

DIVISION OF ACTIVITIES AND TASKS

ORCHESTRATING A NOVEL PUBLIC TRANSPORT SERVICE

Tinnilä, Markku
Kallio, Jukka

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Aalto University publication series

BUSINESS + ECONOMY 2/2017

© 2017 Tinnilä, Markku , Kallio, Jukka

ISBN 978-952-60-7475-7 (pdf)

ISSN-L 1799-4810

ISSN 1799-4810 (printed)

ISSN 1799-4829 (pdf)

<http://urn.fi/URN:ISBN:978-952-60-6894-7>

Unigrafia Oy

Helsinki

2017

Finland

ABSTRACT

The ongoing trend of outsourcing has resulted in re-division of activities and tasks between organizations to gain scale and scope economies. This development is enhanced in the current service economy, where a major part of workforce is in services. This paper focuses on division of activities, tasks and labour between organizations with specific emphasis on organising or orchestrating activities. The principles of division and orchestration are illustrated by an example of a novel public transport service providing demand-responsive mobility service.

Keywords

Division of labour, division of activities, public procurement, public transportation, service efficiency, outsourcing

1. INTRODUCTION

Traditionally organisations have performed all activities internally and having complete control of them. Integration and coordination were done within the organisation. This results in many sub-optimal activities with low efficiency, as specialized organizations can perform them more effectively. Consequently, organizations have for a long time purchased e.g. raw materials and components from specialized manufacturers with scale economies. Also, some services have been purchased. Most notably, very specialized professional services, such as lawyer, medical care and investment services. These require specialized knowledge infrequently required by the organization and consequently these cannot be efficiently performed internally. Over time the trend of outsourcing of activities has gained impetus, and it is maintained that organizations should focus on their core competencies and outsource all non-core activities. In manufacturing this has been common for a long time due to the large scale economies of mass manufacturing. Service activities of all types have been lagging behind.

Public organizations have had a tradition for internal activities to even larger degree than companies. Only recently outsourcing and purchasing has been done in larger scale. This holds also true for traffic services. The standard mode of operations has been by public transport authority, which has internally done all the activities ranging from setting the service level, scheduling and planning, operating equipment, managing personnel and owning the facilities of all types.

This paper focuses on division of activities tasks, activities and labour between organizations with specific emphasis on organising or orchestrating activities. The principles of division are illustrated by an example of transport services.

The paper is organised as follows: Following the introduction, section 2 reviews the literature of division of activities, tasks and labour and forms a background for section 3, which focuses on orchestrating, providing a literature review and definition with analysis. Section 4 provides an illustrative case example of orchestrating and division of activities in a novel transport service. Section 5 provides conclusions and discussion.

2. DIVISION OF ACTIVITIES, TASKS AND LABOUR

2.1 Division of labour

Division of labour in manufacturing was a major factor in the industrial revolution. Already Adam Smith (1776) pointed out this with his example of scale economies in manufacturing with the case making pins. “One worker could probably make only twenty pins per day. But if ten people divided up the eighteen steps required to make a pin, they could make a combined amount of 48,000 pins in one day” (Smith, 1776). He conjectured that corresponding increase in productivity was not feasible for agriculture, nor in services where similar scale economies were deemed un-probable. When Henry Ford was producing the famous T-model, the input to factory was bales of rubber and steel sheets, and all the tasks and process steps were performed by Ford company. Later on, automobile industry has become a prime example of shift from manufacturing, i.e. working on materials, to assembling components manufactured by other companies.

Later the development of large corporations, the division of labour and increase in efficiency played a crucial role (Chandler, 1962). The access to financial capital and specialisation re-divided the activities and labour in a new way. This re-division materialized both within the organisations, as well as, between organisations. Within the large corporations, centralised units became responsible for such activities as acquiring capital and technological development. However, some activities were deliberately acquired from outside the corporations, such as raw materials and components, re-dividing the tasks and labour in a new way. Service economy has been one of the recent trends in developed economies with profound impacts on division of activities and workforce. The share of services is up to 70% in many countries (Spohrer and Kwan, 2009).

As organizations are no longer performing all activities internally, and are acquiring them from markets, there is an on-going re-division of activities. Particularly, activities not directly connected to manufacturing or operating have increased. This, however, is not quite a novel direction of development. Wallis and North pointed in their seminal article, “Long Term Factors in American Economy” (1986), that already in 1950’s majority of employees were in occupations which have little or nothing to do with manufacturing, moving or other way actively dealing with physical products, i.e. making, moving or shaping physical products.

This has also been called “disaggregation of services” (Apte and Mason, 1995), when activities previously performed within an organization are disaggregated by exceeding organizational or geographical boundaries. The division can therefore include organizational decomposition of activities into smaller entities, or geographical dispersion to different location or locations. Therefore, the structure of activity chains is changed. This may be due to organizational change, which in turn is enabled by new technologies (Karmarkar and Apte, 2007).

More recently Apte et al. (Apte et al., 2008) published research results focusing on the shares of information and non-information workers in both manufacturing and service industries. According to these results personnel structures were quite similar in both groups of industries in macro level statistics.

2.2 Division of activities and tasks

An 'activity' is a set of tasks required to produce a particular result (Laamanen, 2015). Every process, whether business or service process, consists of a number of activities, which are sets of tasks required to produce a particular result and, when completed, contribute to the accomplishment of process objectives. Activities disaggregated, or divided, are often services of different types (Apte and Mason, 1995). They include many financial, transportation, and professional services, but also many activities than are traditionally included into manufacturing. The manufacturing related include e.g. product and process design, logistics, and manufacturing information systems.

Division of activities is directly connected to division of labour and changes in workforce structure. One prime example is the transition from manufacturing-centred workforce toward information-centred. According to Apte and al. ((Apte et al., 2008) the share of information workers increased from 37% of the workforce in 1950 to 59% in 2000 in the USA. Similar shifts in workforce can be seen in the small share of labour force in agriculture worldwide and shrinking of industry workforce in most developed countries (China being an exception) and growth of service industries. Statistics show that services of different kinds employ today more people than agriculture, and almost twice as many as in manufacturing (Spohrer and Kwan, 2009).

