Measuring Service individuality in Third Party

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ABSTRACT

Purpose - 3PL services are more or less individually designed bundles of logistics operations that are provided on the basis of a long term relationship between logistics service providers and their clients mostly in industry and retail. The appropriate degree of the individuality is however subject to a trade-off between the creation of complexity to reflect individual customer needs and the realization of synergy effects by the replication of common elements and the multiplied utilization of relevant resources for different customers. The appropriate mix of the more individual elements and the more common elements is seen as a major success factor for the design of the service propositions.

Design/methodology/approach - The explorative paper is combining major elements and frameworks from different interdisciplinary research streams, such as modularity and service design and adapts them to the subject of third party logistics.

Findings - As a major result the paper is providing a conceptual model for the systematic and formal description of modularity and individuality in the configuration of third party logistics services. The model thus serves as a tool to classify and categorize degrees of complexity that are embedded in TPL settings.

Research limitations/implications (if applicable) - As our research is still in the exploratory stage, we do not offer empirical findings.

Practical implications - Our findings can help firms to better understand the critical factors in their current TPL service offerings and how to replicate or (re)design the new services offered. Depending on the level of complexity of the TPL services, firms need also to consider the implications of the replication and/or (re)design on the configuration of the supply chain, especially downstream.

Originality/value - The paper crosses disciplinary boundaries and combines relevant research streams to provide a sound foundation for the categorization and classification of TPL services and for new service design/development (NSD) and supply chain configuration.

Keywords: Third Party Logistics, Individualization, Modularity, Service, Classification.

1 THIRD PARTY LOGISTICS 3PL AND SERVICE INDIVIDUALITY

Third party logistics (3PL) still appears as one of the most interesting market segments for service providers in the logistics industry. It promises better margins and higher future potential than the classic market segments. However this comes at a price, as it also requires different competencies and resources that in particular reflect a specific need towards more customized solutions (e.g. Prockl et al., 2012; Soinio et al. 2012; Halldorsson and Skjøtt-Larsen, 2004, Hertz and Alfredsson, 2003). The appropriate degree of such a customization is also subject to a trade-off between the creation of complexity to better reflect individual customer needs and the realization of synergy effects by the replication of common elements and the multiplied utilization of relevant resources for different customers.

The appropriate mix of the more individual elements and the more common elements may thus be seen as a major success factor for the design of competitive service propositions. The major purpose of this paper is to reflect on approaches that pave the path for a more formalized discussion of these issues by asking: 1) How can we measure individuality of the services in 3PL, and 2) How can we provide more actively a basis for the configuration of an adequate degree of individuality?

This paper thus puts the focus more on the formal aspect of measuring and conceptualizing the degree of individuality for a 3PL provider. We investigate this through the lenses of modularity and mass customization concepts. This is seen as a basic contribution to better understand, analyse and potentially manage such businesses.

The remainder of this paper is organized as follows. Chapter 2 discusses the research object, 3PL, and sets it in contrast to classic forms of logistics services. We particularly focus on the discussion of a required higher degree of individualization tailored to the customer. On this basis we also reflect in more detail on different types of 3PL services within the industry which are differentiated with respect to the degree of customization and the degree of standardization.

In chapter 3 we focus on the more formal approaches towards the measurement of individuality, in general but in particular for services. Management activities needed for the realization of individuality of services also entails customization. By further referring to the concept of customization from the more industrial world of production, we introduce approaches from modularity literature to the interpretation and measurement of services. Chapter 4 deals with the conceptualization of modularity measures and its application to 3PL services. Finally, chapter 5 summarizes the ideas and concludes with discussing potential applications of the approach for future research.

Methodologically we start with existing work from the relevant literature to characterize the research object of 3PL and to emphasize and contrast different types of 3PL services with respect to their respective need for individuality. We then translate the more qualitative description of these different types of 3PL services into the formalized model of service architecture modularity and in particular the service modularity function SMF introduced by Voss and Hsuan (2009).

Currently, our work is at the conceptual stage but it builds the necessary basis for the empirical measurement and in consequence the comparison of existing 3PL services with respect to their degree of individuality.

