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Resource and supplier interaction in network innovation governance: The case of innovating at Unilever

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ABSTRACT

A core challenge of network innovation is the issue of how to govern resource interactions in networks. In this paper, we suggest that Alderson's (1957) model of organised behaviour systems is a valuable way of understanding the governance of resource interactions in selected sets of interacting suppliers. We explore a longitudinal case involving Unilever and parts of its supplier network and apply the extended case method to understand and explore network innovation governance. Alderson's framework is used to analyse the assignment and assortment processes for governing network innovation through centralised space and time interactions.

1. Introduction

The locus of innovation governance is shifting towards inter-organisational networks (Aarikka-Stenroos & Rittala, 2017; Möller & Halinen, 1999). Paraphrasing Halinen and Möller (2017), we define network innovation governance as the attempt of a focal firm to set the direction for interorganisational collaboration in the process of creating innovation that involves suppliers and the focal firm (Halinen & Möller, 2017). Network innovation processes have received considerable attention in the academic literature (Chesbrough & Bogers, 2014; Håkansson & Waluszewski, 2007; Huizingh, 2011), a core challenge of which is the question of how to govern resource interactions. Resource interaction here refers to the "combination, re-combination, and co-development of resources that happen through the interaction among organisations" (Baraldi et al., 2012, p. 266).

Firms may attract, influence, and mobilise external suppliers and their resources through power-dependent relationships (Pfeffer & Salancick, 2003). The innovation management literature often reverts to models that suppliers and their resources adopt as an extended part of their enterprise (e.g., Chesborough, 2003). Such a firm-centric perspective potentially exaggerates managerial influence over other firms. Furthermore, this perspective underestimates the extent to which a firm's activities and resources depend on the actions and interactions of other organisations (Adner, 2013). The quality and innovative potency of a particular network depend on the positive externalities resulting from the diversity of resources available within it. Overt attempts at control and cohesiveness hamper a firm's ability to embrace diversity and innovation effectiveness (Håkansson & Ford, 2002).

Firms seeking to utilise supplier resources face several challenges. First, participating suppliers are not just interdependent nodes in a tapestry of connections; instead, they follow their own strategic agendas and frame resource interactions. Although these suppliers share interests with the focal firm hosting the innovation activities, they also pursue their own self-interests, and their motives may change during the innovation process, as opportunities emerge or wane over time. Generally, suppliers align their activities and resources to strategically position themselves within networks (West & Gallagher, 2006). Second, these external businesses are often concerned with dissimilar materials, products, information, services, and knowledge, which are coordinated in various ways across organisational hierarchies. Third, suppliers are positioned in networks with different levels of access and different abilities to combine external resources (Thorelli, 1986). This adds complexity to the utilisation of suppliers as external resources and thus limits the focal firm's governance options.

The industrial marketing and purchasing (IMP) approach adds to the general discussion regarding innovation network governance by seeking to understand the mechanisms of resource interaction (Baraldi et al., 2012; Bocconcelli et al., 2020). The dominant assumption in the IMP literature is that the interactive processes that occur within a business network define the identity and value of a resource (Håkansson & Snehota, 1995; 2017). However, mobilisation is key to other approaches, such as the open innovation idea, which emphasises that

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resource interaction is an underdeveloped area that would benefit from further inquiry (e.g., Chesbrough, 2003; Laursen & Andersen, 2016).

In this paper, we build on notions of the role of network innovation governance in creating opportunities for resource interaction (Baraldi et al., 2012; Caridà et al., 2019; Håkansson & Waluszewski, 2007; Strömsten & Waluszewski, 2012). We use the concept of business network governance (Wuyts & Van den Bulte, 2012) to focus on intra- and interorganisational architectures and collaboration (Tihany et al., 2014). Network governance assumes that a firm has imperfect oversight and considerable task uncertainty. An individual firm cannot fully understand or control the value-creation potential of its resources; it can only create opportunities by deciding which resources should be used for interaction and which resources from other actors should be combined with its internal resources (Harrison & Håkansson, 2006). In this context, informal means of control, such as setting expectations and facilitating mutual alignment, are more effective than behavioural and formal means (Jones et al., 1997). Nevertheless, some degree of firm-centric governance is required to establish direction and to build momentum in innovation processes (Chesbrough & Teece, 1998).

The issue we explore is the careful balance of firm-centric and networking processes for resource interaction in interorganisational networks. According to Baraldi et al. (2012), firms create resource interfaces because combining resources accrues potential benefits. This process is referred to as resource combination (Prenkert et al., 2019). Furthermore, we add to the current understanding of how a firm can govern and influence resource combinations in network settings by using Alderson's (1957) framework as an alternative theoretical perspective, which arguably offers a complementary perspective to deepen the discourse on network innovation governance and enables a better understanding of the mechanisms that create opportunities for possible resource combinations. An organised behaviour system includes "the firms engaged in buying or selling, the family as an earning and consuming unit, the local dispersion market, the channel of distribution, the industry supplying a phase of consumer or industrial need, and the economic system as a whole" (Alderson & Cox, p. 148). It is a system of related suppliers linked to one another through exchange-related activities that create value. We suggest that Alderson's perspective offers a bridge to exploring how network innovation governance influences supplier and resource interactions.

Specifically, we ask the following research question: How can Alderson's notion of an organised behaviour system be used to explore the governance of resource interactions in network innovation? To answer this question, we combine Alderson's perspective with the resource interaction perspective to explore network innovation governance among Unilever's suppliers. In doing so, we aim to identify and understand the dynamics of the governance of resource interactions in network innovation and to spur further research regarding the role of network innovation governance (Baraldi et al., 2012; Bogers et al., 2017; Christensen & Raynor, 2003; Felin & Zenger, 2014; Prenkert et al., 2019).

The remainder of the paper is structured as follows. First, we discuss the organised behaviour system to highlight its underlying assumptions and show how they can be used to explore resource interactions in network innovation governance. Second, in our analysis of the Unilever case, we use elements from Alderson's framework to explore resource interactions and network governance. Finally, we offer implications for theory and management practice.

2. Resource interaction and network innovation governance in an organised behaviour system

Resource combination in business networks is emergent and results from the interaction of actors pursuing their own interests (Baraldi et al., 2012; La Rocca & Snehota, 2014). Focal firms seeking to innovate by engaging business network actors face a dilemma. Innovation is created as actors combine resources in novel ways, and the number of potentially valuable combinations increases with the size of the selection pool. However, increasing the number of external co-innovators also challenges the focal firm's ability to carefully balance direction-setting control with the benefits of emergence, as network actors continue to combine and recombine resources (Choi et al., 2001).