Some analyses of division of activities and labour focus on the impact of technology and efficiency improvements due to technological innovations and adoption of technology-based new processes. The identification of productivity or efficiency improvements is not always straightforward (Kivijärvi and Saarinen, 1995)), but information technology is without doubt a major factor behind transformation in workforce and industry structures with corresponding changes in activities. Information technology has also impact on labour demand and workforce skills (Bresnahan et al., 1999). IT use is also connected to organisational issue, such as centralisation or decentralisation of activities within or outside organisations.

Some studies point out the differences in efficiency, where service costs are seen to rise relative to manufacturing due to lower productivity growth (Baumol, 1967). Similar changes as at economy and industry levels are also changing individual organisations, where activities are being

moved to outside organisations with connected organisational restructuring.

According to Apte et al. (Apte et al., 2012) organisations change toward two directions. First, at industry level changes demand analogous changes in individual organizations, such as digital channels replacing traditional brick-and-mortar ones, which in turn demand new organisational structures and processes. In some cases, the old channels disappear, as in occurring in music, where on-line services (type Spotify) have replaced physical storage devices (e.g. cd's). Similar examples can be found in travel services, where internet booking services have wiped the physical travel agencies from market (Tinnila, 2001). The second driving force in internal, where use of information technology changes processes and is in turn reflected in organizational structure (Apte et al., 2012). Apte et al. also point out that "Many more changes are occurring due to restructuring of processes and operations down to the most atomic levels of work", i.e. individual activities are also changing.

Division of activities and labour between organisations

Many viewpoints can be made on the division of activities within and between organizations. Among them, the business model view (Zott and Amit, 2010) sees an activity as the commitment of human, physical and capital resources to fulfil a purpose. An activity system comprises interdependent organizational activities within the firm, as well as, the activities performed by partners and customers. Consequently, activity systems cross organizational borders, while activity systems create and capture value for the organization. To manage activity systems there are design elements of content, structure and governance.

Accordingly, interdependencies among activities are on the focus of activity systems, and provide a tool for changing organisational processes to respond to changes in competition and other business environment changes. Business model defines which activities and transactions are performed within the organisation and which are done by suppliers, partners, customers and other members of network. Thus business models aim to define a sound division of activities between an organisation and its network (Ehret et al., 2013).

Division of activities includes also non-ownership services, such as rental, leasing or access services (Lovelock and Gummesson, 2004). These provide short-term use of a resource without owning the facilities or equipment. Similarly, consulting or expert services provide knowledge without having the resource in own staff (Wittkowski et al., 2013). These non-ownership service have been steadily growing and provide today approximately one third of all equipment in US and Europe (Chemmanur et al., 2010).

According to several studies (Ehret and Wirtz, 2010) (Wirtz and Ehret, 2012) (Wirtz et al., 2015)

(Wirtz et al., 2015) providers of business services free their customers from major cost areas such as:

- Costs of asset ownership (Property Rights Theory) as a factor in efficiency. Business service providers are more efficient in providing the required assets.
- Free scarce management capacity to focus on high value-creation opportunities by outsourcing non-core activities to specialised actors (Resource-Based View)
- Support their clients in navigating their firm's boundaries towards their most valuable business opportunities (Entrepreneurial Theory of the Firm) thus enhancing their entrepreneurial agility and leverage toward best business opportunities.

Value co-creation has been recognised as a key element in business models, while exact answer to how this should be divided between organisations is still unanswered (Ndubisi et al., 2016).

2.3 Make or buy-decisions and outsourcing

Division of tasks and labour between organizations contributes to growth and efficiency of individual organizations, networks of companies, as well as, nations. Increased division of activities between organizations also increases flexibility and the number of options available to organizations, and provides faster reaction to changes by use of external resources, and more flexible resources, and capabilities.

A strategic view on division of activities is the decision whether a product, activity, task or service is produced internally or externally. This strategic question is in manufacturing called make or buy, and is still regarded as challenge for manufacturers (Fine, 2004). However, it has been found out that if all manufacturing activities are kept in-house, as the early car manufacturers did, too much time, resources, space and management attention is required. Transaction cost economics points out (Williamson, 1975) that there are costs and risks attached to both choices.

When transaction costs and the capability of an organisation are both low, there is a clear driver for outsourcing, i.e. buy. However, with high transaction costs and capability is available within the organisation, there is far less reason for outsourcing (Parker and Hartley, 2003). The reason for retaining a capability in the organisation may be due to strategic importance of an activity. When there is a conflict between capabilities and transaction costs, the decision to make or buy is less obvious, and requires analysis. In some cases a between solution is partnership retaining more control, but sharing the costs. Consequently, studies point out also a third option (Parmigiani, 2007, Parmigiani and Mitchell, 2009), i.e. "make and buy", which is a mixed strategy including both internal production and purchasing from outside. This is typical to several service sectors, where there exists a private market for services, too. These include e.g. health care and transportation. Also partnerships between private and public organizations are found in the same

areas. Consequently, the decision is not limited to make or buy, but there are solutions with features of both choices (Parmigiani, 2007). Thus, the boundaries of organisations are becoming more blurred with in- and out-sourcing. Outsourcing decisions have also impact on market structures, i.e. what kind firms, such as service companies, operate in a market, or make entry and exit decisions (Dunne et al., 2009).

Professional service requiring highly skilled and knowledgeable personnel, point out the interdependence between organisations and different business sectors. Due to focusing on core competencies, knowledge intensity and specialisation, more companies require these external services and knowledge-based services (Hipp and Grupp, 2005). The resulting relationships are often long-term in nature (Sillanpää et al., 2014) and are based on continuous interaction between organizations (Hallikas et al., 2013).

