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Resource interaction and resource integration:

Similarities, differences, reflections

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Abstract

The purpose of this paper is to provide a state-of-the-art comparison of the conceptualization of resources in the 'Resource Interaction' (IMP) and 'Resource Integration' (SDL). Both are engaged with understanding how value is (co)-created, but with different emphases. Existing comparisons are limited and out of date. We trace how each has evolved over time by analyzing key developments. The focus of SDL has shifted from operant resources toward resource integration, and from a dyadic view towards ecosystem contexts. Within IMP, research takes a network perspective in investigating the nature of resource interaction in a variety of empirical contexts. An analysis of similarities and differences highlights key assumptions, the classification of resources, and the role for the actor. The comparison offers a thorough understanding of Resource Interaction and Resource Integration. The paper concludes by proposing suggestions for further research for Resource Interaction.

Key words: Resource Interaction, Resource Integration, IMP, SDL, Business networks, Ecosystems

1.0 Introduction

The Industrial Marketing and Purchasing group (IMP) and Service-dominant logic (SDL) are two 'academic brands' (Cova, Ford and Salle, 2009) within marketing theory that are actively debating the role of resources in a business context (see e.g., Landqvist and Lind, 2019; Brodie, Löbler and Fehrer, 2019). Both IMP and SDL rely on the dynamic and evolutionary nature of resources as a key driver of value and exchange processes (e.g., Cantù, Corsaro and Snehota, 2012; Peters et al., 2014) and take an inter-organizational perspective on how resources are utilized across firm boundaries (Baraldi, Gressetvold and Harrison, 2012a; Vargo and Lusch, 2011).

Within IMP, there are four core assumptions about resources (Håkansson et al., 2009; Baraldi, Gressetvold and Harrison, 2012b): resources are 'double-faced', resources exist in networked contexts, resource heterogeneity, and resources are open and variable objects. Building on these assumptions, a body of knowledge has developed to provide an understanding of how resources are combined for value creation in business networks. We term this 'Resource Interaction'. Within SDL, Vargo and Lusch (2004:3) advocated a shift from emphasizing operand resources (e.g., machines and facilities) to regarding operant resources (e.g., knowledge and skills) as the fundamental source of competitive advantage. Understandings have progressively developed in SDL to explain how actors integrate resources to co-create value in service ecosystems. We term this 'Resource Integration'.

In this paper, we provide a state-of-the-art comparison of how resources are conceptualized within Resource Interaction and Resource Integration. Both draw on resources as a 'common denominator' to understand value creation. However, the theoretical points of departure and the focuses of the two are different (see also Ford, 2011). Each literature has seen a development of concepts and ideas concerning resources over the last years (e.g., Bocconcelli, Murmura and Pagano, 2018; Prenkert, Hasche and Linton, 2019; Brodie, Löbler and Fehrer,

2019; e.g. Koskela-Huotari and Vargo, 2016). Researchers within both literatures adopt a variety of perspectives to investigate resources, resulting in a huge richness of contribution. As a result, previous comparisons, by Ford (2011) and Baraldi et al. (2012b), are out of date.

Hence, we contend it is timely to make a contemporary comparison to discern the differences (e.g., the theoretical foundations and the level of analysis) and identify any possible convergence. We posit that such a comparison could deepen our understanding concerning the relatedness, strengths and weaknesses of the two, and provide input for further development. Notably, in this paper we focus on future possible developments of Resource Interaction. This is in line with the recent calls within the IMP community, for the necessity of opening up the theoretical debate and broader dialogue within and across neighboring research disciplines in relation to resources (Prenkert, Hasche and Linton, 2019; Waluszewski, Snehota and La Rocca, 2019; Aramo-Immonen et al., 2020).

The research questions underpinning the paper are threefold. Research question one asks '*how are resources conceptualized in Resource Interaction (IMP) and Resource Integration (SDL)?'* The second research question focuses on comparison: '*what are the key similarities and differences in how resources are conceptualized?'* In research question three, we focus on what researchers can learn from the comparison: '*what are some further directions for Resource Interaction?'*

Through a stepwise research design, we have identified 55 key references over a 20-year period to provide a solid foundation for comparison. We have not aimed at performing a systematic literature review to cover all aspects and/or developments; on the contrary, we aimed at collecting key references for both that allowed us to highlight similarities and differences in terms of how resources are conceptualized.

The paper proceeds as follows. In section 2, we outline our research design. Next, we trace the conceptual development of Resource Interaction (section 3) and Resource Integration (section

4). Sections 5 and 6 make a comparison of the two. Section 7, the final section of the paper, proposes three themes for further research within Resource Interaction.

2.0 Research Design

The overall aim of the paper is to compare how Resource Interaction and Resource Integration have evolved in the last two decades. Comparative research involves identifying similarities and differences, then comparing these in order to; "*[…] enhance one's understanding and awareness of other social entities*" (Ragin, 2007:67). Here, the 'entities' are Resource Interaction and Resource Integration. The authors are familiar with both. Additionally, we have a mixture of theoretical backgrounds and experience levels. The complementary expertise of the author team is a strength when undertaking a comparative study (Nason and Pillutla, 1998). Moreover, to ensure the effectiveness of the steps in the research process, the authors took a realist research approach.

In order to answer the research questions the key methodological choices were (i) how to select relevant papers, (ii) how to conduct a critical reading exercise, and (iii) how to build bases of comparison to catch relevant differences and similarities.

We initiated the paper search from our existing knowledge of key references (e.g., literature reviews) over a 20-year period, from 2000 to the present date. This enabled us to start the process of selecting sources to be included in our critical reading exercise. We decided it was essential to include seminal works (e.g., Vargo and Lusch, 2004) and review articles (e.g., Baraldi, Gressetvold and Harrison, 2012b). We used the bibliographies of these works. We also conducted a forward-looking search by checking citations within Google Scholar. While other datasets (i.e. Web of Science and Scopus) rely on a set of source selection, Google Scholar follows an inclusive and automated approach including a wide range of sources (Martín-Martín et al., 2018).

For Resource Interaction, this resulted in a working list of 20 publications, and for Resource Integration, 11 publications. There is clearly an imbalance: One explanation is that SDL is a relatively new area within Marketing compared to IMP, and there are fewer publications overall.

The authors then divided in two, one group focusing on Resource Interaction and the other on Resource Integration. The division of labour reflected the diversity within the author team. For example, we have differing extents of familiarity with IMP and SDL, research experience, and types of empirical studies conducted. The involvement of diverse, multiple researchers increased researcher triangulation (Flick, 2004).

The task, however, was the same; to read critically the relevant sources to obtain (i) understanding of the concepts in use over time, (ii) the levels of analysis and (iii) the variety of empirical contexts involved. Within each group, the authors individually read the sources. Afterwards, each group discussed each in turn and then together, in starting to synthesize developments over time. This process occurred in several iterations of individual reading and group discussions, which was always guided by the realist approach undertaken. During the critical reading exercise, the number of relevant publications increased from 20 to 36 for IMP and from 11 to 19 for SDL. In other words, the complete reading list contained 55 references. Table 1 below provides an overview of the publications selected.

Insert Table 1 about here

Next, we constructed accounts of how Resource Interaction and Resource Integration have evolved over the 20-year timeframe. Moreover, in the various writing phases the authors worked with different sections of the paper in diverse groupings. This facilitated having a fresh

perspective on the paper (Nason and Pillutla, 1998). Section 3 presents an account of Resource Interaction, and section 4, an account of Resource Integration.