2 THIRD PARTY LOGISTICS SERVICES 3PL - A COUNTER APPROACH TO COMMODITIZATION IN LOGISTICS

2.1 3PL in contrast to classic Logistics Services

3PL services have developed over years, and as a consequence there are many blurred definitions and terms, such as “logistics outsourcing”, “logistics alliance”, “contract logistics”, which are frequently used as synonyms to describe the basic idea behind 3PL: to outsource single logistics activities up to complete logistics functions that were previously performed in-house by industry or retailers to service providers (Cui et al., 2009; Marasco, 2008). Additionally, comparing American and European sources of literature, there seems to be different understanding regarding the scope of such services. While the American view provides rather broad definitions of the 3PL industry which also includes freight forwarders and shipping lines (Rao and Young, 1994), the European view tends to be more restrictive (Klaus et al., 2009).

Although the 3PL terminology overlaps and different definitions emphasize different aspects of the approach (Marasco, 2008; Selviaridis and Spring, 2007), there are some common key characteristics that may build together an outline and explication of the concept. Prockl et al. (2012) summarize three key characteristics of 3PL Services in comparison to classic logistics services: the complexity of the service bundle, the contract base of the service relationship, and the duration and volume of the services which require a more specific form of relationship. These three dimensions are also of central relevance for this paper and therefore outlined in more detail.

More individual service bundles instead of logistics commodities

The first characteristic dimension refers to the scope of the services which are offered by the logistics service providers. Classic logistics service providers typically offer elementary logistics activities such as either transport or transshipment or warehousing which are primarily general offerings on the market and purchased by the customers based on price (Andersson and Norrman, 2002). These services very much reflect the properties of a commodity service of more or less standardized routine services which may be bought from many potential suppliers. As a consequence there is frequently a fierce cut-throat competition among the service providers in these logistics market segments. In contrast, combining such separated service commodities into service bundles, which are then more or less individually designed and customized to the demand of the contractor broadens the scope of services offered (Leahy et al., 1995; Sink et al., 1996; Laarhoven et al., 2000; Andersson and Norrman, 2002; Halldorsson and Skjøtt-Larsen, 2004; Prockl et al. 2012). Additional value added services and IT services further supplement the bundles and help, on the one hand, to better match the individual needs of the customer (see e.g. Soino et al., 2011; Van Hoek, 2000). On the other hand the more advanced the service packages get, the less they reflect the properties of a commodity service. Because of the customized combination the bundles become more heterogeneous and individualized and thus less vulnerable for quick replication by other service providers.

Contract based instead of transaction based relationship

In the daily business practice, the above mentioned commodity services from the classic logistics service providers are frequently bought many times from the same service provider. Despite such repetitive patterns the service however rests on the single transaction and not

constituting per se an enduring relationship between client and provider. In case of better prices, quality issues or any other reasons, the next transaction may be bought from another provider without any real restriction to such a change.

In contrast 3PL services are based on a contract that binds both parties for a period of time together (Murphy and Poist, 1998). Typical contracts run for about two to three years and the emphasis on a contract base also explains the synonymously used term contract logistics (Boyson et al., 1999; Bask, 2001; Andersson and Norrman, 2002; Halldorsson and Skjøtt-Larsen, 2004; Knemeyer and Murphy, 2005; Bolumole 2003; Klaus, 2009; Gadde and Hulthen, 2009). From the transaction cost economics perspective, the business relationships of 3PL or in this context better contract logistics services no longer reflect the pure market relationship of the classic services but are more hybrid forms between make and buy (Williamson, 2008).

Duration of relationship and volume implies the development of competences

Halldorsson and Skjøtt-Larsen (2004) discuss the characteristic of a closer relationship in 3PL services compared to classical services from a resource and competence perspective. They divide into four different types of relationships where type 2 and type 3 mostly reflect the basic understanding of 3PL services (see figure 1 dotted line).