Social and technical resources differ in their controllability and mobilizability. According to the 4R approach, resources can be classified as social, such as organisational units and interorganisational relationships with specific capabilities, or technical, which include access to development facilities and products and services created from established resource combinations (Baraldi et al., 2012; Bocconcelli et al., 2020). Creating innovation from existing resources and their combinations has been described as moving from an activated (as is) to an imagined (to be) structure by revealing and combining resources in new ways (Håkansson & Waluszewski, 2002). While focal firms can activate their direct relationships with other organisational units and their internally controlled resources, they only indirectly influence the social and technical resources these actors choose to activate and the ways in which the exchanges unfold as part of the resource interactions. Seeking to influence the direction of these choices and exchanges as the innovation processes unfold is the heart of network innovation governance. Nevertheless, the linking of resource interaction among suppliers with focal firm network innovation governance is an area that is still unexplored. Although research regarding resource interaction emphasises that value creation is critical, the purpose of value appropriation remains underexamined. An emphasis on value creation as governed for a specific purpose is the vantage point of Alderson's concept of an organised behaviour system.

The organised behaviour system explains how market processes move resources from their natural state and lead to a meaningful assortment of goods (Hunt, 2013). In other words, it is "a system of suppliers related and linked to each other by [exchange-related] activities. It displays behaviour and is not simply functioning" (Snehota, 1990, p. 93). Thus, the suppliers are not the analytical unit; instead, the unit comprises the interrelation of the suppliers in the system. The organised behaviour system offers the opportunity to conceptualise this governance function while maintaining the primary focus on network resource interaction as an emergent and non-linear process. Alderson (1957) understood market functions as comprising various business suppliers, where the unique demand of one supplier must be matched with the supply of another supplier for an exchange to occur (Snehota, 1990). In other words, both suppliers must identify a common ground and a joint direction in which to move in the exchange. Alderson also distinguished between the buyer (i.e., the focal firm) and the supplier perspective when creating such a common ground.

It is important to note that Alderson also addressed the challenges of creating valuable resource combinations in a complex market with diverse suppliers. As Alderson explained, the system of market actors performs a series of transformations from meaningless to meaningful (and valuable) assortments (Alderson & Martin, 1965). In line with Alderson's idea, assignment involves the sorting perspective of the supplier or purveyor of goods and the process of performing the assignment. Assorting involves the sorting perspective of the buyer or procurement agent and the process of performing the assortment (Alderson & Martin, 1965). According to Alderson, "assortments are collections which have been assembled by taking account of human expectations concerning future actions" (Alderson & Martin, 1965, p. 125). In other words, there is an assortment procedure, as the focal firm invites suppliers to innovation activities managed by the focal firm. Assignment occurs when suppliers decide whether to participate and what resources to use. Within the selected group of suppliers, resource combinations are conducted interactively through experimentation, bargaining, and joint decisions. Both technical and social resource interfaces, as well as the assortment intent of the local firm, are relevant resource combination criteria.

Alderson's ideas complement the IMP perspective (Gadde &

Hulthén, 2016; Prenkert & Hallén, 2006). Previous research has argued that this perspective is mainly a descriptive lens for viewing and exploring business networks, and its adherents have made limited attempts to offer management advice (Aramo-Immonen et al., 2020; Hunt, 2013). In contrast, Alderson (1957) viewed the provision of knowledge to managers as the purpose of theorising efforts and described assorting processes within the greater market context. According to the IMP view, each supplier has different relationships with other suppliers and provides different market opportunities (Alderson, 1965; Snehota, 1990). Alderson and Martin (1965) understood that organised behaviour systems consist of people with membership (actors), assets (resources) they control, and supporting facilities (rules and preference scales for appraising outputs). Actors in the organised behaviour system also engage in sorting and matching activities. With respect to network innovation governance, this mirrors the notion of an assigned actor set in which a focal firm controls access to an innovation activity (Frey et al., 2011). Understanding how a focal firm selects actors, as well as the selection criteria, relates to the principle of "classification being used by the sorter" (Alderson, 1957). Thus, the behaviour of the actors in the market is undetermined, but deliberate. As the actors in a market are interdependent entities that pursue their own self-interests and hold their own strategic agendas, a central challenge for firms implementing network innovation governance is to create opportunities that encourage the exploration of resource combinations.

3. Innovation governance that enables resource combinations

Resources must be combined and recombined with other resources to maintain and develop their usefulness (Aramo-Immonen et al., 2020). At the same time, while actors cannot discern all the valuable outcomes that are possible from combining resources to create valuable solutions, a global search for possible resource combinations remains unfeasible. Therefore, a critical governance challenge for focal firms is to determine how to create the best conditions for suppliers to match and combine resources, and how to use opportunities. We see assigning and assorting as the two fundamental practices in network innovation governance for overcoming this challenge.

The resource combination and matching functions in organised behaviour systems unfold through suppliers' dual information searches. A need or opportunity is specified, and a resource is shaped, fitted, or identified. The pairing of a relevant resource or resource set in one firm with a suitable use opportunity from another firm materialises through the sorting of information and results in a match (Alderson, 1965). Thus, "the heterogeneous market is cleared by information" (p. 52), through which matches are created. Accordingly, matching takes on an additional behavioural dimension concerning "the freedom of choice" as it relates to the sets with which to interact, the expectations in organising these interactions, and the behaviour that follows.

The interactions within a set are not random; they are linked to and contingent upon the suppliers' relationships with each other. However, resource interaction is also contingent on what is technically possible in combination with the resources controlled and made available by others. Moreover, the organised behaviour system is interactive in the sense that the suppliers are attentive and responsive to each other. Thus, suppliers indirectly influence one another and respond to actions and behaviours that are not directly related to them. Buyers and sellers are not the only influences on each other, as the expectations and behaviours in the relationships outside the focal firm also influence them.

Alderson (1957) discussed various ways in which matching occurs, one of which is centralisation, which occurs when suppliers are brought "together at the same time and place, rather than having individuals seek out each other to conclude each transaction" (Alderson, 1957, p.