Both accounts are based on our interpretation of the sources used. The reader will notice that the two sections are written in a different way. This is because Resource Integration has developed theoretically until quite recently, whereas Resource Interaction is more 'iteration and reiteration', i.e. moving back and forth between the empirical reality and concepts. We had no wish to artificially streamline the pace or shape of the two sections. Furthermore, it is not our intention that the two accounts are read as if there was a single line of development in each. We decided to periodize the two accounts both to facilitate comparability in the research process and to equip the reader with a clearer structure to enhance readability. Periodisation requires researchers to develop a series of phases or periods that relate to a research object (Jessop, 1990; Norcliffe and Bartschat, 1994). It maintains the uniqueness of each account, alongside enabling a comparison of the conceptual and empirical developments over time (Baron, Warnaby, and Hunter-Jones, 2013; Das, 2009). The 55 papers were allocated into five phases of roughly five years each to cover the past 20 years: prior to 2001, 2001-2005, 2006-2010, 2011-2015 and 2016-to date, respectively.

The five-year phases were a compromise between not being too micro or overly detailed (too short periods) or missing a fine-grained analysis by having too long periods of time (say 10 years) and therefore producing a too macro-level comparison. Over the course of five years, development in ideas and frameworks occurs. The periodisation of the two accounts was based on a combination of; conceptual developments in the two, changes in levels of analysis, and set blocks of time. The benefit of periodizing the two accounts is to enable us to compare the conceptualization journeys of resources in a systematic way. Two major concerns are that the periodisation presents a researcher imposition, and that there is some fluidity across the periods

(these do not represent totally clear phases of time). The five phases underpin Figures 1 and 2 (see below).

To address research question two, '*what are key similarities and differences in how resources are conceptualized*, required bases of comparison. We used six themes (i) the assumptions made about resources, (ii) the main concepts, (iii) how resources are classified and analyzed, (iv) role for actors, (v) effects of resource interaction/integration, and (vi) empirical settings.

We were aware of divergences in the two literatures from existing articles (e.g. Ford, 2011 and Baraldi, Gressetvold and Harrison, 2012a). For example, the role of actors (theme four) and empirical settings (theme six). Other themes relating to assumptions made, main concepts, analysis tools and effects emerged from our critical reading of the 55 sources. As we outlined above, the reading and discussion process across the authors centred on looking at commonalities and differences across the sources. We built the two research accounts from this reading exercise. Specifically, there was a focus on how resources have been conceptualized (research question 1) in the two accounts (sections 3 and 4) within and across time-periods in generating themes for comparison.

3.0 Resource Interaction

Resource Interaction in business networks has been defined as "*[…] the processes of combination, re-combination and co-development of resources that happens through the interaction among organizations*" (Baraldi, Gressetvold and Harrison, 2012b:266). The spatial aspects, reflecting the networked context, are essential when considering resources within IMP (Ford, 2011) and it is argued that resources are 'context dependent' (Håkansson, 1993). The temporal aspect highlights how the outcome of previous interaction and expectations for the future influence the combining of resources in the present (Jahre et al., 2006; Håkansson et al.,

2009). Section 3 discusses the definition, development and use of key concepts within Resource Interaction. Figure 1 provides a conceptual timeline (see also Appendix 1).

Insert Figure 1 about here

3.1 The basic assumptions

Baraldi and colleagues' (2012b:266) review adopted four core assumptions and six corresponding propositions from Håkansson et al. (2009). The assumptions and propositions refer to both the nature of resources and how resources interact (see Table 2).

Insert Table 2 about here

In brief, resources must have a known use value (Håkansson and Snehota, 1995) or are valuable when actors find them beneficial for current or future use. Following Penrose (1959), a single resource does not have value. Instead, it must be combined with other resources in a network setting (Håkansson, 1994). Moreover, changing one resource alters both its value and how it relates to other resources. The dynamic nature of resources means that they can always be utilised in new combinations in other business relationships over time (Håkansson and Snehota, 1995).

Assumption 3, regarding resource heterogeneity, has been claimed to be "*...the most important assumption related to resources*" (Holmen and Pedersen, 2012:12). Resource heterogeneity is a strong motivator for actors when working together in combing resources, for example to stimulate innovation (Lind, 2015), develop new products (Crespin-Mazet et al., 2014) and strengthen the role of SME suppliers (Bocconcelli, Murmura and Pagano, 2018).

3.2 Classifying and analysing resources

The resource layer is a longstanding part of the explanation for the existence of business relationships: "*The industrial network is a specific structure which binds together actors, activities, and resources in a certain pattern*" (Håkansson and Johanson, 1988:375). Håkansson's (1987) typology classified resources as physical, financial and human. It was later revised into the multi-layer ARA model (Håkansson and Snehota, 1995), itself later adapted to incorporate time and space (Håkansson at al., 2009).

In parallel to these developments in conceptualizing the resource layer within the ARA framework, and the application of this in various resource-centred studies (e.g. Harrison and Easton, 2002), the 4R Interaction Model (Håkansson and Waluszewski, 2002a), commonly referred to as the '4R Model' was published. The 4R Model "*provides **one way** of classifying, mapping, and analyzing the processes of resource interaction in inter-organizational networks*" (Baraldi, Gressetvold and Harrison, 2012b:268, our emphasis). It enables systematic analysis of how two or more resources interact. It was developed from a large empirical study of the greening of the IKEA catalogue (Håkansson and Waluszewski, 2002a) and within parallel projects such as an EU-wide Furniture Project (e.g. Baraldi and Bocconcelli, 2001), and various PhD theses (e.g. Wedin, 2001; Baraldi, 2003; Forbord, 2003; von Corswant, 2003; Gressetvold, 2004).

The 4R Model classifies resources into four types; *products*, *facilities*, *business units* and *business relationships.* Products and facilities are *physical resources*, with material properties (Håkansson and Waluszewski, 2002a). *Products* are combinations of products and services exchanged between business units (Baraldi and Bocconcelli, 2001). They range from a single physical item, such as components, to a whole system including after sales services. Products are adapted towards the customer's usage context and/or the supplier's context. Hence, product features are a result of interaction (Håkansson and Waluszewski, 2002a; Jahre et al., 2006).

Facilities are the resources required to develop, manufacture and transport products. Baraldi et al. (2012a) restrict the classification of facility resources to tangible artefacts such as warehouses or trucks.

Business units and *business relationships* are of a social character displaying intangible characteristics. They are categorized as *organizational* or *social resources* (Håkansson and Waluszewski, 2002a). Business units contain the knowledge, identity, reputation and routines of an organization. They can be the same as a company in a legal sense, but they can also be parts of one organization, e.g. a division or departments. Business units use their skills and knowledge to organize, manage and control products and facilities (Baraldi, Gressetvold and Harrison, 2012a).

Business relationship resources emerge at the interface between business units. Interaction in a specific relationship both affects and is affected by other relationships and includes memories of what has happened in the past as well as expectations about future activities. Thus, business relationships facilitate opportunities and present restrictions to actors (cf. Håkansson and Snehota, 1989; Ford et al., 2003).