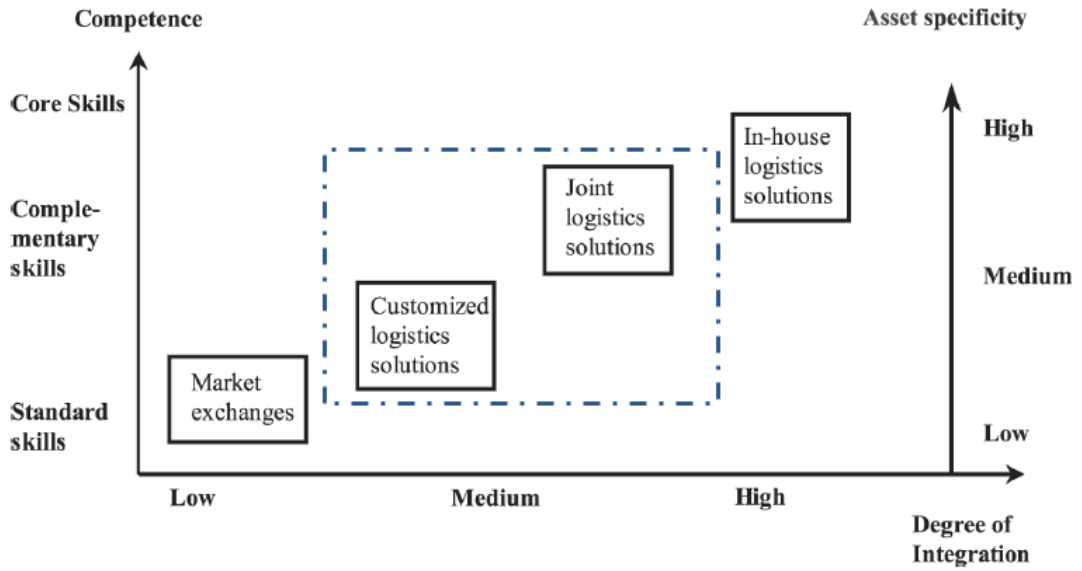

Figure 1: TPL in a competence perspective – Adapted from Halldorsson, Skjøtt-Larsen (2004)

According to this is it essential for 3PL providers to innovate in competencies which are complementary to the shipper's core competencies as well as to increase asset specifity as a means to integrate with the clients' systems (Halldorsson and Skjøtt-Larsen, 2004). A significant business volume and the duration of the contract are basic conditions to allow for the required investments on both sides but in particular on the side of the service provider. The empirical practice often shows a mentality of short contract spans and tendering out of the contracts to put price pressure on the service provider. This may be seen as a restriction to competence development and required investments into the relationship. Especially small 3PL providers may be confronted with high investment risks that do not always match well with the time horizon of the contracts (Soinio et al., 2012). Nevertheless 3PL is characterized by

more interdependency and integration of the service provider and the client than the classic logistics service relationship.

In conclusion: Individuality as a key to position oneself in a commodity market

Concluding from the above discussion of the different characteristic dimensions we basically follow the view of Hertz and Alfredson (2003) that 3PL services reflect the need for a higher ability of problem solving capability and higher ability of customer adaption than classical services.

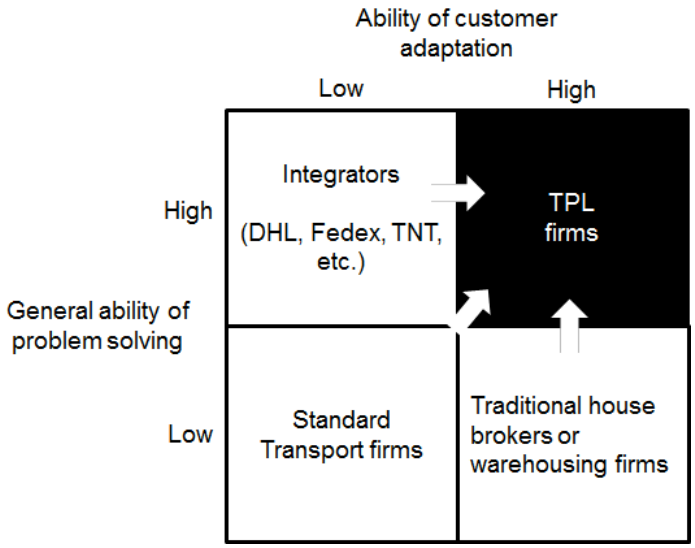

Figure 2: Positioning of 3PL – Adapted from Hertz and Alfredson (2003)

Balancing between adaptation and general ability for problem solving the service providers of 3PL services may thus position themselves in a market segment that is less commoditized than the classic market segments and thus provides better opportunity for sound margins and enduring business relationships based on differentiation from the competitors.

2.2 Contrasting different forms of 3PL Services

In the preceding section we have separated 3PL services from classic logistics services and discussed them in particular with respect to the required higher degree of individuality of the services. As indicated already by the different facets and terms regarding 3PL there are also different forms within that specific market segment that are found in literature and practice. With reference to the figure 2 we thus want to distinguish now also within the black quadrant and briefly discuss different positions within the narrower segment of 3PL services.