2.4 Scale, scope and efficiency in service production and activities

The quest for efficiency has always been prevalent in private companies, but more recently public organisations have joined the race, due to reduced public financing for many services. Manufacturing companies have for a long time made great leaps in improving efficiency by scale and scope economies and by adapting their manufacturing strategy and type to volume and type of product (Hayes and Wheelwright, 1979b, Hayes and Wheelwright, 1979a). Similar gains in efficiency have not been achieved in services, particularly in public services. This has been called “Baumol’s disease” (Baumol, 1967) maintaining that efficiency improvement in services are more difficult to make. However, similar methods as in manufacturing have been used to produce mass services with great efficiency (Schmenner, 1986, Schmenner, 2004). The introduction of ICT has also had great impact on service efficiency by automating mass services as in banking sector (Tinnilä and Vepsäläinen, 1995).

Manufacturing industries have focused on economies of scale, as marginal costs have decreased due to standardisation in mass manufacturing. Cutting down unit costs in mass manufacturing, distribution and logistics, as well as, in administration have been considerable. However, in post-industrial service economy, economies of scope are dominant (Sweet, 2001), and also have impact on entering a market, as scale economies necessitate for the entrants to get considerable volumes and market share before entering a market (Pehrsson, 2002).

Schmenner (Schmenner, 1986, Schmenner, 2004) coined the term “service factory”, to illustrate the transformation of services toward scale economies and more efficient service production in manufacturing type “factories”. The tool for analyzing the suitability of factory type operations in services is the service process matrix, which divides services into service factories, service shops, as well as, mass and professional services. These require different service production types.

Another finding connected to the matrix, is the relevance of scope economies, particularly in knowledge-based services, i.e. professional services (Tinnilä, 2012). Many of the services in e.g. transportation sector can be classified as service factories (Verma, 2000, Tinnilä, 2013), although the relatively high labour intensity resembles mass services.

Business services in particular enjoy benefits of both scale and scope economies (Wirtz and Ehret, 2009). In some cases also very labour intensive services, such as health care have been improved in efficiency by use of outside resources. In the case of Omega Healthcare (Wirtz and Ehret 2009), cost savings of up to 40% were achieved in hospitals and clinics by use of specialised outsourced services. The scale economies are also found to be connected to firm size (De Borger, Kerstens et al. 2002). In several studies there large company size is associated with scale and scope economies, such as market power, and the ability to aggregate resources. However, most studies have focused on manufacturing industries, and the impact of scale and scope in service industries, and particularly knowledge-based services is not clear (Macher and Boerner, 2006).

Public organisations are typically very integrated and focused on providing all services in-house. These hierarchical organisational structures are often inefficient and less innovative than specialised service providers. They often prefer a “quiet life” (Parker and Hartley, 2003), to innovativeness and continuous change. Outsourcing provides in these cases a comparison point to internal efficiency, as well as, quality check.

3. ORCHESTRATING ACTIVITIES

This section regards organising and orchestrating as an independent function, among the other main functions in the economy. We start by looking at the importance of orchestrating, followed by literature review and definitions of orchestrating and connected terminology. Organising differs from orchestrating with its close connection to organisational structures, although activities of organising may be similar.

Planning, decision making, and executing and managing operations are typically tasks that are integrated as key activities in most organisations, as well as, individual level. Typically, we plan our shopping lists ourselves, take the trip to a store ourselves, and pick the goods we want by ourselves in the store, and then carry them home with us. Similarly, a salesman typically uses a lot of time in planning and reporting sales meetings, whereby his or her main task and role should be to persuade customers to buy the products and services he or she is representing. In effect, we could separate the orchestrating activities from other activities, as well as identify the core elements of the orchestrating service to understand what of it can further be outsourced to specialized skilled service operators.

Many businesses have been moving toward dividing activities between different organisations,

i.e. towards specialization. Traffic services, for example, have grown into a large “industry” with numerous service operators offering different kind of transportation services and facilities, and performing different types of activities. In effect, transportation has become a separate area of economic activity. It is no longer an integrated function inside a manufacturing company, but purchased as service from specialized service companies, which provide their services for transportation needs. However, in many cases, only the operative transport activities are acquired from outside organisations. The orchestrating activities, such as planning, scheduling, and setting service levels of transport, are still managed by the organization itself.

If we regard orchestrating as a separate and specialized activity, we can find also in practice many examples where orchestrating is a key activity and has become a separate service with an independent business model.

3.1 Literature on orchestrating

Many studies have recognised orchestrating related activities, although rarely used the term as such. Next, we present some viewpoints on recognising orchestrating as an independent function, thus closely integrated to other functions.

In business as well as public organizations, orchestrating has been regarded as an activity governance system (Zott and Amit, 2010), where it refers to who performs the activities. For example, franchising is a governance system where the orchestrator (franchisor) provides key activities, such as professional management, business model, brand, centralised purchasing, as well as, service and process standardisation. The orchestrating activities provided by McDonalds offer a wide range of services to franchisees, including standardised processes with detailed activity charts.

The division of roles between McDonalds and franchisee seems to be that the day-to-day management of operations is the responsibility of the franchisee, while McDonalds offer the governance structure for longer term operations. However, they also provide the down-to-earth and detailed process manuals with individual activities. It seems to be that orchestrating has several layers or levels ranging from governance structures to activity level operations.

The role of governance structure is to integrate and coordinate activities. One way to orchestrate activities through integration is creation of public private partnerships (PPPs) (Parker and Hartley, 2003) which integrates private and public sectors, with assets not belonging to government. The benefits include better integration to goals, strategies and activities to public organisation, while gaining, at least some of, the benefits of private organisations. These include typically efficiency and flexibility in operations, meeting changes in demand, greater freedom to invest, less governance on operations management, etc.

However, dividing activities to outside organisations, i.e. outsourcing or purchasing, includes at

least some loss of control and coordination. Firms can also simultaneously make and buy the same goods or services, which has been called concurrent sourcing (Parmigiani, 2007). For this, the firms need to finance the activities, allocate capacity and staff, as well as, coordinate the internal part of production. In addition, there are the tasks connected to finding, selecting, negotiating and maintaining external suppliers. Also the managing of concurrent sourcing has its challenges as both parties have their own interests and goals.