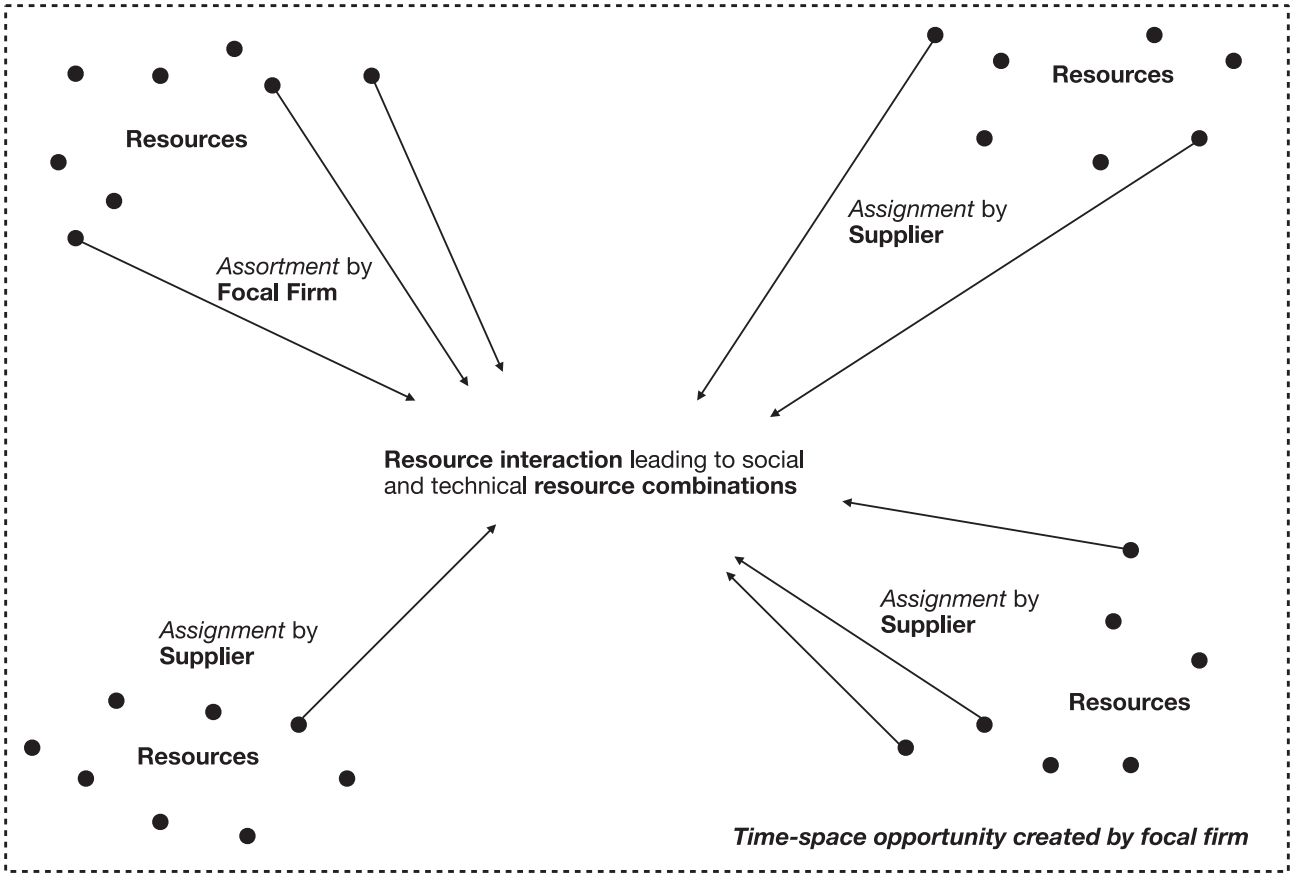

Fig. 1. Time–space opportunities to enable resource interaction leading to resource combinations.

159). We refer to this activity as the design of centralised time–space opportunities (see Fig. 1). The situatedness of interactions relates to the initiation of the combination of knowledge resources within a specific context and moment in time (La Rocca & Snehota, 2011). Time–space opportunities provide important dimensions of knowledge situatedness because they acknowledge that resources are brought together by interacting suppliers behaving in specific ways, and because they are guided by beliefs about situations and available resources. These opportunities can also be activated at specific times (La Rocca & Snehota, 2011). Alderson (1965) thought that a critical reason for considering organised behaviour systems was that opportunities for market exchange are contingent upon time and space as essential channels of market heterogeneity (Reekie & Savitt, 1982; Thorelli, 1986). By creating time and space opportunities, suppliers who have the best insight regarding their own intentions, relations, knowledge, and direction meet and mutually determine the matches for themselves.

4. Methods

We used the extended case method to understand the concept of matching within an exemplary case of network innovation governance (Burawoy, 1998). This method provides an a priori theoretical framework to "delineate the boundaries of an empirical field" for the purpose of modifying, exemplifying, developing, and deepening theorisation (Tavory & Timmermans, 2009). The extended case method is a reflexive model of science that uses multiple researcher–subject dialogues to raise the level of explicitness and explain empirical phenomena. In this paper, we use Alderson's (1965) concepts as analytical devices to explore a case of resource interaction and network innovation governance—that is, the case of Unilever's food waste project.

The extended case method allows for contending with what is described as an ethnographic condition: data are produced through engagement with suppliers behaving in a particular context and from theory-based reflections. Therefore, this perspective is grounded in a theoretical starting point that differs from more exploratory approaches to case studies, such as grounded theory (Burawoy, 1998). In an extended case method, a theoretical framework serves as a reflexive guide for this engagement; it directs interactions with suppliers in the context studied and is used to understand their views. The guiding process is not deployed to confirm a framework but to find refutations or anomalies that can help reconstruct the analytical lens and thus deepen the theoretical insights. To accomplish this, we considered four interrelated aspects of our research (Burawoy, 1998). First, through our research interviews, we sought to engage the interviewees in a meaningful dialogue intended to uncover insights into the motives and processes underlying the words uttered during the interview (Silverman, 2007). Second, the interviews went beyond the exchange of mere information, since meaning and experience contexts included the interviewee's interpretation of the questions, the intent of the interview, the wider research project, and how the interviewee personalises their own narrative. Third, we investigated the business context outside the realm of investigation because of its importance in understanding why and how specific suppliers are present in the social context (Tsoukas, 1989). Fourth, we sought to both impose and challenge the theoretical perspective that we selected as an analytical device to enable the theory to guide the intervention and processes of reflection.

Network innovation governance is a complex phenomenon to study from a researcher's perspective, but the extended case study method can afford an in-depth understanding of its functions. We chose to apply this method to gather a range of perspectives on the content and sequence of interactions. The aim was to understand the highest levels of governance interaction. The extended case study method is particularly suited "to extract the general from the unique, to move from the 'micro' to the 'macro,' and to connect the present to the past in anticipation of the future, all by building on pre-existing theory" (Burawoy, 1998, p. 16). We followed sequences of events unfolding over time by studying the interactions and dynamics between the focal firm and the business network. By delving into the micro-actions taken and decisions made in the business network, we strove to examine how the focal firm governed its supplier network in innovation processes. In other words, the aim was to uncover best management practices for network resource interaction for innovation. Instead of seeking to limit and separate ourselves as researchers from the research subjects (as in the positivist tradition), we endeavoured to "…keep our self steady by rooting our self in the theory that guides our dialogue with participants. […] Objectivity is not measured by procedures that assure an accurate mapping of the world but by the growth of knowledge" (Burawoy, 1998, p. 5).