Different proposals for this may be found in literature. For example the distinction in 3PL and 4PL service, basically developed by consultants, uses in particular the ownership of the physical logistics assets and the service providers role as intermediary as a distinction criterion (Fulconi et al., 2006). Win (2008) defines a 4PL as “non asset based integrator of a client’s supply and demand chains.” The term 4PL thus emphasizes the specific task of designing and organising individual customer solutions of this form of service in contrast then to 3PL services that are seen as more physical asset based. The term is however also criticized for being fuzzy (Win, 2008) and not distinct enough, e.g. when compared to related forms such as the Lead Logistics provider (Prockl et al., 2010).

As shown, Halldorsson and Skjøtt-Larsen (2004), based on the required competencies, distinguish between asset specifity and the degree of integration in customized solutions and

joint solutions. Hertz and Alfredsson (2003) classify four different positions by using the same dimensions which they used for distinguishing 3PL from classic service: (1) “Standard TPL provider” that offers relatively simple combinations based on a highly standardized modular system; (2) “Service developer” which uses a more advanced system of a large variety of services but a common IT-System for all customers; (3) “Customer adapter” which applies dedicated solutions involving the basic services for each customer, and (4) “Customer developer” which develops advanced customer solutions for each customer. Other forms are discussed and compared by Fabbe-Costes et al. (2008) who use the range of service activities, the associated resources and capabilities, relation to the client as description criteria for summarizing different approaches and designated roles of service providers. Berglund et al. (1999) identifies three waves of entrants into the 3PL market: asset-based (i.e. the traditional logistics service providers), network players (i.e. mainly parcel and express companies), and skilled based (i.e. companies with competence in IT, consultancy or financial skills).

Prockl et al. (2012) put, in essence, similar dimensions into the context of a more general service theory and organization theory. From this point of view they understand the basic approach for a value proposition toward the customer, the fulfillment architecture - split into network competences and relationship with the customer – and the basic revenue mechanism as single elements which together systematically build comprehensive business model configurations for 3PL services. Following the basic ideas of the configuration theory (Miller and Friesen, 1980) they thus emphasize the required internal fit of these single elements and identify four generic forms of 3PL business models. They focus in their paper on two of the four forms which are also of particular interest for this paper: the service factory vs. the service theatre (see table 1).

Table 1: Service Factory vs. Service Theatre – Summarizing Prockl et al. 2012

Business model element	Service Factory	Service Theatre (Lernstatt)
Basic approach for a Value Proposition	“One stop shopping” Unburden the client from logistics complexity	Development of more complex individual solutions for the client system
Fulfilment architecture – Network competence	Network competence as build up and mobilization of efficient operational networks	Network competence as setup and further development of working relationships
Fulfilment architecture – Relationship to customer	Relationship characterized by clearly defined interfaces between provider and client	More dynamic relationship with closer, reciprocal linkages
Basis for a revenue mechanism	Price (cost) advantage caused by synergies and utilization of the own core business	Participation in the development of the relationship between client and service provider

The first generic type, the 3PL service factory, reflects the origins of 3PL - that of logistics outsourcing. The basic value proposition towards the customer is searched in this service form in more efficient and effective processes of the service provider and the relief of the customer from the complexity of such, from the customer’s viewpoint, non-core competencies.

In line with the characteristic given in chapter 2 the logistics activities are combined to more or less individual service bundles. The single activities remain however as much standardized as possible. An even more important difference is the location of the service fulfilment. The relevant shares of the services of this business model are fulfilled within the systems and the

processes of the service provider. Referencing the customer contact theory (Chase, 1981; Schmenner, 2004), Prockl et al. (2012) call this a back-end orientation. The typical service factory thus follows the basic ideas of service industrialization (Levitt, 1976) of standardized, routinized service systems with rather limited customer interaction. The typical basis for the business success is seen in volumes and thus economies of scale which are realized by better utilization of resources due to homogenously filled and thus efficient networks.

In contrast to the factory model is the theatre (or "Lernstatt") model characterized by more customized services that happen to a significant degree within the systems and the environment of the customer. Accordingly this reflects a front-end orientation (Prockl et al., 2012). Different to the factories "having competence", i.e. the availability of physical resources such as logistics networks, international depots etc. this model depends more on "doing competencies" which are knowledge based. The solutions typically address more complex logistics operations and value added services solutions and aimed at the client's processes, hence less prone to commoditization. Due to the operation within the client's system the relationship by nature is closer, more interlinked and integrated as in the factory approach.