Service systems have been seen as integrators of resources and activities (Vargo and Akaka, 2009) in co-creation of value. Co-creation consists of integration and use of resources from different service providers, including market-based and public organisations, as well as, service customers. In manufacturing product design, facility planning, process design and production planning are seen as separate activities from core manufacturing related activities (Hayes and Wheelwright, 1979a). In supply chain management the suppliers ability to orchestrate its resource base is important (Lilliecreutz, 1998). This includes the roles, position and activities, as well as, the structure of supply chain network of partners. (Zacharia et al., 2011) point out “many companies participate in supply chains that lack a dominant company that serves a leadership role, yet these companies also need to utilize SCM best practices, share information, reduce inventory, and invest in new technology.” Also Heinonen et al. (Heinonen et al., 2010) point out that value creation is not straightforward activity orchestrated by a company, but involves co-creation with customers.

The key role of orchestrator has been recognised in several studies (see (Dhanaraj and Parkhe, 2006), and it is known as key actor, strategic centre, flagship firm, network orchestrator, focal company or hub firm.

Table 1 - Viewpoints on orchestrator roles

(Dhanaraj and Parkhe, 2006)	A hub firm possesses prominence and power through central position in the network structure, and uses this to perform a leadership role in pulling together the dispersed resources and capabilities of network members. Network orchestration is a set of actions undertaken by the hub firm as it seeks to create value and extract value from the network.
(Zacharia et al., 2011)	Supply networks are governed a “hub” firm—whose role is to provide the required services and assume control of a part of the supply network. The role of orchestrator includes organizing networks, sharing information, managing assets, and reducing inventory.
(Nambisan and Sawhney, 2008)	Orchestra-Integrator provide innovation architecture, facilitates and coordinates activities of the network partners, and integrates and brings to market an innovation.
(Hinterhuber, 2002)	There are four types of orchestrators; architect, judge, developer and leader. E.g. architect defines the objectives and designates member companies of the network, and network developer develops physical and intellectual assets.
(Mumford et al., 2002)	Emergence of multifunctional teams influence the role of orchestrator, such as need for interactive and participative mechanisms.
(Bitran et al., 2006)	The expanded role of the systems integrator and extends into issues related to control and governance of portions of the supply network, which have shifted away from a hierarchical, one-dimensional supply chain to fragmented networks. In these the orchestrator organizes and disperses the manufacturing work flow to many service providers.

3.2 Defining orchestrating

Orchestrating activities, such as planning, scheduling, and setting service levels, are typically managed by the organization itself. These activities are typically tasks that are integrated as key activities in most organisations. When defining terms organising and orchestrating, we find some differences between them.

According to Wikipedia “an organization (or organisation) is an entity, such as an institution or an association, that has a collective goal and is linked to an external environment”. Similarly, “An organizational structure defines how activities such as task allocation, coordination and supervision are directed towards the achievement of organizational aims.—It can also be

considered as the viewing glass or perspective through which individuals see their organization and its environment". Consequently "organising" is typically connected to governing structures in any type of public or private unit. The term includes hierarchical structures of persons and activities.

Furthermore, an organization can be structured in many different ways, depending on their objectives. The structure of an organization will determine the modes in which it operates and performs. Organizational structure allows the expressed allocation of responsibilities for different functions and processes to different entities such as the branch, department, group and individual. Organizational structure affects organizational action in two ways. First, it provides the foundation on which standard operating procedures and routines rest. Second, it determines which individuals get to participate in which decision-making processes, and thus to what extent their views shape the organization's actions.

According to dictionaries, orchestration describes the automated arrangement, coordination, and management of complex computer systems, middleware and services. Similarly, to orchestrate is to plan or coordinate the elements of (a situation) to produce a desired effect, especially surreptitiously, as in "the situation has been orchestrated by a tiny minority". Also orchestration refers to arranging or controlling the elements to achieve a desired overall effect, as in "someone orchestrated a successful political campaign".

To orchestrate is to design or organize something, like a plan or a project. An orchestra is a large group of classical musicians led by a conductor. It consists of many people playing together. Similarly, when we talk about orchestrating, someone is coordinating the activities of many people to accomplish something. Orchestrating is like directing, and it applies to many more things than just music. Other definitions include views of orchestration as the activity of managing, coordinating, and focusing the value-creating network (Zacharia et al., 2011).

Preliminarily, we define orchestrating as independent and separate activity group and function that includes activities focused on arranging, scheduling, coordinating and managing other activities, but not necessarily managing the operations, within the same organisation or other organisations. Therefore orchestrator does not necessarily manage the day-to-day operations, but may focus on coordinating the resources of other organisations to fulfil a value creation need. We can recognise different levels of orchestrating activities ranging from high to low levels. The focus and scope of activities and responsibilities differ from strategic to day-to-day operative issues.

Table 2 - Three levels of orchestrating activities

High level	<ul style="list-style-type: none"> • Governance structure definition • division of labour & activities between organisations • network and ecosystem structure • orchestrating activities between organisations or between organizational units • High level coordination and integration
Middle	<ul style="list-style-type: none"> • Operations management of activities • Scheduling • coordinating activities between organisations in network • “handbooks” and codes of conduct • Process charts and flows
Low	<ul style="list-style-type: none"> • Day-to-day management of activities • Defining and standardising individual activities • Process management

The highest level of orchestrating in table 2 focuses on defining the governance structure, such as administration of activities and organisation, as well as, division of labour and tasks between organisations and organisational units. Also the structure of partner network and ecosystem and division of roles, and orchestrating activities between organisations or between organizational units belongs to this level.

The middle level is closer to operational level as it consists of tasks of operations management, scheduling and coordinating activities between organisations in network. Also, “handbooks” and codes of conduct are determined at this levels, as well as, process charts and flows of tasks.

The lowest level focuses on day-to-day management of activities and tasks. These include defining and standardising individual activities and managing processes.