The above explanation of the four resource types of the 4R model builds on both the well-known Håkansson and Waluszewski (2002a) study, and from parallel and subsequent empirical projects, e.g. PhD thesis (e.g. Gressetvold, 2004) or large team projects (e.g. Jahre et al., 2006). The use and application of the classification is therefore not fixed or singular.

Baraldi et al. (2012b:269-270, table 2) provide a useful summary of the application areas and empirical contexts in research using the 4R model. The 4R Model was developed within a technical development and innovation context (e.g. Håkansson and Waluszewski, 2002a). Later, the scope expanded to include logistics (e.g. Jahre et al., 2006), science-business (e.g. Ingemansson, 2010), and accounting and management control (e.g. Baraldi and Stromsten, 2006). For example, Jahre et al. (2006)'s fifty cases of resourcing in logistics networks each

had a focal resource as the starting point. Other researchers focused more on the nature of resource interfaces (see section 3.3 below). In sum, the expansion in empirical settings led to variety in how the 4R Model was utilized.

The diversification of empirical settings has continued. From 2012 onwards, expansion in themes has included; resource combining in new relationships (Gadde, Hjelmgren and Skarp, 2012); resource interaction in complex solution development (Cantù, Corsaro and Snehota, 2012); and the different roles played by business and non-business actors in resource combining (Crespin-Mazet et al., 2014). It has also encompassed; goal diversity and resource matching in project settings (Lind, 2015); how state actors act as resource mobilisers in facilitating networked innovation processes (Shih and Linné, 2016); start-ups (Landqvist and Lind, 2019) and SME-large customer relationships (Bocconcelli, Murmura and Pagano, 2018) has occurred. Some articles make explicit use of the 4R Model while others do not: The model is not used in a uniform way, and there is an openness regarding concepts. This latter point results in a variety of definitions and or uses.

3.3 The nature of resource interfaces

Resources interact via resource interfaces as a single resource becomes embedded in a network structure. Resource interfaces connect (i) one pair of resources of the same or different types, or (ii) multiple resources of different types. There are multiple understandings of how to define the concept. For example, Håkansson and Waluszewski (2002a, b) and Baraldi (2003) present resource interfaces as the specific contact points between two resources, while Dubois and Araujo (2006:22) define resource interfaces as "*interconnections between two or more entities at a shared boundary*". Baraldi et al. (2012b:267) suggest, "*the concept of interfaces provides the building block for both analyzing resource combinations and for formalizing the interactions between the resources involved.*"

This variety in understandings of the resource interface concept suggests plurality in the various research studies, and hints at different ontological perspectives adopted by different authors, which is in many ways not surprising. Recent research also suggest a wide ontological variety in business network research (Andersen, Medlin, and Törnroos, 2019; Guercini and Medlin, 2020) stemming from different authors' worldview and ontological approaches (e.g., constructivist and realist).

Different types of resource interfaces have been proposed by various researchers, alongside arguments relating to varying extents of directness and strength. *Technical* resource interfaces emerge between products and facilities, *organizational* resource interfaces arise between business units and business relationships (Dubois and Araujo, 2006; Jahre et al., 2006) and *mixed* resource interfaces occur between physical and organizational resources (Jahre et al., 2006). Harrison and Håkansson (2006) propose that finding new ways to create mixed resource interfaces is a source of value identification and creation.

Furthermore, resource interfaces are argued to be both direct and indirect (Jahre et al. 2006) and connected (Dubois and Araujo, 2006). Such indirect or connected interfaces are important because they create imprints (Håkansson and Waluszewski, 2002b). Baraldi et al. (2012b:268) posit that such imprints "*are in the form of pressures to develop certain other features that may be unimportant for a focal interface, but that are necessary for satisfying the technical, social or economic requirements of other resources in order to fit better in a network context.*" In a related line of development, resource interfaces can also be deep/shallow, specific/unspecific and strong/weak (Baraldi and Waluszewski, 2005).

The creation, maintenance and changing of resource interfaces are underpinned by processes of resource combining by actors. Interactive business relationships allow firms to apply a process of "systematic combining" of resources across boundaries (Gadde and Håkansson, 2008). There are two types of resource combining, either (i) related to one specific business

relationship, or (ii) spanning between business relationships. As such, business relationships have a dual role in the combining of resources, because they are both the outcome of previous resource combining, and a resource enabler that *"drives continuing resource combining efforts"* (ibid.34).

3.4. Changing and managing resource combinations

How are resource combinations changed by actors? Notably, tensions are created because resource interfaces are embedded in resource networks (see proposition 4 in Table 2). Håkansson and Waluszewski (2002b:570) argue "*...whenever there is movement of a resource in relation to other resources, there will be friction.*" This is because resource interfaces are the outcome of past investments in stabilising interdependencies over time (Baraldi, Gressetvold and Harrison, 2012a). To discuss the tensions in efforts to alter resources and the related resource interfaces, the concepts of 'heaviness' and 'variety' have been proposed (Baraldi and Bocconcelli, 2001; Håkansson and Waluszewski, 2002b).

Heaviness refers to the strength of a single interface. It is a measure of the difficulty in breaking apart resources because of the investments made in existing interfaces to adapt resources. Such adaptation comes at a cost; actors are required to invest time and money in the process of developing the interfaces. Such investments need to be utilized in the resulting 'heavy resource structure' (Håkansson and Waluszewski, 2002b). The heaviness of a resource structure could lead to resistance to change, and, on a larger scale, result in stability within a network. As in proposition 5 (Table 2), *'interaction intensity influences the effects of a change in a resource.'*

Variety is the term used to refer to the number of different possibilities for recombining resources in new ways. Specifically, Håkansson and Waluszewski (2002b:562) claimed that *"[…] every single resource will have as many features as there are other resources it can be combined with…the possibilities for creating new resources by combining old ones are*

infinite." In other words, resources have an inherent – and wide – range of unknown features (the resource heterogeneity assumption).

In a review of the two concepts, Prenkert et al. (2019) argued that few authors provide explicit definitions. Instead, the definitions are often rather vague, overlapping, or the concepts are 'taken for granted'. Considering the variety in ontological approaches (e.g., realism and constructivism), the differences and inconsistencies is not very surprising as different worldviews impact the way researchers interpret reality. We will return to a discussion of conceptual variation across scholars, papers and ideas, in section 6.

4.0 Resource Integration

In this section we discuss the concept of operant resource, the centrality of the role played by resource integrators, how resource integration required interaction embedded in networks, to the current understandings of resource integration as a process shaped by institutions within service ecosystems. Figure 2 provides an illustration (see also Appendix 2).

Insert Figure 2 about here

4.1 Operant resources as primary

From its inception, resources have been central within SDL. Drawing on prior work (Constantin and Lusch, 1994), SDL advocated two types of resources, *operand* and *operant.* Operand resources were viewed as objects, whereas operant resources (e.g., knowledge and skills) produce effects on the operand resources. The distinction between operand and operant resources separates SDL from a goods-dominant logic (Vargo and Lusch, 2004). The traditional logic assuming a Malthusian view on resources as things or "stuff" (Malthus, 1798)

considers operand resources as primary. In contrast, SDL views operant resources as the fundamental source of competitive advantage (see Foundational Premise 4). Things are neutral until we learn what to do with them (Zimmerman, 1951). Accordingly, Vargo and Lusch (2004:2) argued *"resources are not; they become. ... this change in perspective on resources helps provide a framework for viewing the new dominant logic of marketing."*

4.2 Reconfiguring the terminology

By 2006, the important role of resource integration was recognized (Vargo and Lusch, 2006). All economic entities were argued to be resource integrators. This resulted in a ninth foundational premise (ibid.). However, resource integration required further investigation: *"We have discovered that this idea of resource integration has found almost instant resonance. […] Like most aspects of S-D logic, this resource-integration concept needs refinement and elaboration"* (Lusch and Vargo, 2006:283).