Although we have discussed the service factory and the service theatre as distinct models, this hard separation does not completely hold in practice. In principle one or the other will better reflect the basic strategic positioning of the single company, and the distinction is thus seen as an important contribution to provide orientation to the management of 3PL service providers. We further suppose that the choice of the appropriate business model is also subject to the basic disposition of the respective company in terms of ownership structure, size or history. Small or medium sized companies are less likely to be a successful player in factory segment that is very much based on scale effects and thus network size and volume.

Similar to the concepts of the push/pull boundary, reflecting the customer-penetration point and the degree of customization (Olhager, 2003) in the producing industry we understand the two forms as archetypes that are not always applied in their extreme and pure form in real life. 3PL providers typically serve different customers in many different contract logistics projects and it is not likely hereby that one size fits all. For example global 3PL players that resemble a service factory may also have single projects that are more affine to the individual service theatre business model. Likewise companies that engage in the more individualized segment are forced to keep costs and prices low for their customers. This means that they have to realize economies of scale to reach their margins. The appropriate degree of individuality is therefore seen, for both forms, as a matter of degree which is subject to trade-offs between sound value and cost.

To be clear, this does not mean to position oneself in a continuum between factory and theatre. It means instead to create hybrid forms which include on a lower level, e.g. for a specific project and related business context, the right combination of elements that are standardized with elements that are individualized. Such active management of individuality also requires an operationalization and measurement of the degree of individuality.

3 MANAGING INDIVIDUALITY OF SERVICES

3.1 Measuring approaches for Individuality of Service

After discussing the subject of 3PL services the next issue guides us toward potential approaches for a better management of individuality in service setups. Following the old notion of management and measurement it appears appropriate to first reflect on potential approaches to operationalize and measure the degree of individuality of services. A sound description and operationalization of the degree of individuality provides better opportunities for defining distinct strategies and optimization approach which may support decision makers. Beyond the management aspect we see the formalization of the degree of individuality also as relevant for identifying and contrasting the above mentioned business models and additional research at an academic level.

The measurement of individuality has been developed in different disciplines. Minulescu and Kleinaltenkamp (2012) present an extremely useful overview of related measurement approaches in different disciplines and transform the results to the general field of service management. Reference objects for the measurement of customization are the marketing mix, product structures or services. From the fields of production and operations research they refer, for instance, to the product-process matrix (Hayes and Wheelwright, 1979) and the relationship between product individualization and the appropriate production processes (Safizadeh et al., 1996). Vickery et al. (1999) investigate the link between product individualization and organisational structures. Hedge et al. (2005) put individualization into the context of quality. Other approaches are rooted in marketing or service management (Minulescu and Kleinaltenkamp, 2012). Common for all of them is the application of a single-item measurement approach (Minulescu and Kleinaltenkamp, 2012).

Continuing from their critique on single-item approaches, Minulescu and Kleinaltenkamp (2012) propose instead a generalized multi-item approach that understands customization as a second order construct which is constructed by three 1st order dimensions (see figure 3).

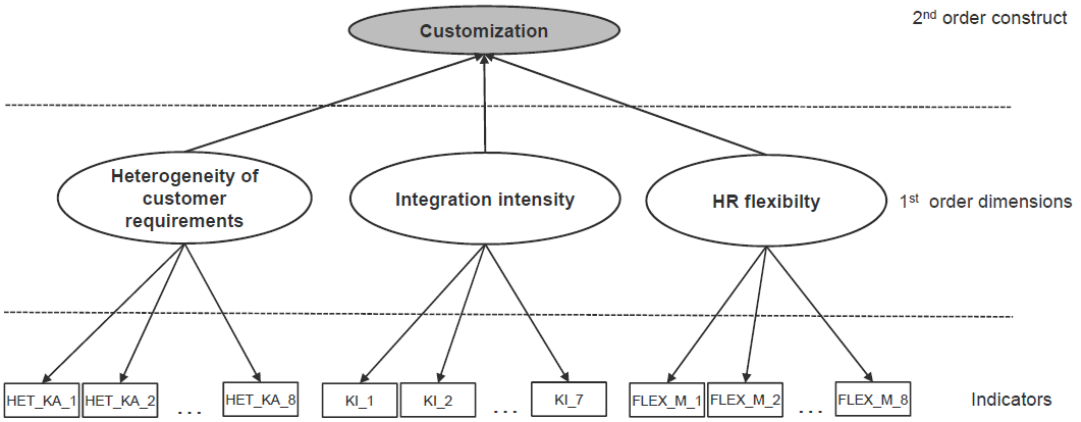

Figure 3: Measurement model of Minulescu and Kleinaltenkamp (2012)

These three dimensions are of special interest for this paper on individuality of 3PL services. Firstly they reflect rather well the above explicated characteristics of the 3PL services. Heterogeneity refers to the more individualized service bundles. Integration intensity reflects the required relationship and HR flexibility may stand for the required development of more individual competencies. Secondly they also reflect the different views on the proposed business model approaches. Heterogeneity of customer requirements targets the external

demand side, i.e. the value proposition towards the customer, while the other two dimensions reflect more the internal architecture, i.e. the capability of the service provider. In the next section, we link the 3PL business model approaches to the modularity and mass customization literature as the foundation for the measurement development.