4. CASE OF ORCHESTRATING A NOVEL PUBLIC TRANSPORT SERVICE

4.1 Division of roles and activities in public transport services

Public transport has until a few years ago been very traditional in its organisation of services.

Typically the organisational mode has been a public, or semi-public, authority with a responsibility to organise transport services within a defined area. It also typically had monopolistic rights to offer transport services. This has in many countries changed toward more open market, where both public organisations, public private partnerships, and private companies are offering services. Therefore, we find more diversity in the division of activities and roles in public transport services, and this trend is expected to continue in the future (Aguiléra and Grébert, 2014).

Both private and public transport companies have traditionally controlled and owned most of the resources needed to provide services. Consequently, bus companies have been operating their own fleets, the vehicles have been owned by the company, and also managed their own operations from personnel to maintenance. Also the equipment for maintaining the vehicles with pertinent premises were owned and operated internally. Subsequently, very little division of activities with other organisations were done.

The role of public authority has been, in addition to operating its own transport services, also to orchestrate the whole service range. The activities included setting of service level, division of routes between different bus companies, scheduling and time tables, as well as, providing ticket systems and setting ticket prices. In many countries the role has been similar including procuring of transport services from private companies, and focusing activities to “plan, lead and evaluate public transportation” (Corvellec, 2009). The responsibility of orchestrating traffic has been mostly decentralised to local or regional authorities (Odeck, 2006).

City areas tend to have the largest range of different types of transport, or mobility services ranging from commuter trains, metros, trams, and light rails to buses and minibuses. This case example focuses on a typical one million inhabitant European city area, with congested downtown and outlying suburbs with different types of connections between city centre. The area also has both commuter trains, metro, trams and large range of bus lines operated by several private and publicly owned organisations.

The case focuses on a new pilot-stage demand driven transport (commonly abbreviated DRT) service called Kutsuplus (“call plus”), which has a relatively large network of partners facilitating the service in different roles and performing different activities. The demand for DRT services is expected to increase in future to provide more flexible public transport services (Tinnilä and Kallio, 2015) and is in line with the ideas of providing mobility as a service (MaaS) (Tinnilä, 2016).

4.2 Case Kutsuplus of Helsinki

Kutsuplus was a pilot of a DRT system of shared minibus rides based on mobile or internet reservations and engaged by an automated scheduling and dispatching system, which links customers travelling into same direction and provides a joint ride. The service was operated by 9-seat minibuses with distinctive colour scheme and markings between 2013-2015.

DRT provided a shared transport service, based on a dynamic and real-time dispatching system which routes and re-routes a vehicle fleet. Consequently, the service had no fixed routes nor timetables, and routes can be changed while on the move. This dynamic approach increases the capacity of the service and requires no previously made reservation, which has been a challenge in most DRT systems (see e.g. (Brake et al., 2007), (Mulley and Nelson, 2009)). According to Jokinen et al. (Jokinen et al., 2011) this type of flexibility of the DRT facilitates both the high quality service of taxi or a private car, connected to the efficiency of the public mass transport.

In practice, customers define their places of departure and destination either from a list of bus stops or based on street address. The service provides non-stop trip from bus stop to bus stop, rather than from any address to another like taxis. However, the number of virtual bus stops is large. When ordering a trip the system provides alternative ride options, based on the time window required. The tighter the time limit chosen, the higher the price. Typically there are normal and economy-options. As the dispatching engine re-routes buses on the move, rather than makes beforehand reservations, there is a maximum one hour departure time limit from ordering time. Customers pay the rides in advance by using a specific electronic trip wallet, where they have transferred money from bank account or credit card. The normal basic price is 3,50 € with an addition of 0,45 € per kilometre. The starting fee for economy ride with longer waiting time was 2,80 € with 0,36 €/km.

The automatic reservation and dispatching system sends an order confirmation in the form of a travel code, which is the ticket. The code is checked by the driver when boarding. The pick-up time, estimated arrival time and bus number is also provided to the mobile phone.

In addition, the customers are provided with a map to their smart phones, showing the walking route from departure address to picking up stop. During the trip an internal display shows the route and estimated travel time to next stop. When leaving the bus at their stop, the customer is provided with a walking route map in smartphone to their destination.

The provision of the DRT services requires several actors in addition to the service provider, which is the front face that the customer sees. The roles are presented in table 3, where the role of orchestrator falls to the service provider. Thus the service provider has the connection to customers.

Table 3 – Roles of actors and their activities

Actor	Role of actor and activities performed
Customer	End users (passengers) of travel services with a large range of preferences in terms of travelling time, ticket prices and service levels
Orchestrator and service provider	HSL (Helsinki regional traffic) providing services to customers and <i>orchestrates</i> the service components by purchasing from different operators, integrating them, providing ticketing systems, and. navigation information. Also responsible for setting service levels and planning service types.
Transport company	Private minibuss transport company is an actor operating the actual traffic service with connected management of personnel (bus drivers), car fleet equipment, etc. The service provider makes a time-based contract with one of several transport companies for DRT service.
Transport equipment provider and financier	Transport equipment used by transport companies is either owned by them, leased or rented from specialised financing companies.
Sponsor	City council and administration decided on subsidies to public traffic services, sets the service level requirements and decides e.g. ticket pricing.
Ticketing and payment system provider	A specific trip wallet for Kutsuplus orchestrated by HSL but operated by data service providers and financial organisations.
Traffic data provider	Provides collection and distribution of traffic data (volumes, travel speeds) for travel time estimates and route planning
Map provider	Digital map provider manages and updates the maps of roads, obstacles and bus stops.
Bus dispatching system operator	Company providing and developing the automated dispatching system, which organises the trips, dispatches the minibuses and act as information and ordering channel for customers. Provides for customers the time estimates for pick-up and delivery.
Telecom operator	Telecom operators provide the connections to mobile phones and other consumer devices.
Driving time forecast provider	Provider driving time forecasts based on digital maps, real-time traffic data and collected previous realised driving times

Presented in figure 1 are the roles of the network, with the orchestrator in the middle responsible for the service and managing the customer relationship.

