result. Olander (2007) proposed that power is the most important attribute for decision making, as it is a necessity to raise impact level, and it should be given a relatively higher weighted value when total salience is calculated. Following this proposal, in this study, the weighting factors on salience attributes were 0.4 (power), 0.3 (legitimacy) and 0.3 (urgency).

After concluding the pair wise comparisons, the priority vectors (eigenvectors) can be calculated. Each element in the eight-parameter matrix is divided by the column total, and the priority vector is defined by taking the row averages. The consistency of comparisons is determined by using the eigenvalue (λmax) to calculate the consistency index (CI) and to calculate the consistency ratio (CR) by dividing the CI by the random index (RI). For an eight-parameter matrix, the RI is set as 1.41. In a case when the CR is below 0.10, the prioritization judgement matrix is consistent (Al-Subhi Al-Harbi 2001; Aapaoja, Kinnunen, and Haapasalo 2013).

Once the salience score was defined, the stakeholders' impact probability was estimated by the central actor, using a 1–5 scale in free-form discussion. As a final step, the stakeholders were mapped into a two-dimensional stakeholder assessment matrix to visualize the assessment conclusion on the impact of probability and salience.

Results

As the first step of the assessment process, the key stakeholders for the school campus central actor are presented in a network diagram (Fassin 2008) in figure 1, also scoping the campus ecosystem.

Campus steering group members that were interviewed are in bolded black circles. Dependencies and their densities present the

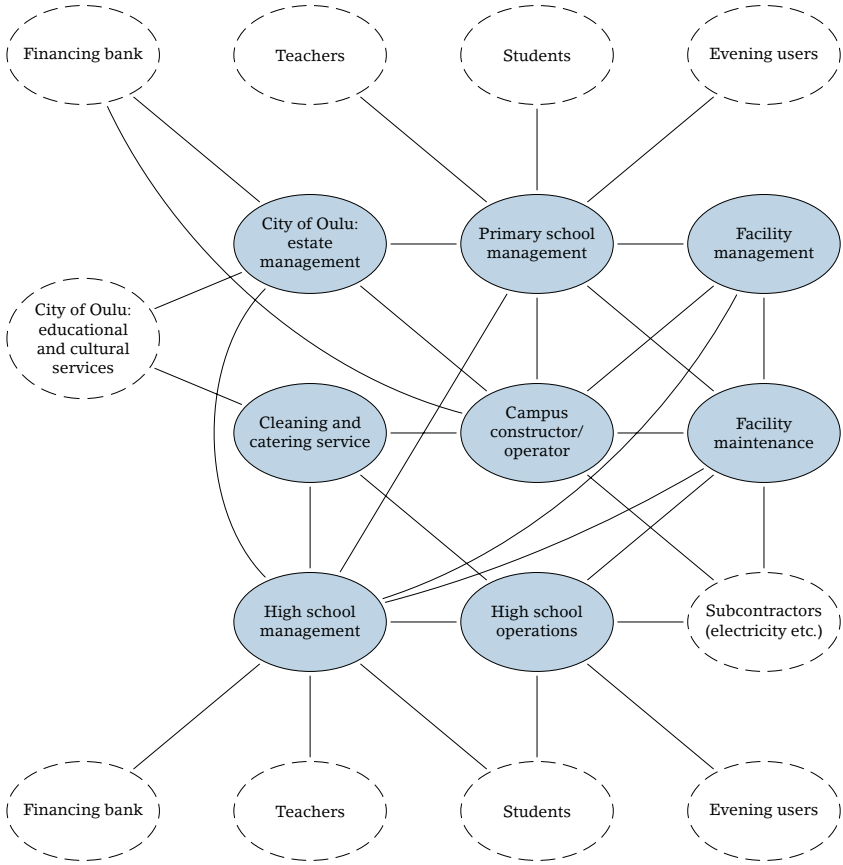

FIGURE 1 School Campus Stakeholder Network (dark – campus steering group members)

fact that the high school management, primary school management, facility managing company and facility maintenance company are the key internal stakeholders for the central actor (constructor) from the steering group. The central actor is located in another city (Helsinki), and local daily operations of the school campus are carried out by the key stakeholders. These stakeholders have critical resources for the central actor and have access to set requirements in the agreed-upon requirement management system. High school management and primary school management represent the end user or the ecosystem customer. They consolidate requirements from other users and manage the daily usage of the campus, thus driving the value co-creation.