3.2 Configuration of Individuality - Modularization and Mass Customization

Customization is the active action to realize individuality either in products or services. Customization of products has been successfully implemented by applying platform and modularization strategies. Volkswagen, for instance, produces Skoda Octavia, Seat Leon, VW Golf, Audi A3, and Audi TT from a common platform (Muffatto and Roveda, 2000). Product platform is (Meyer and Lehnerd, 1997) "a set of subsystems and interfaces that form a common structure from which a stream of derivative products can be efficiently developed and produced." It encompasses the design and components shared by a set of products. A robust platform is the heart of a successful product family, serving as the foundation for a series of closely related products (Meyer and Utterback, 1993). Platforms enable the integration of the core technologies and processes in order to provide product variety and customization required by the customers. How platform is planned and configured, in terms of technology composition contained in the subsystems and respective interfaces linking these subsystems, has significant impact on tradeoffs between the degree of standardization and customization offered to the customers.

The process of standardization is referred to as modularization. Modularization permits components to be produced separately and used interchangeably in different product configurations without compromising system integrity (Schilling, 2000). It intentionally creates a high degree of independence between component designs by standardizing component interface specifications.

Platform implementation is closely related to product architecture designs, which can range between modular and integral. Product architecture design strategies are dependent on the way systems are decomposed, the selection of components to be used and how these components are linked with one another, such as exemplified by Figure 3. Architectural decisions consider various tradeoffs and there are no optimal designs. For instance, some of the benefits gained from modular solutions include economies of scale, increased number of variants, platform flexibility, and cost savings through component reuse. However, if the goal is craftsmanship and high performance, more integral solutions are often preferred. Hence, it is crucial for designers to understand the fundamental relationships shared between the components, respective interfaces and how tightly (or loosely) they are coupled. It is also important to understand how innovation evolves (such as with the development of new components) and to what extent components can be substituted or reused, as it is crucial to prevent imitation and long term survival of firms (Mikkola and Gassmann, 2003; Mikkola, 2006).

Modularization is an enabler for creating product variety, hence achieving mass customization. The goal of mass customization is to provide outstanding value to customers by providing products and services that meet their needs (through maximizing individual customization) at a low cost (such as through modular components) (Feitzinger and Lee, 1997; Kotha, 1995; Pine et al., 1993). Mass customization allows companies to enter new markets and capture customers whose individual needs could not be met by standard products (Lee, 1998). However, when devising product architecture strategies for mass customization, there should be a balance between the gains achievable through recombination (such as

through mixing-and-matching) of components and the gains achievable through specificity (such as through components with higher performance) in determining the pressure for or against the decomposition of a system (Schilling, 2000). The majority of the studies on mass customization are qualitative, and the few quantitative studies rely on statistical methods (e.g., Duray et al., 2000; Fiore et al, 2002; Tu et al., 2001; Yassine et al., 2001) or mathematical and econometric models (e.g. Jiao et al., 2003; Mikkola, 2007). One common factor with the literature is the linkage between customization and modular product architectures.

Recently, the notion of modularity is getting increasing attention in the services operations management. Voss and Hsuan (2009) illuminates on why understanding of the nature of service architecture and modularity is crucial to service design and innovation. There are three areas that can contribute to the competitiveness of a service system: the possession of unique service modules that are not easily copied by the competitors in the short term; the ability to exploit these through replication across multiple services and/or sites; and, the presence of a degree of modularity, which in turn supports both customization and rapid new product development. In their study of the Dutch healthcare for the elderly, De Blok et al. (2010) describe how modularity can be extended to investigate service systems, as to how different modules can be mixed and matched to provide the desired care service of individual patients. Bask et al. (2010) show that standardization, service productization and modularization of services, and service production structures are useful tools for efficient service production.