Figure 1– the roles in the service network

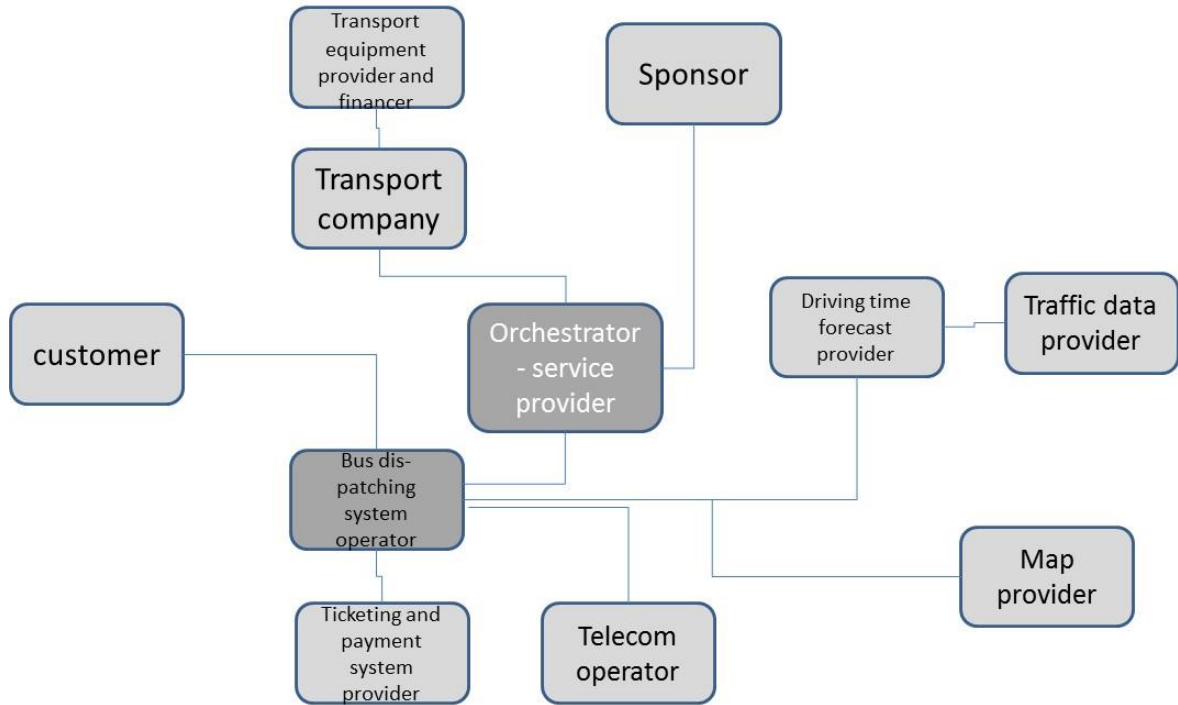
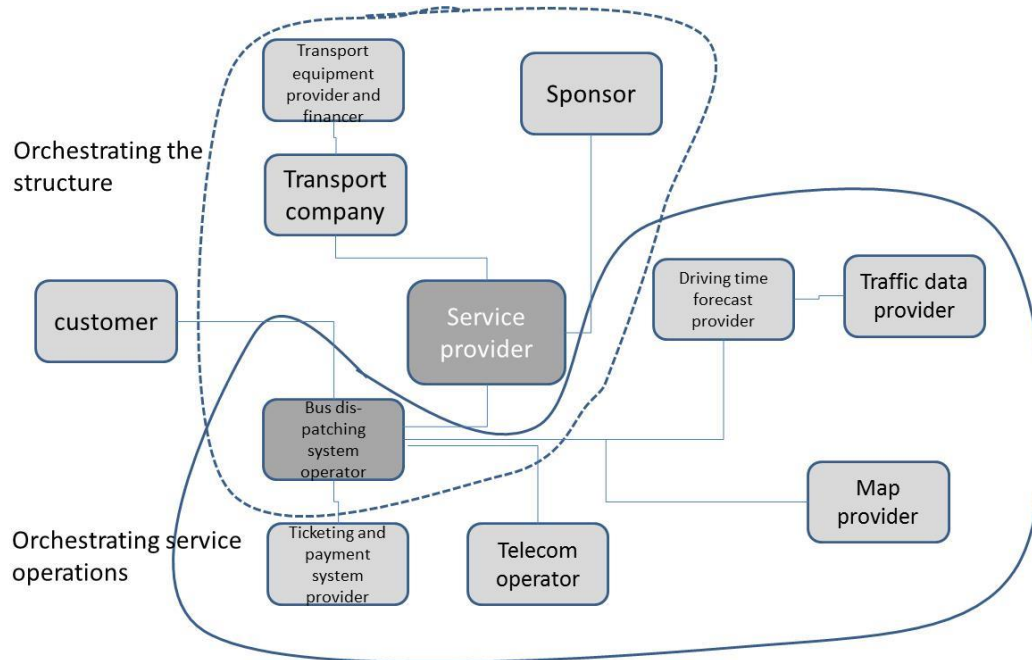


Figure 2 points out the differing roles of service provider and dispatching system operator. These two have different roles, as service provider orchestrates the network structure, but actual service operations are largely orchestrated by the dispatching system operator. The service provider is also typically local, while dispatching system operator can operate in several locations, as their operations are mostly digital. The service operator is therefore more locally oriented and orchestrates the physical transport operations. This division is along the lines presented in table 3.

Figure 2 – Orchestrators of structure and operations



5. DISCUSSION AND CONCLUSIONS

Traditionally organizations have accomplished most activities by own resources and internally. This has given complete control of their operations. However, performing activities with low efficiency has not been optimal, and large productivity gains are reached by outsourcing. More recently, organizations are focusing on core activities and leaving other, less important ones to outsiders. This outsourcing or re-division of activities is a global trend, as is reflected in the growth of business- to-business services. The range of these services is wide, compassing simple operative activities to design, consulting, maintenance and management. Many new services are focusing on orchestrating or organizing activities. For example, Uber has gained phenomenal growth by focusing on orchestrating taxi services, without owning a single car. It orchestrates the connections between customers and service providers, and leaves owning and operating cars and

personnel to outsiders.

