Chapter 14
A New Service Typology: Geographical Diversity and Dynamics of the German Service Economy

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1 Introduction

Although there is a wide consensus about the increasing predominance of the service economy in the developed economies, and although the structural shift from manufacturing to services has been broadly discussed, the inherent heterogeneity within the service economy still seems to be little understood. Services comprise a large set of seemingly different activities that vary with respect to qualification, productivity, innovativeness, growth, distinctive locational structures and geographical dynamics. This diversity is usually studied in one of two different ways. Micro approaches usually rely on case studies within selected service branches in order to reveal the particularities of these activities (e.g. Daniels & Bryson, 2005; Glückler 2004; Léo & Philippe, 2007; Rusten, Bryson, & Gammelsæter, 2005) whereas macro approaches attempt to capture the diversity of services by classifying services into homogenous statistical categories of similar attributes (e.g. OECD, 2000).

After a decade or more of research on service taxonomies, scholars and policy makers still lack pragmatic tools to capture and monitor the development of regional service economies. Service typologies are affluent yet incomplete and often partial in their focus. Many regional monitors are based on idiosyncratic definitions and sometimes incomparable classifications of service sectors (Chadwick, Glasson, & Lawton Smith, 2008; Jung, 2006; Laafia, 2002; Wood, 2006). This can be observed, to take a few examples, in studies on media, consulting, logistics etc. (Cook & Pandit, 2007; IHK München & Oberbayern, 2003). As a consequence, interregional comparisons and the development of evidence-based regional are rather difficult. Apart from the use of partial and sometimes inconsistent taxonomies, there is an additional debate about the boundary between service and non-service sectors (e.g. European Commission, 2005). In this context of taxonomic confusion and in an interest to help ease comparative regional

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monitoring and regional policies, we develop an integrative typology of the service economy. This chapter is a more detailed and refined elaboration of a previous article in which we design a three-dimensional service typology (Glückler & Hammer, 2011). Here, we develop a more refined and accurate methodology to obtain a more concise and valid classification of service types that capture different sectoral and spatial dynamics relevant for regional policy. The following sections pursue three concrete objectives:

First, we develop a classification which integrates several partial service typologies into a multidimensional taxonomic framework which is meant to deliver a useful differentiation of service types in the economy. Different terminologies and conceptual distinctions of service activities have been developed (Cook, Goh, & Chung, 1999; Lovelock, 1983), but only a minority of service classifications has made the effort to match its theoretical concepts with statistical data and to translate terminologies into standard industry codes (Browning & Singelmann, 1975; Illeris, 1996; Miles, 1993; Miles & Watt, 1995).

Second, we develop an own classification to distinguish between different, yet important forms of service types which have been comprehensively discussed in the scientific literature. Particularly, our typology enables us to distinguish service industries by their knowledge-intensity and demand orientation. In the absence of an own classification scheme for technology-intensive business-orientated services, we draw on existing typologies to distinguish non-technological service (e.g. management consulting) from technological services (e.g. computer software). Despite the theoretical stimulation of this classification and the usage of an own classification scheme, we seek to develop full value by matching important dimensions of services with a concise statistical classification of service types at the three-digit level of the European standard industry classification NACE.

Third, we demonstrate empirically how this typology captures significant differences in the spatial and sectoral dynamics of the service economy in Germany. By translating conceptual service types into the sectoral classification of NACE categories we offer the opportunity to empirically assess the capacity of the new typology to capture a significant part of the heterogeneity of sectoral and regional service development. The paper uses employment statistics for Germany to analyse services development in terms of growth, locational structure and geographical dynamics of regional employment. In particular, the paper analyses how reliably the typology manages to separate employment decline from growth, geographical agglomeration from decentralized distribution and regional expansion from local clustering. The final section will discuss the limitations and opportunities of this approach.

2 Toward a Pragmatic Classification of Service Types

Service research has a long tradition and reaches back at least to the well-known contributions on the structural transformation from agriculture over manufacturing to services (Clark, 1940; Fisher, 1939). However, many conceptions of characteristics

and types of services have been developed without translations into statistical industry standards such that empirical analysis is often limited to case examples rather than broader assessments of the service economy. The current NACE standard[1] was introduced in 1970 and adapted only slowly to the new realities of an ever more service-based European economy. Although 70 % of European value-added is generated in the service sector, the industry classification distinguishes many sub-classes in manufacturing but only broad classes of service activities. Many European countries began only toward the end of the 1990s to implement systematic observations of services development and published annual statistical reports. In Germany, for instance, the federal service statistics were launched only in 2000 and the first report was based on figures from 2001 (Gans-Raschke, 2006). Fortunately, the major revision of the European industry classification NACE Rev. 2 will provide more classificatory detail to service activities from 2008 onwards (Eurostat, 2008).