4.1. Data collection

The case was tracked through multiple informal and formal means and sources, such as participant observation in meetings, informal talks and discussions with the project team, and specific interviews, emails, conference calls, presentations, and briefs. Data were collected from 2014 to 2016. Table 1 provides an overview of the formally arranged interviews.

The interviews were carried out with key Unilever personnel, including project leaders and those who managed the interorganisational and knowledge-sharing processes, all of whom had more than 15 years of work experience at the company. The supplier interviewees were selected from various firms, with participants holding a range of positions, but all were engaged in and responsible for the interaction. Unilever's project leaders were asked to indicate key individuals from different supplier organisations who would be relevant interview prospects. This enabled us to avoid peripherally involved participants from various organisations. All interviews were conducted using a semi-structured interview guide that focused on interaction. The interviews were chronologically structured in a dialogic setting. They followed the process of going through the occurrence of actions; getting suppliers to explain decisions, resources, and reflections; and, finally, paying heed to the interactions. The main discussion included core themes, such as motivation, dialogue, and the roles of collaboration and resource mobilisation, while also allowing for emerging themes to be explored. The interviews were recorded and transcribed. New and surprising insights were validated against previous interview responses using an iterative approach to the interview guide (Miles & Huberman, 1994).

Beyond interviewing, we conducted extensive participant observation, supported by collecting relevant documentation, to understand the facilitation and development of collaborative work. These data helped us capture the sorting of the supplier sets, as well as the expectations and

Table 1
Overview of interviews conducted with Unilever employees and its suppliers.

Interviews conducted at Unilever and with the supplier network **Company, Position**	**Duration**
Unilever, R&D Foods Director	55 min
Unilever, R&D Programme Director	50 min
Unilever, Open Innovation Director	45 min
Unilever, R&D Project Leader + Unilever, R&D Manager	70 min
Supplier A, Head of Products, Technology, Innovation and Commercialisation	45 min
Supplier A, Global R&D Director	40 min
Supplier B, Global Strategic Director	45 min
Supplier B, Technical Account Manager	35 min
Supplier C, R&D Key Account Manager	65 min
Supplier C, R&D Director	50 min
Supplier D, VP Marketing	30 min
Supplier E, Head of Innovation	45 min
Supplier F, R&D Director	40 min
Supplier G, Director of Global Strategic Relationships	45 min
Supplier H, VP Europe	50 min
Supplier I, Head of Human Nutrition	35 min
Supplier J, Head of Product Development	50 min
Supplier K, CEO	25 min

behaviours of the suppliers, to better understand the interaction of centralised space–time opportunities throughout the process, as outlined in the theoretical framework. Initially, we collected insights through participant observation of the internal planning meetings of the network invitation setup; we also collected relevant data, including the invitations, facilitation guidelines, programmes, and minutes of different agenda meetings. Next, we conducted participant observation of the first network workshop and collected relevant documentation, including the PowerPoint presentations used to stage the meeting and internal summaries of the takeaways from the meeting. Throughout the development process, we also participated in regular internal Unilever team meetings, where the progress, procedures, and takeaways were discussed and evaluated, thus enabling comparisons of how the insights obtained altered Unilever's perceptions and evaluations. During this process, we collected documentation on the behaviours and expectations of suppliers regarding whether they would join or exit. This documentation included briefs, minutes of meetings, presentation material, email communication with suppliers, and internal summaries of takeaways, which captured the positions of the participating suppliers and their contributions and engagement.

5. Case background

5.1. Unilever: Background of the case selection

Unilever is a multinational consumer goods company regarded as one of the leading companies in supplier innovation practices (Trebilcock, 2014). Therefore, it is a source of inspiration for other firms exploring new management practices (Haunschild & Miner, 1997). For several years, Unilever has endeavoured to design and refine its approach to managing its supplier network and pursuing an innovation agenda. With more than 10,000 suppliers, it has recognised the potential of leveraging the supplier base as an innovation resource; therefore, solving the managerial challenge of how to mobilise suppliers' resources for innovation has been a top priority. Through past dealings with suppliers, the company has established multiple conventions that suppliers have come to expect and that are self-enforced through actions taken by others, as well as through interactions, such as clear and generally acknowledged guidelines for resolving breaches of confidentiality, violations of agreements, and other potential conflicts. In the present discussion, our focus is less on these elements (e.g., the formulation of underlying contracts) and more on the governance of resource interactions.

In the past, Unilever had tested several modes of governing external involvement in innovation and refined its current approaches. For example, the company had hosted large-scale innovation contests for suppliers, where suppliers were asked to develop ideas, concepts, and solutions for the company (Laursen, 2017). Although several hundred supplier ideas were produced in just one of these contests, the outcome proved disappointing. Systematic tracking of these contests by the innovation management department at Unilever HQ revealed that none of these ideas were subsequently implemented. This was due to a lack of internal and external commitment and a misfit between the suppliers' solutions and Unilever's needs. Beyond large-scale initiatives, such as these contests, Unilever has extensive experience with the conventional approach of supplier involvement in innovation, where specific suppliers have been invited to participate in innovation tasks. To increase the output and efficiency of this approach, Unilever has been trying for years to improve its selection of suppliers, their activities, and the timing of their involvement. However, the magnitude of the supplier base and its independent strategic agendas have often made these predictions faulty. Moreover, although most suppliers showed a willingness to participate in projects, their interest proved to be superficial when they were specifically asked to do so. Following these experiences, Unilever gradually realised that it did not know whom to involve, what to involve them in, what they might contribute, and to which areas the suppliers were interested in assigning resources. These questions were best answered by the suppliers themselves. Unilever has, therefore, worked to change its course by adopting an open, receptive, and much less direct governance approach (Laursen & Andersen, 2016).

5.2. A network innovation governance case in point: The food waste project

When Paul Polman took over as CEO of Unilever in 2009, he envisaged the company embracing sustainability as a dominant element of its strategy for the future. This led Unilever to launch several innovation initiatives to engage suppliers in reducing its environmental footprint. One initiative was the food waste project, which focused on reducing waste from the processing of crops and other raw materials, either by utilising materials in a better way or by finding alternative uses for the waste products. Unilever needed access to knowledge and insights from suppliers, as well as to ensure that the knowledge resources of suppliers were sufficiently paired to develop the best solutions. We followed the food waste project over a two-year period from the point of conception until the technological development was completed and handed over to Unilever (2014–2016). The brief was not defined at its inception. The project was introduced as an open call to a dozen strategic suppliers to get a sense of whether they might be interested in collaborating around innovation and the direction in which they were interested in assigning R&D resources. Unilever's goal was to join forces to openly innovate with interested suppliers and create a mutual win for itself and its suppliers. The company initially defined its starting theme as the "total use of agricultural raw materials" (Unilever presentation, 2014, p. 14). The rationale behind choosing a theme relating to a broad section of the supply base was that it had the potential to include a range of suppliers, since waste can accrue at multiple source points. Moreover, each supplier would see different potential gains and possible contributions to the challenge, depending on its resources and how these resources were combinable with others. The framing was deliberately kept open and wide so that the suppliers themselves could locate their interests and resources and align them with their own strategic R&D agendas.