4 CONCEPTUALIZING 3PL SYSTEMS THROUGH MODULARITY

In this paper we explore the possibilities to measure the degree of individuality in 3PL through the lenses of modularity. We built from Voss and Hsuan's (2009) work on service architecture modularity, which applies system decomposition logic to measure the degree of modularity embedded in a service system. In their study of cruise line service and small banking systems, they introduced the service modularity function (SMF) – Equation 1, which is a mathematical model that measures the degree of modularity deriving from unique services and degree of to which the modules can be replicated across a variety of services. It has the following variables: number of unique service components (u), total number of service components (N), and the replicability factor of the unique service component (f).

$$SMF(u) = e^{-u^2/2Nf}$$

Equation 1

The unique services (u) are emphasized as these types of services are strategic as they keep the firm at the forefront of innovation, nurture its core competences, and prevent imitation from competitors. Examples of unique services include R&D consulting and specialized services provided by the bridge and engine room staff in a cruise ship. The amount of standard services is captured in the total number of service components (N), which is the sum of unique and standard services. Standard services are abundant in the multi-site services such as fast-food, retailing, and the generic services provided by the service factory. Replicability factor (f) indicates the extent a service can be reproduced. The ability for firms to replicate unique services would provide the capability to leverage their service innovation within their supply chain network.

For 3PL systems, high degree of individuality imposes a high degree of innovativeness (or low degree of standardized routine services). We follow the same logic as the analysis of service modularity architectures to assess 3PL systems. For any given 3PL system the degree

of individuality embedded in the system is dependent on the types of services (e.g., standardized or specialized) comprising the 3PL system and how they are linked with other services in the system.

Mirroring SMF to 3PL systems, such as service factory and service theatre, we can conceptualize their degrees of individuality as follows:

1. We start with the 3PL industry as the initial level of decomposition (level 0). The industry might be represented by the stakeholders (or the companies) offering different solutions, such as market exchanges, customized logistics solutions, joint logistics solutions, and in-house logistics solutions (as illustrated in Figure 1). The levels of decomposition are shown in Figure 4.
2. The next level of decomposition is represented by the 3PL companies (level 1) with respective types of 3PL services, where we find the configuration of the 3PL service system.
3. At level 2 (service bundle) we characterize the service architecture elements of the 3PL system. This is the level where the assessment of the degree of individuality takes place.

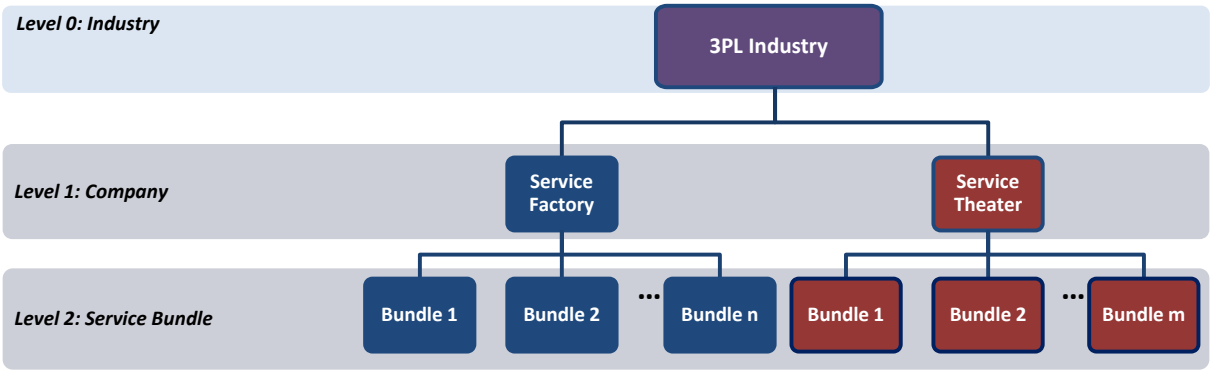

Figure 4: Decomposition of 3PL service systems.

For each 3PL system (i.e. service factory or service theatre), there are a set of service bundles that are comprised of unique (u) and standard elements (or components). Table 2 lists examples of standard and unique service bundles. We would expect service theatres to have more unique components as these components would include more customized solutions for the clients; this means a higher value of u. From SMF's lenses, service theatre would have lower degree of modularity than service factory. However, if the 3PL company is able to replicate the individual solutions across other service settings, the modularity level would increase, meaning that it would be able to benefit from economies of scale and cost savings. SMF emphasizes the replicability of unique services (f), as such services relate to uniqueness as a source of sustained competitive advantage, and hence providing heterogeneity that makes replication and imitation difficult by the competitors, at least in the short term.