Both networks and interaction were acknowledged as useful to understand how resource integration enabled value co-creation. This is one link between IMP and SDL. In a 2010 special issue, Vargo and Lusch's editorial argued: *"S-D logic…with its service-for-service, resource-integration perspective, represents a shift in thinking away from dyadic notions of production and consumption connected by transactional value delivery, toward the co-creation of value through complex, interactive, resource-integrating networks, especially including those associated with the service beneficiary"* (2010a:167-168).

The recognition of value co-creation situated in networks was SDL's response to critiques about vagueness regarding the role of the network (Lusch and Vargo, 2006). Citing the work of Håkansson and Prenkert (2004), Lusch and Vargo (2006:285) advocate SDL to have a more explicit connection to *"the interactivity and networking."* Later, Mele et al.'s (2010) empirical article analyzed innovation projects as value co-creation process of interaction and resource

integration (see also Gummesson and Mele, 2010). Network interaction between actors became an antecedent to resource integration.

In 2008, Vargo and Lusch (2008:3, our emphasis) posited, *"…all economic **actors** (e.g., individuals, households, firms, nations, etc.) are resource integrators."* Furthermore, in 2011 Vargo and Lusch argued that *"[o]f particular note is the interactive, network orientation introduced by the IMP group (e.g., Håkansson and Snehota, 1995), which began to replace the dyadic perspective. […] Perhaps most directly, similar to the stance we take here, is the emergence of economic-actor-to-economic-actor perspective (e.g. Håkansson and Prenkert, 2004), replacing (at least partially) the producer-consumer perspective"* (Vargo and Lusch, 2011:183). The use of the term *"actors"* is adopted from IMP *"with something less than complete comfort"* (Vargo and Lusch, 2008:9). This is a second link between IMP and SDL. Accordingly, FP9 was changed to *"all social and economic actors are resource integrators"* (ibid.:9). Essentially, it indicates an emphasis on 'resource integrators' rather than 'resource integration', and a shift from organizations to actors.

4.3 From networks to systems with an institutional lens

From 2010 onwards, ideas about resource integration were further developing and the concept of *service ecosystems* was emerging. Vargo and Lusch (2010b:176) outlined: *"[...] service ecosystems emerge and evolve through relationships among service-for-service providing, resource-integrating actors."* The introduction of the service ecosystem context directed the focus away from dyads and networks.

Moreover, resources were no longer limited to being 'market facing'; both private resources (e.g., friendship) and public resources (e.g., health care) were incorporated. This expansion was leaning towards a more complex model. Layers of resource integrating actors and their specific configurations in ecosystems became an emergent topic. By duplicating layer on layer

of resource-integrating actors, the density dimension in resource integration occurs (inspired by Normann, 2001). High density implies the best combination of resources for an actor at a given time (see Figure 3 adopted from Lusch and Vargo, 2014).

Insert Figure 3 about here

Value (sometimes value-in-use) was increasingly assumed as a core concept emphasizing the active role of actors as resource integrators (Lusch and Vargo, 2014). In addition, Edvardsson and colleagues (2014) proposed SDL to adopt institutions as a new lens to explain the resource integrating activities in service ecosystems. Institutions refer to the rules, norms, and beliefs that provide a social context for understanding resource integration (Vargo and Lusch, 2016). Notably, the *value assessment* concept assumes a central role when an institutional perspective to Resource Integration is adopted (Edvardsson, Kleinaltenkamp and Tronvoll, 2014). Hereafter, SDL started to conceptualize Resource Integration relating to institutions with more systemic thinking. This can be viewed as different to IMP (see Vargo and Lusch, 2011).

4.4 Resource integration as a process

Increasingly, Resource Integration emphasizes the process of how actors co-create value (e.g., Kleinaltenkamp et al., 2012; Caridà, Edvardsson and Colurcio, 2019). To explore the institutional context in which resource integration process takes place, Koskela-Huotari and Vargo (2016) introduced a new concept, '*resourceness'.* Specifically, the concept aids understanding of how potential resources become realized resources.

Resourceness was initially defined as *"the quality and realization of potential resources through the process of human appraisal and action which then transforms potential resources into realized resources"* (Lusch and Vargo, 2014:121). Later, Koskela-Huotari and Vargo

(2016) provided a re-interpretation: "*the ability of potential resources to facilitate the accomplishment of something desirable—is determined by the availability of other, complimentary and inhibiting potential resources, including the actors' ability to integrate and apply these resources"* (ibid., 2016:164). This also resulted in a change from considering resources as 'things' that are tangible (operand) and intangible (operant), to viewing resources as *abstractions* that describe the functions that substances or ideas can contribute to the achievement of a desired end (Koskela-Huotari and Vargo, 2016).

Vargo and Lusch's (2017) future-oriented paper encouraged SDL scholars to develop more evidence-based midrange theory on SDL's core concepts, including resource integration. Echoing the call, and using a practice theory approach, Caridà et al. (2019) empirically illustrated resource integration as an embedded process of value co-creation through three practices (matching, resourcing and valuing) and the role of institutions shaping these. In parallel, Peters (2016, 2018) identified two types of resource integration, *homopathic (summative processes)* and *heteropathic (emergent processes)* when applying a critical realist approach. Notably, interaction was perceived as a necessary but not sufficient condition for resource integration processes (Peters, 2016:3000). As a final remark, we acknowledge the existence of different ontological approaches in Resource Integration research, spanning from realist to constructivism (see for example Peters et al., 2014).

5.0 Comparison

In this section we address the second research question; '*what are the key similarities and differences in how resources are conceptualized?*' Table 3 provides a summary using the six themes introduced and discussed in Section 2.

Insert Table 3 about here

5.1 Similarities

First, some of the terms used, e.g. resources and relationships, are the same. This is potentially trivial, but also a possible source of confusion when the same terms are given different conceptual understandings and are underpinned by different assumptions. We reflect further on the differences in the conceptualization of resources specifically in section 5.2 below. More generally, this is an issue of how to communicate research ideas which are often underpinned by different ontologies and depth of analytical precision (Prenkert, Hasche and Linton, 2019; Andersen, Medlin and Törnroos; 2019; Aramo-Immonen et al., 2020). We return to this point in section 6, discussion.

Second, both Resource Interaction and Resource Integration now emphasize the idea of *'resources becoming'* and stress the availability of other resources as the preconditions for this. In Resource Interaction, a single resource gains value by being combined with other resources in network contexts. Within Resource Integration, there are different understandings of the concept of resources over time. Resources were initially seen as tangible and intangible, whereas more recently they have been re-conceptualized as an abstraction (Koskela-Huotari and Vargo, 2016). The implication is that it is through actors integrating (potential) resources in the relevant context that enables potential resources to gain resourceness.