TABLE 2 School Campus Ecosystem Stakeholders' Salience: Central Actor View

Stakeholders	Power	Legitimacy	Urgency	Salience
Constructor/operating company	0.016	0.085	0.017	0.037
High school management	0.698	0.448	0.410	0.537
High school operations	0.090	0.036	0.130	0.086
Primary school management	0.162	0.197	0.410	0.247
Facility maintenance company	0.004	0.048	0.003	0.017
Facility management company	0.012	0.048	0.012	0.023
Oulu City estate management	0.015	0.104	0.015	0.042
Cleaning and catering company	0.002	0.034	0.003	0.012
Consistency ratio	5.805	3.607	3.025	

Oulu City estate management is a private company publicly owned by the City of Oulu. The company is responsible for all built environment properties in Oulu, including the financial liabilities of PPPS. Facility management has several interfaces and participates in the campus steering group, but as they are not operating the campus on a daily basis, their role remains more distant. The cleaning and catering service provider is another distant stakeholder for the central actor, but with a different profile. They participate in the daily campus activities, but their contribution is valued most directly by the end users such as teachers and students.

As a next step, the central actor evaluated the stakeholders' salience through a pair wise comparison and an AHP calculation process. The results of the salience scoring are presented in table 2.

The high school management's role as the most salient stakeholder for the central actor is confirmed in table 2. As the ecosystem customer with the most frequent interaction with the central actor, their value perception drives the ecosystem value co-creation. The high school management is a long-term member of the ecosystem. They have already been involved in the planning phase by defining requirements for the spaces etc. Long participation binds a stakeholder tightly into the ecosystem, as proposed by Aapaoja, Kinnunen, and Haapasalo (2013).

The primary school management's role is officially similar, but its lower salience score suggests a weaker true impact. Table 2 defines the Oulu city estate management as a legitimate stakeholder yet not powerful or time critical. This is aligned with the results of the interview-based network diagram in figure 1. Higher than 0.10 CR values for all salience attributes indicate a polarized impact of the stakeholders. Stakeholders with a customer role have high impact

on the central actor, whereas actors in a subcontracting relationship with the central actor have low impact.

Both figure 1 and table 2 indicate that the role of the facility management company is not well established in the ecosystem in terms of expectations and performance. Facility management should be accountable for the campus operations, but the daily operations are organized directly between the school's management and the central actor. Bypassing of the role set for the local facility management creates a contradiction that is visible as overlapping connections in figure 3, reflecting the expectation-performance challenge presented by Gobble (2014).

The expectation-performance gap may be temporary and due to a recent personnel change in the facility management company, but regardless of the root cause, the findings characterize how the utilization of a formal stakeholder assessment process reveals the ecosystem dynamics and frames the challenges related to stakeholders' relationships, expectations and true performance (Adner 2006).

The third step in the stakeholder assessment is concluded in figure 2, where the salience score from table 2 and the impact probabilities evaluated by the central actor are presented as a two-dimensional matrix. The assessment matrix utilizes the template defined by Aapaoja and Haapasalo (2014). The matrix provides a simplified view of the school campus business ecosystem in its operational base, enabling further stakeholder management actions.

The stakeholder assessment matrix presents the view that the campus is in a steady operational phase where the activities are concentrated on campus users and maintenance organizations (B, D, C, A). Internal stakeholders for the central actor comprise the closest and longest-term participants from the campus steering group, presented through salience evaluation.

Discussion

The findings of the study validate the fact that a business ecosystem collaboration concept can be defined by applying a three-step stakeholder assessment process including a stakeholder network diagram, Mitchell, Agle, and Wood's (1997) stakeholder salience model with pair wise comparison and an impact probability-salience matrix. In essence, the process provides a framework that is easy for scholars to apply and for practitioners to use in approaching complex business ecosystem and project environments. Limitations of the results concern the dynamic nature of the business ecosys-