Table 2: Examples of standard and unique service bundles.

Standard services	• Transportation • Warehousing • Call centers • Invoicing
Unique services	• Dedicated warehouses, specialized handling equipment • IT competencies and System integration services • (Re-)packing, Finishing, pre-assembly activities • Organization of milk-runs, JiT, JiS production supply • Spare part management • Coordination of inter-organizational teams at various management levels • Management of human assets such as exchange of personnel and specialized training • Consultancy and financial services • Management and optimization of the client's supply chain

Assume, for instance, that we want to investigate the degree of individuality of COMPANY A (e.g. service factory) and COMPANY B (e.g. service theater). Company A offers 10 standard and 2 unique service bundles ($u_A = 2$), for a total of 12 service bundles (N = 12). Because Company A has 7 subsidiaries worldwide that the unique services can be replicated (f = 7). The degree of service architecture modularity, $SMF_A(u)$, therefore is 0,97. As SMF values can vary between 0,0 (i.e. a perfect integral system) and 1,0 (i.e. a perfect modular system), Company A's 3PL system is considered to be a highly modular, reflecting its low degree of individualization. Company B, on the other hand, is an innovative company that offers specialized services mainly for the niche market. In its portfolio, it has 10 unique service bundles ($u_B = 10$) and only 2 standard services bundles ($n_B = 2$), for a total of 12 service bundles (N = 12). Like Company A, it also has 7 subsidiaries worldwide that the unique service bundles can be replicated (f = 7). This makes its SMF value to be 0,55, which is significantly lower than Company A's value.

Table 3: Example of two hypothetical examples.

	Company A (Service Factory)	**Company B (Service Theater)**
Number of standard service bundles, n	$n_A = 10$	$n_B = 2$
Number of unique service bundles, u	$u_A = 2$	$u_B = 10$
Total number of service bundles, N = n + u	N = 12	N = 12
Replicability factor, f	$f_A = 7$	$f_B = 7$
Degree of modularity, SMF(u)	**$SMF_A(u) = 0,97$**	**$SMF_A(u) = 0,55$**

5 CONCLUSION

In this paper we discussed the relevance of individualization in 3PL services. We concur with the main stream literature that 3PL service providers need to have higher ability for problem solving capability and higher ability of customer adaptation than classical services. The varying levels of commoditization coupled with increasing levels of customization in the services offered suggest that there are varying levels of individualization embedded in the

configuration of the 3PL services. Service factory, for instance, offers 'one stop shopping' solution that does not burden the client with logistics complexity. Service theatres, on the other hand, seek to offer more complex and more customized solutions for the client. The degree of customization versus commoditization considers various tradeoffs and can be treated as a matter of degree that is subject to value provided and cost savings.

We have explored the possibilities of measuring degree of individuality of 3PL systems through the theoretical lenses of service architecture modularity. The next step of our investigation is twofold. First, we are going to test the SMF with different hypothetical 3PL systems. In doing so we have to define the systems, how they can be decomposed, characterize the composition of the service bundles, and how each element (standard or unique) are linked with the rest of the system. This exercise will tell us whether it is possible to measure degree of individuality of 3PL systems, what are the trade-offs, and whether the SMF should be modified to fit 3PL settings. It would also lead us to have a better understanding about the theoretical underpinnings between 3PL and service architecture modularity. Second, this process should provide us with the foundation to conduct empirical research and data collection.

Although we have only scratched the surface of possibilities for measuring individuality in 3PL, we can draw some theoretical observations from the application of SMF. Being in principle a standardized 3PL service provider (such as with service factories), firms can still provide value to the customers (such as the case of service theatres), which means they are innovative in creating individual solutions for the clients. The level of innovativeness (in the sense of preventing imitation by the competitors in the short run) is captured by the variable u (the number of unique components), which also means that there is a trade-off between standardization and innovation. While standardization enhances the opportunity for modularization (hence mass customization), innovation hampers it.

As the size of the 3PL companies matters for the allocation of resources and the extent that business model configurations can be achieved, the larger the variable N (the total number of standard and unique components) the more options there are for customization. Assuming two similar 3PL systems offering the same level of individuality/uniqueness (u) and replication capabilities (f), the 3PL company with the higher value of N would have a higher degree of modularity.

This study only began to explore 3PL individualization with the application of modularity principles and to what extent it can be measured. However, our theoretical insights and model development need to be substantiated and validated with empirical studies. This is the next stage of development of our study.

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