Ikea is another well-known example of orchestrating. It focuses on design and sales of products, but relies on its network of manufacturing companies in the actual production of furniture. The orchestrating task includes design, quality management, and supply chain coordination.

It is notable that a large share of value creation is captured by the orchestrator. In physical products, e.g. mobile phones, only a few percentages of value is created in manufacturing and most is captured by the orchestrator of the network (Ali-Yrkkö et al., 2011).

This paper presents an illustrative case of a novel public transport service, where the role of the orchestrator is focal. The demand-driven mini-bus service is orchestrated by a public organization and outsources most activities from specialized operators. These include operating the vehicle fleet, owning and maintaining them, as well as, managing the personnel. Also ICT-services, such as driving-time forecasts, dispatching and navigation, are acquired as services. The case demonstrates the trend of dividing activities into the network of organizations orchestrated by the focal organization.

This work was supported by the Aalto Energy Efficiency Research Programme as part of TrafficSense research project.

6. REFERENCES

- AGUILÉRA, A. & GRÉBERT, J. 2014. Passenger transport mode share in cities: exploration of actual and future trends with a worldwide survey. *International Journal of Automotive Technology and Management*, 14, 203-216.
- ALI-YRKKÖ, J., ROUVINEN, P., SEPPÄLÄ, T. & YLÄ-ANTTILA, P. 2011. Who captures value in global supply chains? Case Nokia N95 Smartphone. *Journal of Industry, Competition and Trade*, 11, 263-278.
- APTE, U., KARMARKAR, U. & NATH, H. 2012. The US Information Economy: Value, Employment, Industry Structure, and Trade.
- APTE, U. M., KARMARKAR, U. S. & NATH, H. K. 2008. Information services in the US economy: Value, jobs, and management implications. *California Management Review*, 50, 12.
- APTE, U. M. & MASON, R. O. 1995. Global disaggregation of information-intensive services. *Management science*, 41, 1250-1262.
- BAUMOL, W. J. 1967. Macroeconomics of unbalanced growth: the anatomy of urban crisis. *The American Economic Review*, 57, 415-426.

- BITRAN, G. R., GURUMURTHI, S. & SAM, S. L. 2006. Emerging trends in supply chain governance. *digital.mit.edu/research/papers/227_Sam_Emerging_Tends_Supply_Chain_Governance.pdf-2006-06*, 10.
- BRAKE, J., MULLEY, C., NELSON, J. D. & WRIGHT, S. 2007. Key lessons learned from recent experience with Flexible Transport Services. *Transport Policy*, 14, 458-466.
- BRESNAHAN, T. F., BRYNJOLFSSON, E. & HITT, L. M. 1999. Information technology, workplace organization and the demand for skilled labor: firm-level evidence. National bureau of economic research.
- CHANDLER, A. D. 1962. Strategy and structure: Chapters in the history of the american enterprise. *Massachusetts Institute of Technology Cambridge*.
- CHEMMANUR, T., JIAO, Y. & YAN, A. 2010. A theory of contractual provisions in leasing. *Journal of Financial Intermediation*, 19, 116-142.
- CORVELLEC, H. 2009. The practice of risk management: Silence is not absence. *Risk Management*, 11, 285-304.
- DHANARAJ, C. & PARKHE, A. 2006. Orchestrating innovation networks. *Academy of management review*, 31, 659-669.
- DUNNE, T., KLIMEK, S. D., ROBERTS, M. J. & XU, D. Y. 2009. Entry, exit, and the determinants of market structure. National Bureau of Economic Research.
- EHRET, M., KASHYAP, V. & WIRTZ, J. 2013. Business models: Impact on business markets and opportunities for marketing research. *Industrial Marketing Management*, 42, 649-655.
- EHRET, M. & WIRTZ, J. 2010. Division of labor between firms: Business services, non-ownership-value and the rise of the service economy. *Service Science*, 2, 136-145.
- FINE, C. H. 2004. Make versus Buy. *The Power of the 2 x 2 Matrix: Using 2 x 2 Thinking to Solve Business Problems and Make Better Decisions*, 233.
- HALLIKAS, J., KULHA, T. & LINTUKANGAS, K. 2013. The characteristics of service buying in the business-to-business sector. *International Journal of Procurement Management*, 6, 280-296.
- HAYES, R. H. & WHEELWRIGHT, S. C. 1979a. The dynamics of process-product life cycles. *Harvard business review*, 57, 127-136.
- HAYES, R. H. & WHEELWRIGHT, S. C. 1979b. Link manufacturing process and product life cycles. *Harvard business review*.
- HEINONEN, K., STRANDVIK, T., MICKELSSON, K.-J., EDVARDSSON, B., SUNDSTRÖM, E. & ANDERSSON, P. 2010. A customer-dominant logic of service. *Journal of Service Management*, 21, 531-548.
- HINTERHUBER, A. 2002. Value chain orchestration in action and the case of the global agrochemical industry. *Long range planning*, 35, 615-635.
- HIPP, C. & GRUPP, H. 2005. Innovation in the service sector: The demand for service-specific innovation measurement concepts and typologies. *Research policy*, 34, 517-535.
- JOKINEN, J., SIHVOLA, T., HYYTIA, E. & SULONEN, R. Why urban mass demand responsive transport? Integrated and Sustainable Transportation System (FISTS), 2011 IEEE Forum on, 2011. IEEE, 317-322.
- KARMARKAR, U. S. & APTE, U. M. 2007. Operations management in the information economy: Information products, processes, and chains. *Journal of Operations Management*, 25, 438-453.