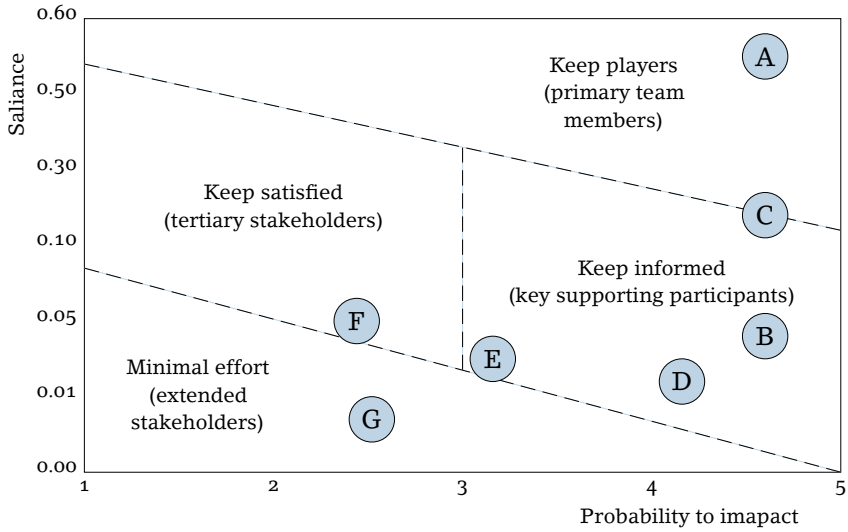

FIGURE 2 Probability and Salience Assessment Matrix (adapted from Aapaoja and Haapasalo 2014; A – high school management, B – high school operations, C – primary school management, D – facility maintenance company, E – facility management company, F – City of Oulu estate management, G – cleaning and catering company)

tem and possible conflicts between the stakeholders' own targets and ecosystem goals. These gaps should be assessed as the next steps through the ecosystem life cycle and value co-creation process assessments. The set-up should be repeated in similar built environment project cases to enable generalizations of the stakeholder salience conclusions and to identify improvements to the ecosystem definition process.

The school campus ecosystem is in an active value co-creation phase where the key actors are investing a lot of effort and resources. Simultaneously, the users are consuming the created value and setting requirements for the campus maintenance organizations. The stakeholder assessment matrix in figure 2 presents the fact that value co-creation of the campus is jointly orchestrated by the central actor and the customer. This merges the value co-creation and value capture processes, defined as separate entities by Ramaswamy and Gouillart (2010). This finding provides an interesting area for further research on business ecosystem value processes.

Aapaoja, Kinnunen, and Haapasalo (2013) brought up the challenge of using a static stakeholder role definition in built environment PPP projects, since due to the longevity of a PPP project, the stakeholders have different roles. The results of this study build on

these findings by specifying that the described ecosystem is specific to the operational phase of the project and that the dynamic nature of the ecosystem is reflected through changes in stakeholder roles. In other words, the study emphasizes how project stakeholder management needs to adopt a dynamic approach; a project moves through distinctive phases over its life cycle, requiring different approaches for managing different stakeholders at different points in time (Aaltonen and Kujala, 2010). Aapaoja, Kinnunen, and Haapasalo (2013) also presented the idea that customer roles have the highest salience, which is aligned with the school management's high salience scores in this study.

This study contributes to business ecosystem literature by illustrating the applicability of the stakeholder assessment method to ecosystem definition, as intended in research question 1. It presents a process to suppress the discussion controversies on business ecosystems. Insights on how the campus activities in the operations phase concentrate around a few stakeholders and how it is important to manage the expectations and performance of new stakeholders build forward the knowledge base of built environment projects and their operations. This response to research question 2 describes how the salience analysis brings forward information supporting stakeholder management.

The stakeholder assessment process enables scoping of the business ecosystem as a holistic collaboration entity. The use of the presented methods identifies the ecosystem's key contributors but also helps to define actions to strengthen the ecosystem's own role and to streamline it by excluding the non-value-adding participants. This builds on Gossain and Kandiah's (1998) view that the long-term success of a business ecosystem requires the actors to be truly committed and contribute to the ecosystem's system-level targets and that their business models must be aligned with the ecosystem benefits.

As another further study proposal, an analysis of the transitions of the campus ecosystem in its life cycle through stakeholder changes would illustrate the background of the salience assessment results. In addition, evaluating the stakeholder salience against different ecosystem goals would broaden the understanding of how different stakeholders interpret the ecosystem and how well the system-level goals are actually shared amongst the ecosystem actors.

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