6. Network innovation governance at Unilever

We zoomed in on three space–time opportunities (meetings and workshops) Unilever has systematically hosted to drive resource interaction among its supplier network (Fig. 2). The timeline displays the governance activities over two years (i.e., from September 2014 to September 2016) and how the resource interaction evolved through an assignment and assortment process in which various resource combinations were explored. This shows how the resource interaction moved from an idea structure to an activated structure. As suppliers interacted and discussed how to potentially combine their resources, they revealed an array of options to pursue further work. As a result of the iterative assignment and assortment process, the number of relevant suppliers contracted, as some decided to withdraw, or Unilever deselected them. Other projects may have branched out and become activated resource combinations of their own, pursued by different sets of suppliers and Unilever itself. In such cases, we only had the opportunity to longitudinally follow one of two final activated structures, namely the onions project, as the malt-refining project (marked with grey in Fig. 2) was outside the scope of our research.

6.1. Briefing 20 strategic suppliers

Unilever's normal practice of organising innovation tasks is to use a brief to communicate the intent and success or failure criteria of projects to collaboration partners. In September 2014, it identified a challenge "to reduce the environmental footprint of its products, taking a whole value chain perspective." (Unilever presentation, 2014). Since the challenge exceeded the internal supply chain and technical resources in

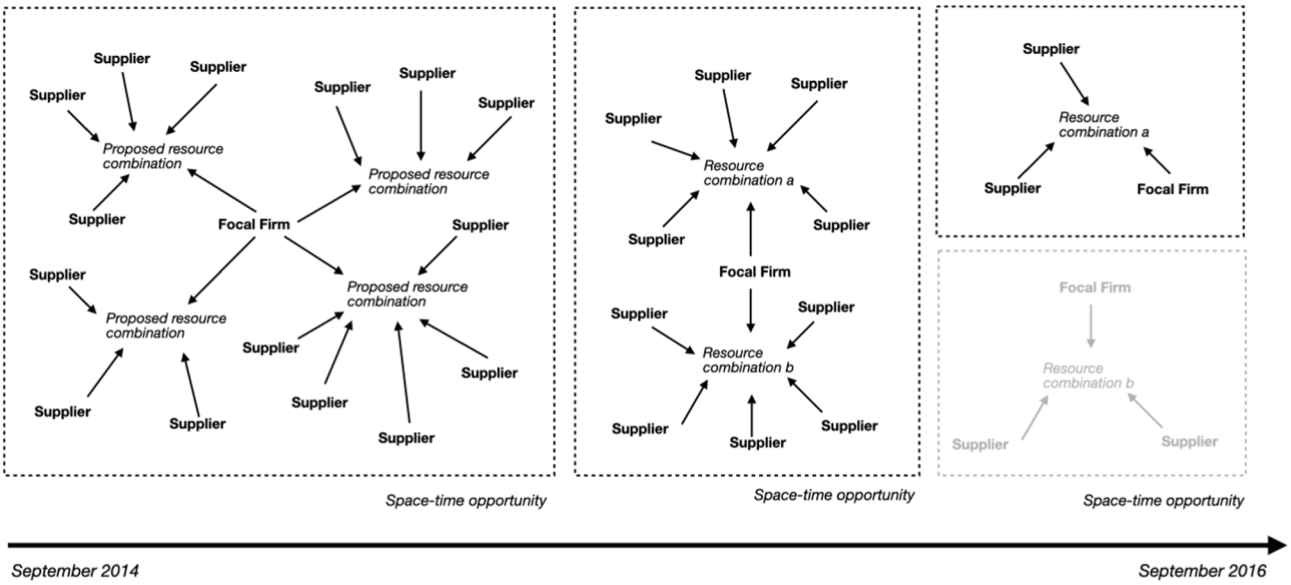

Fig. 2. An overview of the Unilever workshops for enabling suppliers' resource interactions and combinations.

terms of products and facilities, Unilever needed to involve its supplier network to find a solution. The global innovation units within Unilever defined the task aim and utilised the existing strategic supplier network to identify potential contributors. This was communicated to suppliers in the following way: "Most processes in use in today's food industry have not been optimised in terms of energy, water, material use, and contamination from a total value chain perspective. This must change. Successful solutions require integrated approaches combining key skills of all relevant parties, both producers and users" (Unilever presentation, 2014, p. 7).

The suppliers invited to participate in the project were identified according to the following selection criteria: supplier relations (social resources: each one was a strategic supplier to Unilever), potential possession of technical resources, specifically products or facilities (e.g., leading products within their industry, or suppliers in possession of significant R&D facilities), and the complementarity of resource sets, both considering Unilever and the potential set of suppliers (e.g., non-competing suppliers). To enable the supplier network's ability to interact and distil useful resource combinations, 20 suppliers were assigned and invited to a strategic intent workshop with the aim of understanding potential resource combinations. This was to be achieved by considering social aspects, such as interorganisational relationships, and the potential technical contributions, complementarity, and combinations. Specifically, Unilever disseminated a brief to key persons in a subset of 20 strategic supplier companies, scoping their expectations in terms of both organisational and technical resource commitments and contributions. One of the expectations was related to how Unilever expected suppliers to interact, as illustrated in Fig. 3. Here, Unilever wanted the suppliers to change their assortment behaviour by moving from a bilateral and traditional joint project model to a multilateral model, where they were expected to collaboratively engage in developing the draft brief into a final brief.