Third, there is a *role for the actor* within both Resource Interaction and Resource Integration (see also Ford, 2011). There are developments over time within Resource Integration regarding who is the actor. Within Resource Interaction there are nuances relating to the status of the actor, for example as a resource within the 4R model or outside of this specific analytical framework. We elaborate further on the status of the actor and what activities/processes actors perform in relation to resources in section 5.2.

That the notions of *value* and *value creation* are intricately connected to resources is a fourth similarity. In Resource Interaction, actors jointly combine resources for the creation of value while in Resource Integration, actors collaboratively integrating resources is an underlying mechanism of value co-creation. With respect to the appraisal of the value of resources, though, there are different views (see section 5.2).

5.2 Differences

First, there are differences in the *processes involved in* '*how resources become'*. Within Resource Interaction, a resource does not exist unless it is combined with other resources via resource interfaces. Within Resource Integration, a recent development is to consider resources as abstractions rather than things. Yet the perspective is from the 'outside': actors act on the resources within a given institutional context. By contrast, within Resource Interaction, the discussion is 'inside' the interaction. This difference is reflected in the pillars underpinning the nature of resources (see table 3).

A second difference is how resources are *classified and analyzed*. We suggest that Resource Integration does not currently analyze resources as such. For example, 'operant' and 'operand' resources are differentiated, but the features of these two resources are not elaborated. Instead, the processes of integrating resources for value creation (e.g., the practices involved) are emphasized. One current focus is on resource integration being shaped by contexts such as service ecosystems and institutions (and vice versa, contexts shaping resource integration).

By contrast, within Resource Interaction there is one tool to classify resources and resource interfaces (the 4R Model). It should be noted, though, that the model is not used in a uniform way.

Third, *how resources can be changed and managed* varies between the approaches. Within Resource Interaction, resources are embedded within a resource structure at the network level.

Over time, features of resources and resource interfaces are developed. In Resource Integration, a potential resource can have a lot of "resourceness", which changes depending on the institutional arrangements (Koskela-Huotari and Vargo, 2016). It can be said the relatively new concept 'resourceness' shares a similar assumption with Resource Interaction – that of resource heterogeneity. However, the two approaches depart in how resource heterogeneity is enacted; the role of the shaping context (Resource Integration) or interactions between resources embedded in network contexts (Resource Interaction).

The ability to manage resources is therefore different; actors can attempt to activate and manage resources within Resource Interaction, but they may meet challenges in changing a resource or resource interface. Any actor might envision a change, but the existing resource structure must be considered before mobilizing efforts are to have any success. Resource Integration has less of a focus on the existing resource structure, but more on the shaping contexts like institutions (Koskela-Huotari and Vargo, 2016). This is possibly due to SDL having a more macro-level focus (Vargo and Lusch, 2017).

How value arises is a fourth difference. Within Resource Interaction, the value of a resource depends on it being combined with other resources. Identifying potential new interfaces and embedding these in the existing resource structure is a key source of value (e.g. Harrison and Håkansson, 2006, Cantù, Corsaro and Snehota, 2012). In Resource Integration, value-in-use is central (although disputed), implying an actor-centric view with value as an outcome of resource integration activities (Lusch and Vargo, 2014). Moreover, Resource Integration specifically points to the importance of value assessment (evaluation), a notion that is less emphasized in Resource Interaction.

Lastly, the *context and empirical settings* of Resource Interaction has varied over time. It encompasses the B2B setting, with initial contexts including innovation and logistics, and more recently, SMEs and start-ups. We argue that although Resource Integration is said to be

relevant in every setting – A2A (Actor-to-Actor; see Vargo and Lusch, 2011) – there are currently relatively very few empirical works (although this is under development). This makes the distinction between the level of analysis and the context of the analysis somewhat problematic.

6.0 Discussion

Section 4 pointed to several links between Resource Interaction and Resource Integration, and section 5 stressed that some ideas and terms are similar. However, such similarities should be treated with caution. Aramo-Immonen et al. (2020) argued how IMP concepts are modified and translated into the norms of the citing disciplines, or recognized by citing disciplines without a deeper appreciation of differences in ontology. The comparison made in section 5 highlights such differences.

We recognize that scholars use alternative lenses when studying various aspects of a phenomena. Leory, Cova and Salle (2013) argue that researchers consecutively zooming in (observing at micro level) and zooming out (observing at macro level). There are risks involved in using both lenses. When zooming in, it is easy to get too close and not be able to make sense of the details. When zooming out on the bigger picture, the researcher risks missing all the nuances and to lose touch with the everyday practices of firms.

As is clear from section 5, Resource Interaction is empirically grounded, and draws on contextual descriptions and empirical generalizations. This is in keeping with the way in which knowledge is developed within IMP (Ford, 2011). The result is an open language system with less of an overarching syntax, and with terminology stemming from many rich empirical studies. As such, Resource Interaction contains a broad range of concepts. Moreover, IMP more broadly offers mid-range theories (Brodie, Saren and Pels, 2011:77), e.g. frameworks such as the ARA Model.

It may be argued that when studies ‘zoom in’, what is created is a plethora of notions discussing essentially the same thing using several different concepts. We can question whether all these concepts are clearly defined (cf. Prenkert, Hasche and Linton, 2019), which can lead to difficulties of suitable theorizing. Put another way, there is a risk of shaping a narrative that is perhaps ‘local’ and potentially inaccessible due to fuzziness.

Resource Integration, on the other hand, is more theoretically-driven with – as yet – fewer empirical examples (Baraldi et al., 2012a, b; Brodie, Löbler and Fehrer, 2019). A grand narrative is suggested by the originators/architects (Vargo and Lusch, 2004, 2008, 2017) with an overarching framework with a centralized language system and syntax, underpinned by foundational premises and axioms.

The inherent risk is to lose touch with the ‘everyday ’revealed from rich empirical studies due to too much ‘zooming out ’(Leroy, Cova and Salle, 2013). As noted by Hunt (1983:12), “[t]*heorists concerned with developing general theories should be alert to the problems involved in empirically testing their theoretical constructions.”* Notably, there are still very few examples of mid-range theories related to Resource Integration and critiques emphasize the lack of applicability to managerial practice (Hietanen, Andéhn, and Bradshaw, 2018). This lack of analytical tools and models can be explained by the relatively young research domain and a strong focus on general theory building.

Moreover, the notion of *time* (cf. Halinen, Medlin and Törnroos, 2012) is an interesting point of departure between the two approaches. Time is an explicitly important dimension in Resource Interaction (Håkansson et al., 2009). Many studies have a longitudinal, dynamic research design to analyze processes of resource interaction over multiple periods. This is in keeping with foundational IMP ideas of relationships underpinned by sequences of interaction episodes.

In Resource Integration, there is a more outcome-oriented focus, in the form of value. Leroy et al. (2012) question the lack of a long-term temporal dimension in SDL and that SDL has not utilized research knowledge from neighboring research disciplines. In particular, Leroy et al. (2012:69) state that *"[t]he common umbrella offered by the value co-creation concept does not explicitly take into account the long term dimension included in the notions of relationships and networks as a BtoB process… It seems more appropriate to explain short term interactions typical of service activities i.e. "service encounters" and "consumption experiences", focused on particular episodes."*

It is somewhat ambiguous as to whether value is an as outcome of, or a part of, the resource integration process. However, the idea of value as an outcome of resource integration appears to be dominant, especially in earlier SDL works. In sum, Resource Interaction emphasizes empirical findings with processual focus, and Resource Integration general theories with an outcome focus. Resource Interaction tends to zoom in (to the empirical world) while Resource Integration zooms out (to the abstract world).