The first step toward a service typology is to define the boundary between service activities and non-service activities. Instead of pursuing a functional approach to services (e.g. Dicken, 1992; Illeris, 1996) which would be difficult to break down to the level of employment data, this approach follows a sectoral perspective. Based on the NACE standard of industry classification, business sectors are qualified as primary, industrial or service activities at the three-digit level. Within this framework, the service sector is defined as the sum of NACE groups G (wholesale and retail etc.) to O (other community, social and personal services).[2] In contrast to mainstream definitions, however, recent work by the European Commission (European Commission, 2005) includes utilities as network services into the service sector. In line with this extension, the service economy is defined here to comprise the NACE groups E *and* G to O.

The second step in conceptualizing a typology is to define the relevant criteria and to join similar services into more or less homogenous service types. Service typologies are as affluent as the range of criteria that are considered

[1] The *Nomenclature générale des activités économiques dans les Communautés Européennes* (General Industrial Classification of Economic Activities within the European Communities) was first developed in 1970. Since this first taxonomy was not compatible with other international industry standards, a joint United Nations Statistical Office/Eurostat working group got involved in the third revision of the International Standard Industrial Classification of All Economic Activities (ISIC Rev. 3), which was adopted by the United Nations Statistical Commission in February 1989. Subsequently, a working group promoted by Eurostat with representatives of Member States developed a revised version of NACE, called NACE Rev. 1., which was established in 1990. In 2002, the minor update NACE Rev. 1.1 was established. NACE Rev. 1.1 introduced a few additional items and changes to some titles. The aim of the update was to reflect new activities which did not exist before (e.g. call centres) and activities which had manifestly grown in importance. In 2002, a new revision was initiated until 2007.

[2] The NACE groups are defined as follows: E. Electricity, gas and water supply, G. Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods, H. Hotels and restaurants, I. Transport, storage and communication, J. Financial intermediation, K. Real estate, renting and business activities, L. Public administration and defence; compulsory social security, M. Education, N. Health and social work, O. Other community, social and personal service activities.

(Buckley, Pass, & Prescott, 1992; Cook et al., 1999; Illeris, 1996; Lovelock, 1983): services have been distinguished by the type of delivery, the nature of service activity, the type of client relationship, the user sectors, the method of finance, the degree of standardization and many other characteristics. There have been various macro approaches to service classifications in which individual dimensions have been combined to more complex typologies (e.g. Miles, 2007; Viitamo, 2007; cf. Illeris, 1996, ch. 3, for an extended discussion of earlier approaches). These approaches are limited to the extent that they define rather broad types often only at the level of one or—at most—two digits of the standard statistical classification of economic activities. Our attempt is to build on earlier work, combine partial perspectives into an integrated typology and achieve a higher resolution by matching service types to three-digit industry codes of economic sectors.

Within the debate about the multiple distinctive aspects of services, three dimensions appear especially critical and receive full attention by researchers as well as by regional analysts and policy makers: demand orientation, knowledge-intensity, and technology-intensity. Each of these dimensions is expected to imply different economic effects. In the past, business services have experienced higher growth in employment and revenues than consumer services. Knowledge-intensive services seem to yield higher value-added and offer more opportunities for innovation than operational services both for themselves and for their client industries. Finally, technology-based services are hypothesized to yield higher productivity gains than non-technological or technology-using services. In consequence, the general aim of a new typology is to conceive meaningful service types which capture significant differences in growth, innovation and productivity gains. This paper focuses on the analysis of growth differentials in sectoral employment and the geographical dynamics of sectoral growth in Germany.

2.1 Demand Orientation

One of the first criteria to classify services is the demand orientation and the position within the supply chain (Illeris, 1996). While some services are delivered directly to final consumers, other services are used by intermediary clients such as firms and other organizations (Ronning, 2003). Research on business services has proliferated over the last decade because the demand for intermediary services had grown tremendously. Without going into the details of the different explanations of business service growth, three major trends may be observed.