In earlier supplier network innovation projects, Unilever's experience was that resource mobilisation was not the key challenge,

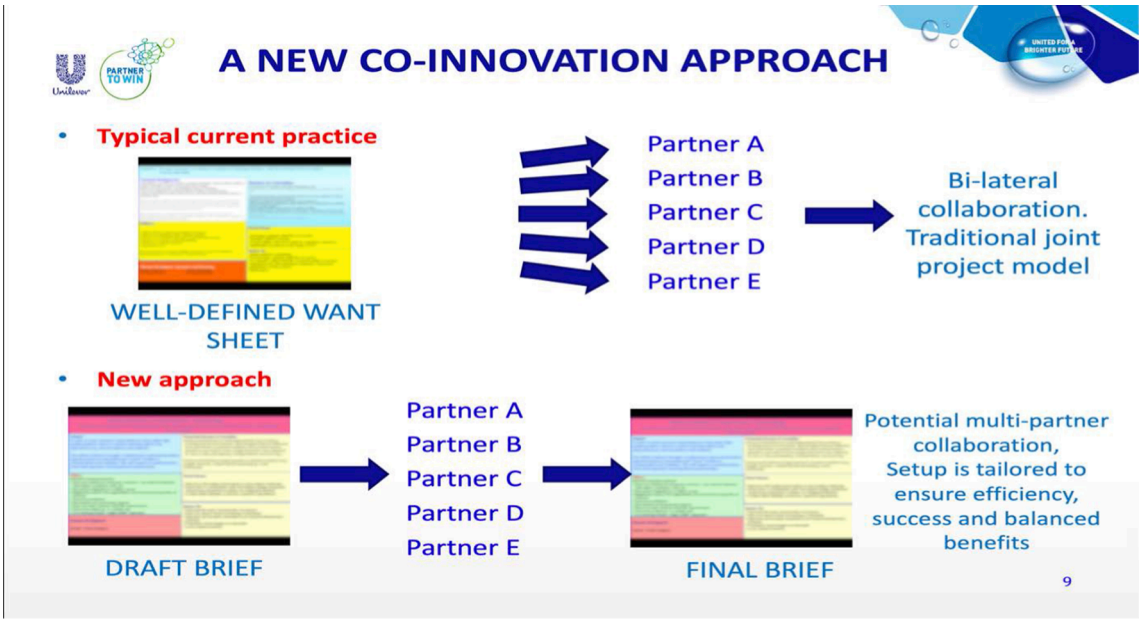

Fig. 3. Sharing expectations with suppliers (internal Unilever documents).

underlining that it instead lay in the interaction of resources leading to valuable resource combinations: "There is no problem in getting ideas, technology or knowledge from the externals – the problem is to get internal alignment and commitment for external innovation" (Director, Unilever). By briefing suppliers and aligning expectations, Unilever also supported the interfacing of resources, thus applying governance without engaging in outright control of interactions.

6.2. Synchronising 15 strategic suppliers

Of the 20 assigned suppliers, 15 agreed to participate in the strategic intent workshop. There were 49 participants in total: 10 participants from Unilever and 39 participants from 15 strategic supplier companies that attended the strategic intent workshop. For the workshop, each supplier had assorted a few participants to partake in the interactions. The organisational units interacting from both Unilever and the supplier network included a mixture of top management and senior operational personnel (i.e., vice presidents, directors, project leaders and senior managers), whose mandate was to grant further resource access in terms of organisational units, products, and facilities. Moreover, technical specialists from various organisational units (including R&D, innovation, procurement, and, in some instances, marketing and the supply chain) interacted around the specific technical challenge. The interaction at the workshop iterated between the top management decision-making level (proposing, adapting, and synchronising access to facilities, products, and different parts of the organisation) and the technical knowledge-holder level (which allowed for technical scoping suggestions). This activity allowed for mutual proposals of resource (re-) combinations to be made by the suppliers themselves, taking account of relations and complementarity, as well as each supplier's situation, capabilities, interests, and strategic reasons for initiating the project.

Putting potential project partners together in the same room enabled the suppliers to share knowledge concerning how the project could be framed to fit their future strategies, different technological bases, and facilities. One supplier referred to the importance of mutual framing of the project scope: "Because Unilever indicates that they want something is not enough reason for us to invest our research resources, because this is in direct internal competition with 45 million euro projects that are tangible and have a segmented market, which serves as an argument as to why they will succeed" (Supplier A). Colocating Unilever and the suppliers allowed for an interactive unfolding of the task. The participants considered different resource combinations and various strategic agendas. The discussions brought about synchronisation in the suppliers' suggestions and relevant technical resource combinations. The social resources in terms of the interfirm relationship between the various constellations of suppliers and their extended networks were discussed to understand the possible potency of resource interactions among different constellations of actors. Synchronising the resource interaction in time and space not only led to efficiency in the exploration of resource combinations and a spin-off from the interactions, but also clarity of the social construction and the complementarity of the supplier constellations. The interaction at the workshop drove a simultaneous and joint assortment of potential combinations of products, facilities, and interorganisational relationships among the suppliers.

6.3. Briefing 15 strategic suppliers

The insights gathered helped Unilever's management understand the suppliers' interests and potential resource contributions and proposed combinations. For Unilever, this interaction informed the assignment of future resource configurations, including the kind of product and facility resources and the different project scopes and supplier combinations that could be unlocked. One Unilever manager explained that based on the supplier interaction process in the strategic intent workshop, Unilever was able to narrow down and identify-two crop areas, onions and malt refining, where the suppliers' suggested that they could provide valuable reductions in food waste. The tasks allocated to the suppliers were framed in a new brief and distributed to a subset of the 15 suppliers participating in the workshop. The 15 suppliers then reviewed the brief and considered whether they would dedicate resources within their organisational boundaries to the interaction and determined which resources would be relevant and to what extent. In response to the task assigned by Unilever, five suppliers decided to exit, choosing not to interact further in the project. Their reasons included that their products or facilities did not match the project's scope, that the strategic investment was outside the brief content, or that there was a change in their business circumstances.

6.4. Network discussions among 10 strategic suppliers

The remaining 10 suppliers presented their potential resource contributions and areas of interest within the respective projects and engaged in joint, non-confidential discussions. These projects were related to both reducing waste and mitigating the additional costs of processing food through various production, distribution, and storage facilities. Various suppliers joined the onion and malt-refining projects, and these choices were based on strategic interests and capabilities. Where the malt-refining project demanded fewer research resources, the onions project required significant access to research units and facilities among suppliers. As the authors only had the opportunity to follow one project, going forward, the onion project was chosen, as it required significant interaction across organisations and various organisational units within each organisation and provided the richest opportunity to understand the interface and interaction between types of resources.