Lastly, on an ontological level, the differences we observe today between the two approaches appear to be smaller than 10 years ago. Now there seems to be a relativistic ontological assumption within the SDL tradition, although different ontological/epistemological perspectives co-exist (Pohlman and Kaartemo, 2017). This ontological position studies dynamic and complex interactions and typically regards time as an important factor as activities and interaction are formed in processes over time; it is hence more similar to Resource Interaction. The relativistic ontology tries to denote diversity and complexity in different phenomena during a specific period.

This ontology has been rooted in IMP for a long time, while it is historically more difficult to trace within SDL. Our study also indicates (see section 4) SDL's turn to add institutions as a new lens to explain the mutual shaping of resource integrating activities and contexts somehow

leads the stream to embrace social constructionism. However, it is not well explained how this turn sits with efforts to develop a positivist theory (Hietanen et al, 2017; Vargo and Lusch, 2016), which could result in confusion for readers.

7.0 Conclusions

In sum, the paper has provided a state-of-the-art comparison of the conceptualization of resources within Resource Interaction and Resource Integration. In so doing, it has heeded the call for theoretical development of Resource Interaction (e.g. Peters et al., 2014). The comparison is timely as both approaches involves a growing interest in the roles of resources in a business context, and the extant comparisons of IMP and SDL ideas (Ford, 2011 and Baraldi, Gressetvold and Harrison, 2012a, b) are out of date. Now we return to the three research questions articulated at the outset of the paper in order to conclude.

The first research question problematized *how resources are conceptualized.* Sections 3 and 4 outlined the conceptualization journeys. The sections identify key concepts and trace important theoretical developments. Further, the conceptualization of resources in Resource Integration and Resource Interaction is systemic (resources are dispersed) and malleable (resources are not given functions a priori) in its very nature, hence emphasizing the need for interorganizational coordination.

The second research question, focusing on *the key similarities and differences in how resources are conceptualized* is addressed in section 5. As we emphasized in Section 6, the similarities observed need to be treated with caution as the same term may be interpreted and used differently. Moreover, and again with reference to Section 6, ‘open language ’is a key characteristic of Resource Interaction, while Resource Integration has a more deterministic syntax (axioms, foundational premises etc.). In addition, while Resource Interaction studies

tend to zoom in to the empirical world, Resource Integration scholars zoom out to the abstract world.

Research question three has the objective of outlining some further directions for Resource Interaction. Here we address three key themes: conceptual refinement, value generation and an overarching framework.

In terms of conceptual refinement, the open language system and extensive empirical research within Resource Interaction encompasses a wide range of concepts. This can result in issues regarding the clarity of conceptual definitions, and the relatedness and coherence between concepts, which makes ‘going the last analytical mile ’somewhat problematic.

One result is unnecessary complications when communicating the contributions of Resource Interaction research with other neighboring research disciplines. In terms of ‘efforts to formalize and refining the existing concepts’, it could be that Resource Interaction research needs to be developed in a more ‘guided ’way. In line with the arguments of Waluszewski et al. (2019), we suggest that the research enters a phase underpinned by conceptual refinement and definition, or a shift from empirical to conceptual understandings.

Scholars interested in Resource Interaction arguably need to use the existing concepts in a more systematic way, describing in more detail how concepts are defined and how concepts are related to each other. For example, ‘finding the inconsistencies in definitions’ is one way to further develop the language of Resource Interaction, and to make it easier to communicate to a wider audience.

The second theme we suggest regards *value generation*. Both approaches argue that value is created by actors combining resources (Harrison and Håkansson, 2006, Cantù, Corsaro and Snehota, 2012; Lusch and Vargo, 2014). Yet although it is commonly understood that the generation of value is central for actors in the business landscape, the notion of value and the mechanisms for value generation are seldomly explicitly discussed in detail within IMP and in

relation to Resource Interaction. Further developing the notion of value generation from the combining of resources in an interorganizational context would be timely. For example, emphasis on the dynamics of resource interaction over time could add to the understanding of how value is co-created and assessed in a multi-actor context subject to change. Hence, for an interorganizational context – a context that often is seen as a challenge for research on value generation (e.g., Kowalkowski et al., 2012; La Rocca and Snehota, 2014) – IMP and the Resource Interaction approach may provide opportunities for development.

The third theme relates to considering a *Resource Interaction framework* to give young scholars guidance as well as clarifying existing research. Based on the comparison in this study, we suggest that a future 'Resource Interaction framework 'should concentrate on zooming out – partly learning from Resource Integration - in order to shape a more generally valid base of knowledge. Of course, here we acknowledge the long history of substantial empirical studies. However, we believe Resource Interaction would theoretically benefit from a future research direction encompassing more generally oriented claims. We noted earlier in the paper that IMP in general has had limited success in leaving imprints on adjacent fields (Aramo-Immonen et al., 2020). However, by zooming out and sharpening the contours of Resource Interaction, a greater impact could be possible.

Finally, we return to Table 3, the comparison of the conceptualization journeys, built from 6 key themes. The sixth theme, 'empirical settings; 'is where IMP generally and therefore also Resource Interaction typically takes as the starting point as an empirically derived knowledge base. Further development of central concepts, refinement of the 4R model and perhaps the elaboration of new models, the role for actors, and the effects of resource interaction – including value generation – can be inspired by contemporary business contexts. For example, how resource interaction is impacted by external shocks, such as Covid-19, which might also result in the lifting of current regulatory barriers to collaborative innovation, or other perhaps

less dramatic examples of changes impacting business networks, e.g as roles change as new business models and platforms develop.

Contemporary ways of organizing business and collaboration can provide interesting challenges to how to understand resource interaction. For example, when a combination of resources becomes a platform technology within a network, which might underpin an actor changing their network role, or how resource interfaces are changed by designing circular economy business models. This is also arguably the best place to discover and develop what is *not* currently there in our understanding of resource interaction, and it is in keeping with the way of generating new ideas and frameworks within IMP.

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Table 1: The 55 publications

Resource Interaction (IMP)				
Prior to 2001	**2001-2005**	**2006-2010**	**2011-2015**	**2016 to date**
Håkansson, 1982	Baraldi & Bocconcelli, 2001	Dubois & Araujo, 2006	Baraldi, Gressetvold & Harrison, 2012a	Shih & Linné, 2016
Håkansson, 1987	Wedin, 2001	Jahre et al., 2006	Baraldi, Gressetvold & Harrison, 2012b	Landqvist & Lind, 2019
Snehota, 1990	Holmen, 2001	Harrison & Håkansson, 2006	Cantù et al., 2012	Bocconcelli, Murmura & Pagano, 2018
Håkansson 1993	Håkansson & Waluszewski, 2002a	Baraldi & Strömsten, 2006	Holmen & Pedersen, 2012	Prenkert, Hasche & Linton, 2019
Håkansson, 1994	Håkansson & Waluszewski, 2002b	Lind, 2006	Gadde et al., 2012	
Håkansson & Snehota, 1995	Baraldi, 2003	Håkansson & Waluszewski, 2007	Crespin-Mazet et al., 2014	
Ford et al., 1998	Forbord, 2003	Gadde & Håkansson, 2008	Lind, 2015	
	Gressetvold, 2004	Håkansson et al., 2009		
	Baraldi & Waluszewski, 2005	Ingemansson, 2010		
Resource Integration (SDL)				
Prior to 2001	**2001-2005**	**2006-2010**	**2011-2015**	**2016 to date**
Constantin & Lusch, 1994	Vargo & Lusch, 2004	Vargo & Lusch, 2006	Vargo & Lusch, 2011	Vargo & Lusch, 2016
		Lusch & Vargo, 2006	Kleinaltenkamp et al., 2012	Koskela-Huotari & Vargo, 2016
		Vargo & Lusch, 2008	Peters et al., 2014	Peters, 2016
		Vargo & Lusch, 2010	Lusch & Vargo, 2014	Vargo & Lusch, 2017
		Gummesson & Mele, 2010	Edvardsson et al., 2014	Peters, 2018
		Mele, Russo Spena & Colurcio, 2010		Caridà, Edvardsson & Colurcio, 2019