- KIVIJÄRVI, H. & SAARINEN, T. 1995. Investment in information systems and the financial performance of the firm. *Information & Management*, 28, 143-163.
- LAAMANEN, K. A. T., M. 2015. *Terms and Concepts in Business Process Management*, Teknolögiateollisuus- Federation of Technology Industries.
- LILLIECREUTZ, J. 1998. Orchestrating resource base, role, and position: a supplier's strategy in buyer-dominated relationships. *European Journal of Purchasing & Supply Management*, 4, 73-85.
- LOVELOCK, C. & GUMMESSON, E. 2004. Whither services marketing? In search of a new paradigm and fresh perspectives. *Journal of Service Research*, 7, 20-41.
- MACHER, J. T. & BOERNER, C. S. 2006. Experience and scale and scope economies: trade-offs and performance in development. *Strategic Management Journal*, 27, 845-865.
- MULLEY, C. & NELSON, J. D. 2009. Flexible transport services: A new market opportunity for public transport. *Research in Transportation Economics*, 25, 39-45.
- MUMFORD, M. D., SCOTT, G. M., GADDIS, B. & STRANGE, J. M. 2002. Leading creative people: Orchestrating expertise and relationships. *The Leadership Quarterly*, 13, 705-750.
- NAMBISAN, S. & SAWHNEY, M. 2008. The global brain. *Roadmap for Innovating Fast-14*.
- NDUBISI, N. O., EHRET, M. & WIRTZ, J. 2016. Relational Governance Mechanisms and Uncertainties in Nonownership Services. *Psychology & Marketing*, 33, 250-266.
- ODECK, J. 2006. Congestion, ownership, region of operation, and scale: Their impact on bus operator performance in Norway. *Socio-Economic Planning Sciences*, 40, 52-69.
- PARKER, D. & HARTLEY, K. 2003. Transaction costs, relational contracting and public private partnerships: a case study of UK defence. *Journal of Purchasing and Supply Management*, 9, 97-108.
- PARMIGIANI, A. 2007. Why do firms both make and buy? An investigation of concurrent sourcing. *Strategic Management Journal*, 28, 285-311.
- PARMIGIANI, A. & MITCHELL, W. 2009. Complementarity, capabilities, and the boundaries of the firm: the impact of within-firm and interfirm expertise on concurrent sourcing of complementary components. *Strategic Management Journal*, 30, 1065-1091.
- PEHRSSON, A. 2002. The PSE model: entry into emerging markets. *Strategic Change*, 11, 143-154.
- SCHMENNER, R. W. 1986. How can service businesses survive and prosper? *Sloan Management Review*, 27, 21.
- SCHMENNER, R. W. 2004. Service Businesses and Productivity*. *Decision Sciences*, 35, 333-347.
- SILLANPÄÄ, I., SHAHZAD, K. & SILLANPÄÄ, E. 2014. Supplier development and buyer-supplier relationship strategies—a literature review. *International Journal of Procurement Management*, 8, 227-250.
- SPOHRER, J. & KWAN, S. K. 2009. Service Science, Management, Engineering, and Design (SSMED): An Emerging Discipline—Outline & References. *International Journal of Information Systems in the Service Sector (IJISSS)*, 1, 1-31.
- SWEET, P. 2001. Strategic value configuration logics and the “new” economy: a service economy revolution? *International Journal of Service Industry Management*, 12, 70-84.

- TINNILÄ, M. 2001. Service processes in electronic travel services: A summary. *Information Technology & Tourism*, 4, 3, 203-214.
- TINNILÄ, M. 2012. A classification of service facilities, servicescapes and service factories. *International Journal of Services and Operations Management*, 11, 267-291.
- TINNILÄ, M. 2013. Measurement of Service Efficiency in Different Types of Banking Services: Mass Services, Service Factories, Service Shops, and Professional Services. *International Journal of Service Science, Management, Engineering, and Technology (IJSSMET)*, 4, 47-67.
- TINNILÄ, M. 2016. Towards Servitization of Mobility - Mobility as a Service *International Journal of Research in Business and Technology* 8, 958-963.
- TINNILÄ, M. & KALLIO, J. 2015. Impact of future trends on personal mobility services. *International Journal of Automotive Technology and Management*, 15, 401-417.
- TINNILÄ, M. & VEPSÄLÄINEN, A. P. J. 1995. A model for strategic repositioning of service processes. *International Journal of Service Industry Management*, 6, 57-80.
- VARGO, S. L. & AKAKA, M. A. 2009. Service-dominant logic as a foundation for service science: clarifications. *Service Science*, 1, 32-41.
- VERMA, R. 2000. An empirical analysis of management challenges in service factories, service shops, mass services and professional services. *International Journal of Service Industry Management*, 11, 8-25.
- WILLIAMSON, O. 1975. Markets and hierarchies: analysis and antitrust implications: a study in the economics of internal organization. *University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship*.
- WIRTZ, J. & EHRET, M. 2009. Creative restructuring—how business services drive economic evolution. *European Business Review*, 21, 380-394.
- WIRTZ, J. & EHRET, M. 2012. 'Service-based Business Models: Transforming Businesses, Industries and Economies. *Serving Customers: Global Services Marketing Perspectives*.
- WIRTZ, J., TUZOVIC, S. & EHRET, M. 2015. Global business services: increasing specialization and integration of the world economy as drivers of economic growth. *Journal of Service Management*, 26, 565-587.
- WITTKOWSKI, K., MOELLER, S. & WIRTZ, J. 2013. Firms' Intentions to Use Nonownership Services. *Journal of Service Research*.
- ZACHARIA, Z. G., SANDERS, N. R. & NIX, N. W. 2011. The Emerging Role of the Third-Party Logistics Provider (3PL) as an Orchestrator. *Journal of business logistics*, 32, 40-54.
- ZOTT, C. & AMIT, R. 2010. Business model design: an activity system perspective. *Long range planning*, 43, 216-226.

ISBN 978-952-60-7475-7 (pdf)
ISSN-L 1799-4810
ISSN 1799-4810 (printed)
ISSN 1799-4829 (pdf)

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