First, corporations have been focusing increasingly on the core competences and have begun to externalize (or outsource) formerly internal support and administrative services (Fink, Köhler, & Scholtissek, 2004; Prahalad & Hamel, 1990). In their study of the headquarters of large corporations located in London, Aksoy and Marshall (1992) found downsizing and externalization of employment up to 90 % during the 1980s and 1990s. If all growth in business services was merely the result of the "hollowing out" of head offices in the manufacturing sector—as Williams,

Williams and Haslam (1990) and Marshall (1994) call this process—service growth would only be a statistical effect of reassigning activities from the industrial to the service sector. Second, there has also been an emergence of new services in the market. Given the ever more global competition, accelerating innovation cycles and an ongoing specialization in product markets, management labour has experienced an increasing division of labour (Wood, 2002a). As a consequence, corporate management has produced new demand for expert services, e.g. financial services, and has stimulated an ongoing growth and diversity of business services. A final element driving external service demand for organizations is the development of information and communication technologies with two major effects: new technologies have led to the innovation of new additional service offerings for business, as for instance, the delivery tracking of commodities along the supply chain or real-time inventory assessment. Moreover, the proliferation of computer-support for many business processes has leveraged external demand for business services comprising hardware implementation and maintenance, software, data management and technological solutions to business processes.

More difficult than identifying new sources of intermediary demand is it to clearly define statistical delineations between consumer and business services. Any taxonomic approach faces a mixed-market problem because empirically, many service sectors are "both-and" (Illeris, 1996) in that they sell to final consumers *and* intermediate firms (Miles, 1993). Financial services, transport and logistics as well as different retail businesses are sectors that broadly sell to both, intermediary and final consumers. Extant classifications (e.g. Ganz 2005; Haas & Lindemann, 2000; Hertog et al. 2006) are problematic because of their lack of transparency about the empirical boundaries between business and final demand. So far, there is no comprehensive typology of business and consumer services that would provide a clear rationale to qualify e.g. inland water transports (61.2) as business or consumer services? One feasible solution to this problem is to collect data on real demand for every service industry although this task has not been done for many years and only for highly aggregated sectors (e.g. Fontaine, 1987).[3] We use input–output statistics from the national accounting system in Germany in order to measure the relative proportions of intermediary (business) and final (consumer) demand for each of the 93 three-digit service branches (Destatis, 2005). Within the input–output system, we define business demand as purchases by all economic sectors, private organizations and fixed investments. In contrast, final demand is represented by the consumption through households for each of the 93 service sectors. Based on this transformation, we are able to assign business and consumer demand for each service industry. Database activities, for instance, sell 98 % of

[3] In the mid 1980s, Fontaine (1987) assessed the French demand structure for rather broad service categories empirically (quoted in Illeris, 1996, ch. 3). Another way to assess the demand orientation of an industry would be to use input-out-tables. To our knowledge, however, the demand structure has so far not been analyzed for services at the NACE three-digit level.

combined output[4] to business (98 %) and only 2 % to final consumers. By using a threshold, we classify all services as business services if they sell more than 50 % of combined output to other business sectors. In turn, services are defined as consumer services if their output to households is higher than that to business sectors. This dichotomization implies some weaknesses: on the one hand, the composition of demand may vary over years and produce different percentages e.g. for final consumption; on the other hand, the composition of demand is certainly specific for each regional and national economy and therefore only valid for the German context. Other countries may be characterized by different demand structures and the classification of certain service sectors may therefore differ. The resulting classification complies with the level of the three-digit industries and it incorporates the whole range of knowledge-intensive and also operational services such as cleaning, security, facility management etc. (Fig. 14.1).

2.2 Knowledge Intensity

The qualification and expertise necessary for the provision of services has been a second important dimension in services research. Many researchers have looked at the particular conditions of knowledge-intensive services and their development over time and space (e.g. Balaz, 2004; Bryson & Rusten, 2005; Hauknes & Antonelli, 1997; Rubalcaba, 2007). The term knowledge-intensive generally alludes to high levels of individual expertise of service professionals as well as the general complexity and specificity of the service offerings (Tether & Hipp, 2002; Wood, 2002b). One approach to capture knowledge-intensity is to investigate the quality of human capital in service products by measuring the share of employees with a tertiary education in overall employment (Haas & Lindemann, 2000). Generally, the higher the knowledge-intensity of a service the more difficult it is to standardize these services. Problems become more specific and solutions grow more complex. The specificity and sometimes uniqueness of expertise services require and enable more innovativeness and competitiveness because standardization and cost strategies are hard to realize. Knowledge-intensity stimulates innovation in order to generate rents from temporary knowledge monopolies. This is true not only for service providers but often also for service users in agriculture and manufacturing. One typology available that has provided a classification of sectors by knowledge-intensity has been developed by the *Niedersächsisches Institut für Wirtschaftsforschung*. Although it has been used by several research organizations in Germany (e.g. ZEW, DIW, Fraunhofer ISI etc.), for the framework studies on the German innovation system carried out by the

[4] Combined output refers to the sum of intermediary and final demand, excluding sales to the public sector and exports.