Figure 1: A conceptual timeline of Resource Interaction

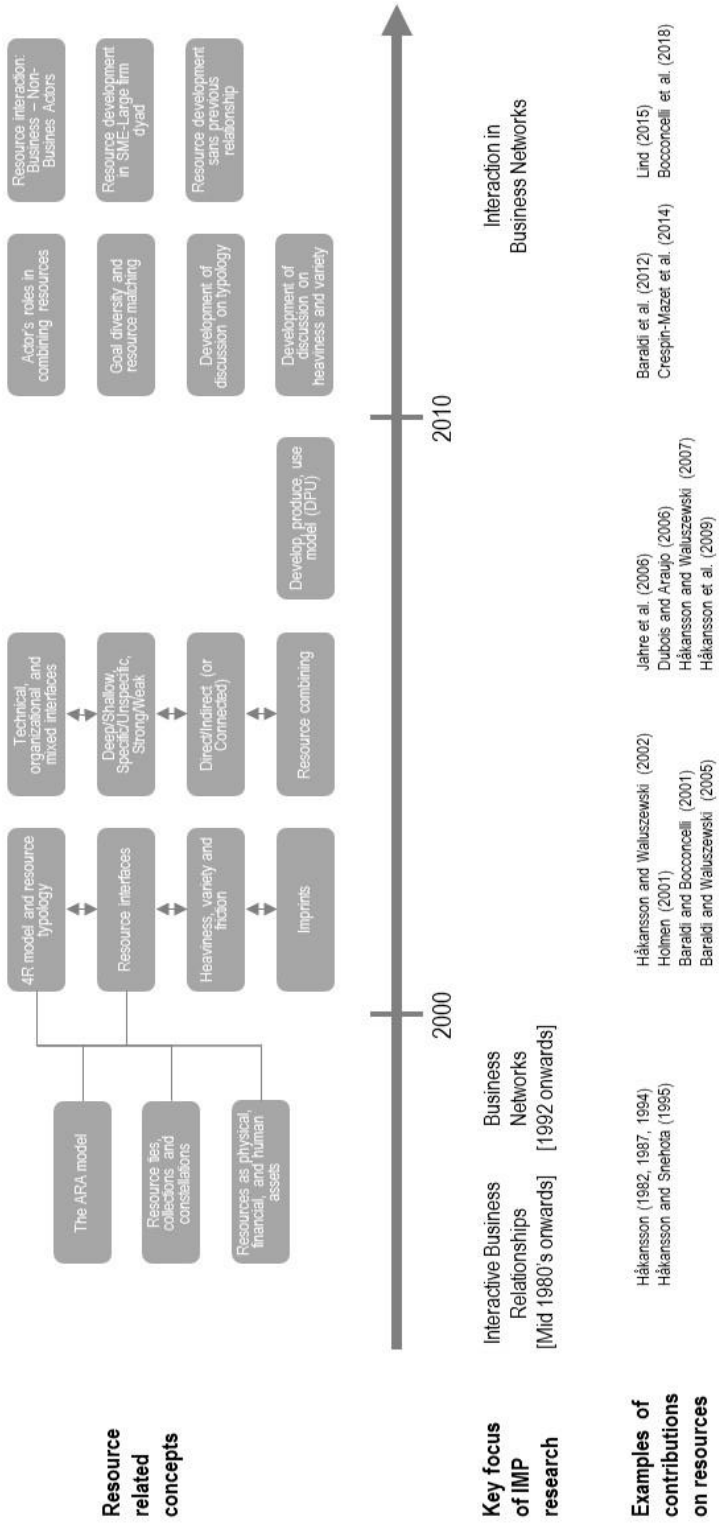

Table 2: Assumptions within Resource Interaction

Core assumptions	Propositions
1. Resources are 'double-faced' (within activities between 2 or more actors)	1. The value of a resource is dependent on its connections to other resources
2. Resources exist in networked contexts	2. A resource changes and develops characteristics over time
3. Resource heterogeneity	3. A resource is embedded in a multidimensional context
4. Resources are open and variable objects	4. All changes of a resource create tensions
	5. Interaction intensity influences the effects of a change in a resource
	6. Interaction breadth influences the number of resources that are affected by a resource change