A Unilever manager explained how the discussion moved rapidly between matters concerning interorganisational relationships (who could work with whom) and technical resources, such as the potential products and facilities that each supplier could bring to the table. The suggestion of one supplier spurred a string of interactions, including suppliers proposing complementary facilities (e.g., we have a research project in this area; we can do this type of product processing or reaction; we consider that it is outside of our interest areas; or we are willing to engage with specific suppliers based on previous experience, facilities, or competences). Such a synchronised assortment of potential project scopes and participants and their resources led the suppliers to engage, join, and exit the projects and processes based on an iterative proposition of resource combinations. Thus, by moving away from a dyadic interaction around one topic (e.g., a technical or social focus), the setup spurred a multifaceted discussion around many subtopics and actors, where different constellations of relations–resources–project scopes were proposed, discussed, and tested. Through resource interaction, Unilever became informed about the potency of different resource constellations and how and the extent to which this would unlock resources within the various supplier organisations. One Unilever manager explained this as follows:

> There were questions for everybody—for the partners, and us. However, the crucial questions for us concerned the commercial opportunity. For one supplier, it [the commercialisation potential] was less important because they saw this project as a strategic project […] there was a bigger opportunity [for them] if it was a success because the thing that was proposed was a technical solution – an activity. We found out in hindsight that they had already worked on this topic. So, they knew, from a technical point of view, what it could deliver. They knew where it could be applied in our business. At that stage, they probably also knew it could be used in other businesses as well, being food businesses but outside savoury, so they knew the snack industry would probably also be interested. So, they could extend the volume and the business case. (R&D Manager, Unilever)

Thus, an alignment of supplier and Unilever interests emerged through the interaction. Unilever did not have this insight in advance

and would not have been able to scope a brief that would have granted them access to suppliers' resources as effectively as was achieved through this dialogue. Thus, Unilever's management learned that the open-ended approach potentially paved the way towards using the suppliers' resources in contexts that would not have surfaced in a more linear collaborative mode. The interfacing opportunities allowed the resources to be combined in a valuable manner for all the parties involved.

6.5. Resource combination workshop

Two suppliers were selected for the onions project, as they showed distinctive levels of engagement in interacting with each other and offered complementarity capabilities:

> When we, the two supplier companies, were selected to be a part of the onion project, Unilever briefed us on their ambition and what they wanted but very little on the actual design criteria. Then, we decided to take the lead because it didn't seem like anyone had taken the lead in making the strategic decisions that needed to be made. What was the target for the criteria, and how would we reach them? How would we manage innovation between the different partners? (Technical Account Manager, Supplier A)

Thus, in the eight-month period that followed, Supplier A took the project lead and deployed its organisational processes and routines. They applied their way of working (organisational resources), organised meetings every-six weeks, arranged two "integration workshops," and sought to clarify commercial matters, all of which were crucial in terms of continuously unlocking R&D resources from Supplier A's organisation. The different workshops were hosted at the facilities of Unilever, Supplier A and Supplier B, with the focus being on advancing the project in terms of technological principles, the business case, and finding a strategic fit.

A Unilever manager explained that the idea behind the workshops (i.e., aligning expectations to create space–time opportunities), while allowing suppliers to drive interactions, revealed knowledge of each supplier's resource availability depending on different project scopes, partners, other available resources, how they may be combined, and how these factors may be valuable for each of the suppliers. When the technological development aspects of the project and business case were clarified, Supplier A, who had been leading the project, decided not to invest further due to the size of the business case, and the amount of its product that would have been applied in the final technology could not justify a further investment of R&D resources. As one manager explained, "Onion was closed because the business case was too small" (Technical Key Account Manager, Supplier A). Hence, although technically a bit off centre, Supplier A remained in the process for longer than was probably reasonable, considering the match of social resources. Thus, a case may be made for the complementarity of resource interfaces. Supplier A decided to assign the use of a technical resource that did not strictly fit the resource combination, and this suggests that although analysed separately, the social and technical resource interfaces should occasionally be viewed in combination with each other.

Unilever and Supplier B then progressed into the final phase of technological development. Unilever's R&D project leader explained the collaboration as follows: "There was a kind of synergy in the business case. We [Unilever] use a lot of this stuff in our products, and they [Supplier B] produce a lot of it in their portfolio." By September 2016, Unilever's R&D department, along with the supplier, had finalised the development of the technology, after which it was handed over to another department within Unilever for consumer testing and commercialisation. It was then agreed that the supplier would be free to use the technology for customers in non-competing areas.

7. Discussion

How can the Unilever project help us extend our theoretical understanding of resource interaction in network innovation governance? More specifically, can the concept of matching through assortment and assignment in the Unilever case help us understand the mechanisms that allow a focal firm to govern resource combination processes?

7.1. Combining theoretical frameworks

In answering the aforementioned questions, we identified three relevant findings from combining the IMP approach to resource interaction with the Aldersonian framework.

First, by analysing Unilever's role as an active intermediator of processes that create time–space opportunities for combining resources among suppliers and Unilever, we began to understand the dynamics of how these entities governed processes through intermediation. In our view, the idea of condensing time–space opportunities and designing assortment requirements to increase resource interaction opportunities borrows from Alderson's description of markets as behaviour systems in which interactions are at the core (Alderson, 1957). This soft-power approach of aligning buyer assortments and supplier assignments expands the management role of network governance advanced by Håkansson and Ford (2002) and aligns with the tension between control and emergence in distributed innovation contexts (see, e.g., Cheng & Van de Ven, 1996; Choi et al., 2001). In addition to providing time and space opportunities, soft power also included assessing social and technical resources and mobilising Unilever's resources.

Second, the analysis showed how assigning and assorting activities unfolded in the interaction process among suppliers and Unilever with the matching design and provided an interesting approach to research resource combinations and buyer–supplier alignment interests concerning network innovation governance (see also Corsaro & Snehota, 2011 for an interesting parallel discussion of the emergence of buyer–supplier misalignment over time).

Third, our extension of the Aldersonian framework addresses the role of knowledge and learning that results from resource interaction, which, in this case, eventually changed Unilever's assumption about the value of supplier networks. This final element is better understood within the IMP tradition, which keenly focuses on learning as a transformative force for networks and interactions (Håkansson et al., 1999; Håkansson & Johanson, 2001).

7.2. Dynamics: Assigning and assorting as mutually constituting processes

As the case moved beyond the firm-centric dyadic approach to examining open innovation with multiple suppliers, it provided insights into the allocation and governance of resources, suppliers, and activities in a behavioural system of related suppliers that are outside the focal firm's reach. By using assigning and assorting as reflexive devices, we highlighted the mechanics of a governance approach that considers the dynamics of micro-adaptations and mutual responses of the interlinked dynamics in the behaviour system. The mutual aspects of assigning and assorting account for effects outside the focal firm's control, influence, and awareness. For example, the onion project tapped into Supplier B's strategic R&D agenda, as it aligned with and benefited its product portfolio. What Unilever did not know until halfway into the project was that the onion crop was a core strategic interest for Supplier B, because the work from this project also served many of Supplier B's customers in other industries. The case thus shows the complexity of network innovation governance efforts. Instead of attempting to predict resource combinations, complex matches are made through centralisation, where there is mutual adaptation according to the individual suppliers' research focus, available resources, common strategic interests, and relationships.