Federal Ministry of Education and Research (Legler & Frietsch, 2006) and by ourselves in an earlier approach (Glückler & Hammer, 2011), we found the typology intransparent with respect to the raw employment information entering the classification.[5] In addition, we began to be interested in adopting a more widely accepted approach to capture the knowledge-intensity of business sectors.

Therefore, we make use of Richard Florida's conception of the creative class as encompassing those people who perform non-routine tasks, who identify with their professions and who use expertise to develop customized solutions to complex problems (Florida, 2002). Based on the crucial assumption that "*it is what people actually do, rather than their industry affiliations or their educational attainment, that makes them economically productive*" Boschma & Fritsch, 2009, 393), we consider those professionals as knowledge workers who require individual creativity, problem-solving capacities and discretionary measures to accomplish with specific tasks (Glückler, Ries, & Schmid, 2010). In its empirical assessment, Florida first distinguishes three groups of creative people: the creative core, the creative professionals and the bohemians. Second, he matches concrete professions with these three levels of creative people. The group of bohemians comprises writers, photographers or sportspeople etc., the group of creative professionals includes employees such as consultants or professionals for technical problem solving, and the creative core consists of engineers, mathematicians, teachers or academics. To determine the knowledge-intensity of the 93 service branches, we use a matrix of employment data that cross tabulates the number of employees for each of the 93 sectors in each of 334 statistical professions (as defined by the Federal Employment Agency (KldB88).[6] We calculate the ratio of creative employment, i.e. the number of jobs in occupations that belong to the creative class, for every service branch and use again a threshold of 50 % to distinguish operational from knowledge-intensive services. Services are classified as knowledge intensive if the share of employment in creative occupations surpasses 50 %, in case of less than 50 % services are classified as operational. In contrast to existing classifications, such as the classifications developed by the *Niedersächsische Institut für Wirtschaftsforschung* (NIW/ISI-List), which focus on the qualification of employees in every branch (share of academic graduates as well as employees with special skills like planning, design or construction), we focus on the percentage of the creative class in every service branch.

Given the knowledge intensity and demand-orientation for every service industry, we are able to assign every service sector in a matrix. Figure 14.1 displays the distribution of service sectors by their relative composition of demand and knowledge-intensity. No single sector operates without any creative employment. Obviously, even in operative services like transportation or facility management

[5] In the work of Legler and Frietsch (2006), the procedure of classifying knowledge-intensity has only been accessible for us in an incomplete way. We could not retrieve a documentation of the criteria and values for classification.

[6] For a detailed discussion and documentation of this methodology see Glückler et al. (2010).

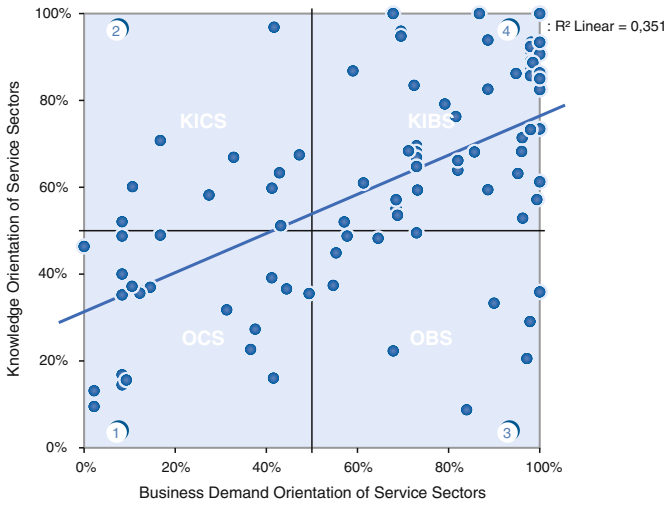

Fig. 14.1 Knowledge intensity and demand orientation for the complete service industry

there are highly qualified people who are responsible for calculations, management or governance. Figure 14.1 also demonstrates that the level of demand orientation and the share of creative employment are statistically associated. With an increasing business orientation, the knowledge-intensity also rises ($R^2 = 0.34$). Typical examples of operational and consumer orientated services are hotels, bars, restaurants or cafes as well as retail businesses. These services predominantly employ skilled personnel without university grades. Notably, even knowledge-intensive consumer oriented services never reach the high ratios of knowledge-intensity that business oriented services achieve. As a consequence, consumer services tend to be rather operational whereas business services tend to be more knowledge-intensive. On average, while 41 % of the workforce in consumer services is knowledge-intensive, 69 % of total employment in business services is knowledge-intensive. With a few exceptions such as insurance and pension funding, this finding suggests that business services pose more complex and unique tasks that require higher competences and problem-solving capacities than consumer-oriented services. Nonetheless, some operational business services show very little need for creative professionals. These findings apply to transport services, industrial cleaning, security activities and labor recruitment and provision of professionals.