Figure 2: A conceptual timeline of Resource Integration

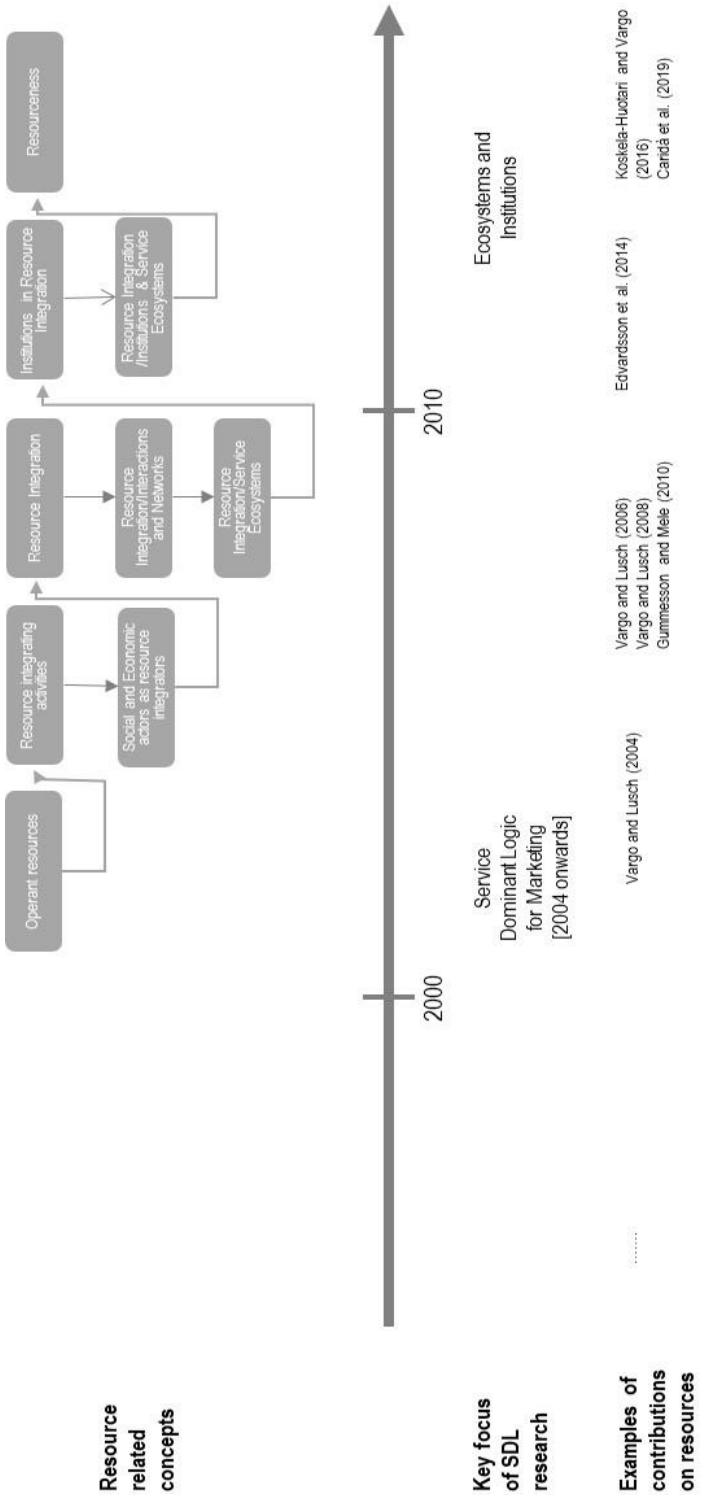

Figure 3: The Density Dimension within Resource Integration

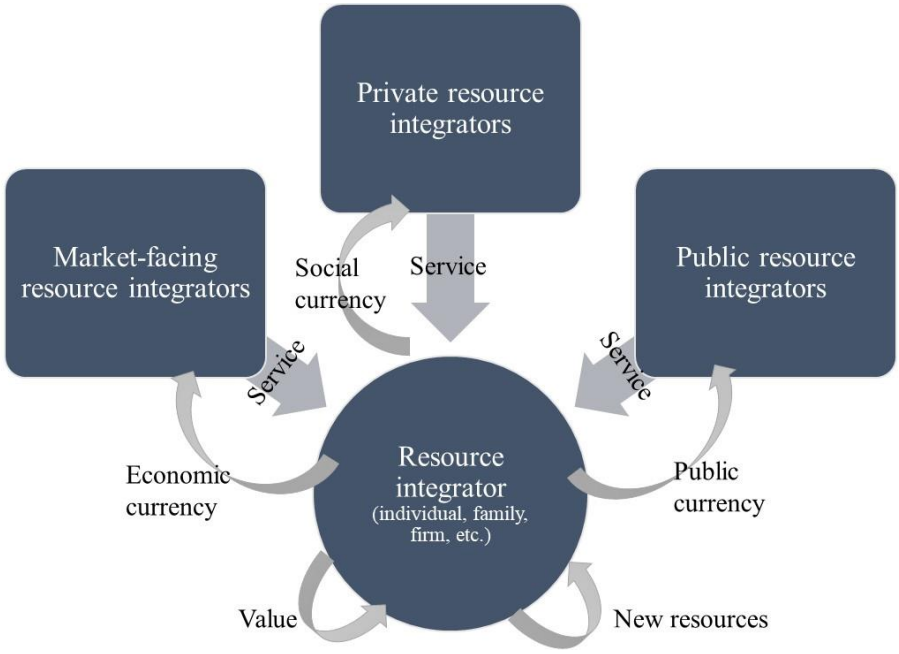

Table 3: A comparison of the conceptualization journeys

Theme	Resource Interaction (IMP)	Resource Integration (SDL)
Pillars	• Resources exist in interaction, when combined with other resources • Heterogeneity & embeddedness (see table 2 for complete list of assumptions and propositions) • Resources have interfaces (technical, organizational, mixed) • Both physical and social resources contain a knowledge dimension, as do the interfaces between them	• Resources exist as objects (prior to 2016) • Resources are abstractions (since 2016) and 'becoming' in service ecosystem and institutional contexts
Main concepts	• Interaction, 4R model, resource interfaces, resource combining, heaviness & variety, relationships, business networks	• Operand & operant resources, value in use, resource integration, service ecosystems, institutions, resourceness, actors as resource integrators, relationships
Classification and analysis of resources	• Early classified as physical, financial and human resources. • The 4R model - Products, facilities, business units and business relationships • Resources are connected through resource interfaces	• Operand and operant • Internal/external resources • Resource integration is analyzed through actors' integrating activities in the institutional and service ecosystem context
Role for actors	• Actors have a role in the collective creation of resource combinations • A resource's embeddedness in a resource structure means that efforts to change depend on variety and heaviness	• All social and economic actors are resource integrators (See Foundational Premise number 9 and Axiom 3) Contexts (e.g., institutional context) shaping what and how resources are connected • The assessed value always informs the integration of resources
Effects of resource interaction/integration	• Value is created through the combining of resources over time • Through interaction, the resource interfaces can be added and/or changed • Resources gain features via interaction with other resources	• Value (at a certain point of time) • Co-created value is phenomenologically experienced when the actors integrate their resources
Empirical settings	• B2B context, e.g. innovation, solutions, logistics, accounting, start-ups, etc.	• Service Marketing • A2A • Service for service

Appendix 1

IMP and Resource Interaction: Development of concepts regarding resource interaction.

Pre 2001	2001-2005	2006-2010	2011-2015	2016-2018
Interaction model – resources only have value in interaction with other resources ARA model • Resource collections, resource constellations, resource ties, resource networks • Resources exist in networked contexts Resource heterogeneity	4R model to classify and analyse resources Modelling resource interaction Resource interfaces & resource combinations	Types of resource interfaces Dimensions of resource interfaces DPU (Developing-Producing-Using) model of 3 network settings	The role of the actor in resource combining	The role of the actor in resource combining Expansion into different empirical contexts, e.g. SMEs, start-ups, etc.
Håkansson (1982, 1987, 1994) Håkansson & Snehota, (1995)	Holmen (2001) Baraldi and Bocconcelli (2001) Håkansson and Waluszewski (2002) Baraldi and Waluszewski (2005)	Jahre et al. (2006) Dubois and Araujo (2006) Håkansson and Waluszewski (2007) Håkansson et al. (2009)	Cantù et al. (2012) Crespin-Mazet et al. (2014)	Shih and Linné (2016) Landqvist and Lind (2019) Bocconcelli et al. (2018)

Appendix 2

SDL and Resource Integration: Development of concepts regarding resource integration.

Pre 2001	2001-2005	2006-2010	2011-2015	2016-2018
Operant resources, operand resources	Operant resources & service logic	Economic actors as resource integrators S-D Logic and resource integration perspective Service ecosystems and resource-integrating networks	Resource Integration & Service Ecosystems Institutional logics in Resource Integration	Institutions & Resource Integration Resourceness (process of resources "becoming," using an institutional perspective) Deepening Resource Integration as a process • Homopathic (summative processes), Heteropathic (emergent processes) • Matching, Resourcing, Valuing
Constantin & Lusch (1994)	Vargo & Lusch (2004)	Vargo & Lusch (2006, 2008, 2010) Gummesson & Mele (2010)	Kleinaltenkamp et al. (2012) Peters et al. (2014) Lusch & Vargo (2014) Edvardsson et al. (2014)	Koskela-Huotari & Vargo (2016) Peters (2016) Vargo & Lusch (2017) Caridà, Edvardsson & Colurcio (2019)