8. Limitations and implications for management and research

This case study offers several important lessons for research and innovation managers regarding the ways in which Unilever engages its supplier network. Regarding the research implications, the concept of assigning and assorting is a new way of understanding network governance processes involving interfirm innovation activities. Similar to other researchers, we found the Aldersonian framework useful for analysing interactions in complex networks (Gadde & Hulthén, 2016; Prenkert & Hallén, 2006). More specifically, we believe that applying this framework to innovation interaction can facilitate the characterisation of the governing role of the focal firm, especially-one that seeks to use the potential learning and matching benefits of interacting with suppliers. By bringing the notions of assortment and assignment into the business network, as well as B2B marketing and IMP, our study unlocks several important research avenues. Specifically, the approach suggested here reframes the role of governance and raises several relevant questions: How can a firm design a space for resource interaction? How do managers continuously align dynamic interests and change the intentions of suppliers in business networks? How can firms facilitate collaboration among suppliers in a network? How does collaboration change through the development of the innovation process? We believe that there is ample opportunity to use Alderson's concepts to further explore the success or failure of governance processes in network innovation.

Unilever's approach to directing innovation processes potentially addresses the challenges of combining resources from diverse suppliers. Compared to other processes that steer the innovation inputs of suppliers more strictly, such as early supplier involvement and open innovation, Unilever's process allows for considerable intersupplier diversity, which relates to the skills and interests of the suppliers involved. Instead of preselecting suppliers from the outset, assorting processes allow for a lateral process of matching, which may lead to valuable and novel supplier collaborations. With the Unilever case study, neither the engaged suppliers nor the project scope were predefined; instead they co-evolved in a way that Unilever could not have envisioned. In conceptualising the organised behaviour system, Alderson (1965) stressed the coordinating role of information, stating that "the heterogeneous market is cleared by information" (p. 52). Our vantage point is unique because we do not deal with commodities, but with resources used for innovation purposes. We understand that the assortment, assignment, and resource combinations are still useful building blocks, but with the additional idea that they are dynamic and constantly evolving. In this context, resource combinations are not only actor-driven but also co-constituted by users and producers, and they assume an independent role in matching processes as they unfold. Although actors in the Aldersonian model match resources, the process is interactive and coevolutive in the sense that the proposed resource combinations influence assortment and assignment, which again leads to new resource combinations.

Our approach to research network innovation governance arguably offers an alternative to top-down governance approaches. For valid reasons, the IMP literature has challenged firm-centric models of management, which disregard network interdependencies (Håkansson & Ford, 2002). However, as explained by other researchers within this tradition, this has also left the IMP approach without a clear conceptualisation of how management actually occurs in networks (Möller & Halinen, 2017). Combining Alderson's notion of behavioural systems with the resource interaction perspective of the IMP approach offers an alternative way to analytically address governance processes in networks without reverting to linearity models for managing and aligning the resources and interests of partners. Therefore, we see this study as contributing to ongoing discussions regarding management in business networks.

From a managerial perspective, the research framework has helped us address and analyse the complex dynamics of Unilever's successful approach. An important part of their approach is scoping the activity in a way that balances the interests of the focal firm with those of the participating partners. Providing opportunities to participate in the development processes, as exemplified by the suppliers' behaviour during the food project, strengthens the motivation of those who decide to participate. This prevents superficial commitments in which the supplier network, due to relational aspects, indicates a willingness to contribute to innovation activities when the knowledge and resources involved are insubstantial. Furthermore, this perspective accounts for the dynamics of committing to activities that develop over time. As engagement may strengthen and wane over time, self-organisation and lateral alignment may prove to be more effective. Postponing commitment and development processes allows suppliers to change and adjust commitments over time. Innovation is a rugged and messy business, and most projects fail. In the best case, projects may develop unpredictably, leading to novel outcomes. As illustrated, the consecutive matches provided opportunities to exit the specific project as it matured. If a project takes a strategically uninteresting direction for a particular supplier, the supplier can disengage without damaging the project or the relationship in general. Consequently, matching allows suppliers with continuously changing business circumstances and strategic agendas to evaluate and react to the attractiveness of projects in a nonconfrontational way during the process, which benefits all parties.

Although we showed that the assigning and assorting process offers a valuable alternative approach, it should also be noted that it is a resource-demanding process for the focal firm, as is the case with more top-down approaches. Managerial efforts change from focusing on control to a process of guidance, attention, and support. Managers must remain engaged in the assigning and assorting process and continually stage opportunities for mutual interactions to unite suppliers, resources, and activities within the business network. The governance of social entities assumes imperfect knowledge and considerable task uncertainty, but this does not mean that direction setting does not occur. In fact, such direction setting happens through informal means, such as setting expectations and general rules relating to behaviour (Jones et al., 1997). A firm must present assigning and assorting opportunities, and suppliers can decide whether to mobilise their resources. Ultimately, managers need to acknowledge their incomplete understanding and limited control instead of trying to converge paths.

The case highlights the circumstances in which an open approach to supplier network innovation governance may be applicable. Unilever is regarded as an industry leader, and many suppliers consider Unilever to be an attractive customer because of its scale. Smaller or less attractive firms may be unable to engage suppliers in the moves required to facilitate such resource matches. In other words, the benefits of investing may not be sufficiently attractive to mobilise the network. The benefits of investing may also vary with the character of the industry, since some may be tightly regulated or more scattered, or the risk of spillover knowledge may prevent such efforts.

In terms of limitations, this paper details an attempt to use Alderson's framework to explore network innovation governance and the structure of time–space opportunities for resource combinations among a set of participants. Consequently, our results have several limitations. Exploring a single case means that the circumstances and context of that case influence perceptions and learning possibilities. As we move from a general framework to an in-depth exploration of a specific case, we can only add to the body of knowledge by showing the reality of that specific case. There are other ways of governing network innovation in which matching and the creation of time–space opportunities play different roles (if any), and we hope that future research will further explore these boundaries. Moreover, the underlying assumption that interaction can be governed is a partial viewpoint that may lead to disagreement among researchers.

CRediT authorship contribution statement

Linda Nhu Laursen: Conceptualization, Funding aquisition, Data curation, Writing - original draft, Writing - review & editing, Visualization, Investigation, Validation, Formal analysis, Methodology, Supervision, Resources, Project administration, software. **Poul Houman Andersen:** Conceptualization, Funding aquisition, Data curation, Writing - original draft, Writing - review & editing, Visualization, Investigation, Validation, Formal analysis, Methodology, Supervision, Resources, Project administration, software.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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