2.3 Technology Intensity

The third dimension of our analysis is technology-intensity. While many services simply use technologies such as information and communication technologies to transmit part or all of their service, other services are focused on developing or

improving these technologies (e.g. software firms and databank development). The technology dimension is particularly critical for the economics of services because services are often unable to experience productivity gains (Baumol, 1996). While work is an input in the manufacturing sector, which may be replaced through the application of technology at the same or higher output, work is both, input *and* output in most services. Generally, increases in productivity over time may be achieved through increased capital per worker, improvements in technology, labour skill or management, and economies of scale as output rises (Heilbrun, 2003). In services, however, these sources of productivity gains are often not available. Despite these restrictions, several OECD studies provide evidence for sometimes remarkable productivity increases in technological services (Wölfl, 2003). Services that focus strongly on the development or application of technology seem to be sources of productivity growth. An economic perspective which is sensitive to productivity gains requires classifying services according to their technology-intensity (Freel, 2006; Tether & Hipp, 2002; Viitamo, 2007). So far, traditional service classifications have largely disregarded the technology-intensity. Only recently, new research has proposed a promising attempt to classify the service sector into distinct productivity types (Viitamo, 2007).

Similar to our approach, Viitamo recombines three dimensions—capital intensity, degree of standardization, degree of tangibility—into eight service types with distinct productivities. Despite its conceptual appeal, however, one of the critical problems of these approaches is that they are difficult to match with NACE industry codes and therefore hard to assess empirically. In contrast, the OECD (Hauknes & Antonelli, 1997) have suggested a typology based on NACE codes that distinguishes non-technological or technology-using from technology-based services. In the absence of an own classification scheme, the approach taken in this paper has been adapted from the OECD's technology classification of manufacturing industries: they have used the research and development (R&D) intensity as the defining criterion to distinguish technologically intensive from less intensive services (Hauknes & Antonelli, 1997). This definition, however, is not fully independent of knowledge-intensity because R&D intensity inherently requires highly qualified human capital. This latent effect between the intensities of knowledge and technology in services causes the third dimension of our typology to be empirically incomplete.[7]

[7] Operational services are defined by a lower share of employees with a tertiary education. Conceptually, it is therefore difficult to qualify as technology-intensive as long as R&D intensity is the defining criterion. To our knowledge, no alternative research has been published on the technology-intensity of operational services. While operational services are subject to standardization and the use of technology, they are usually not found to be producers of technology. In some cases, however, services such as logistics and retailing have been found to develop new technologies internally. Hence, it would be possible to empirically find technology-intensive firms within these service sectors. It is certainly an area for future research to conceive alternative measures of technology-intensity.

2.4 A New Service Typology

A combination of the three dimensions demand, knowledge-intensity and technology-intensity produces a cube with eight theoretical service types of which five are empirically defined (Fig. 14.2): These types are operational (OCS) and knowledge-intensive consumer services (KICS) on the one hand, and operational (OBS), knowledge-intensive (KIBS) and technological knowledge-intensive business services (TKIBS) on the other. In contrast to our prior classification where we recombined existing classifications (Glückler & Hammer, 2011), this revised typology is rooted in original employment statistics for Germany and therefore represents a fully coherent classification of services sectors. As a consequence of our approach to reassess the composition of demand (based on input–output statistics), and the composition of knowledge-intensity (based on the share of jobs considered as part of the creative class), several service sectors have been reclassified.

To ensure transparency, some major changes are discussed. Apparently, the most important reallocations occur in OCS and KIBS (Table 14.1). On the one side, operational consumer services lose more than a half of the sectors to other types and on the other hand, knowledge-intensive service sectors quadrupled in number of sectors. This accounts for a remarkable shift of service branches from consumer services to knowledge intensive business sectors. While in the case of KICS and OBS the number of sectors in each type remains constant, some sectors change from OBS to KIBS and KICS, and other industries are reclassified from OCS to KICS. We checked for all reallocations and found a remarkably improved fit of the overall classification. Many prior misclassifications now appear reassigned correctly to the corresponding service type: while cargo handling was classified as consumer service in the old typology, it is now correctly reclassified as a business service. In line with this example, many previously misclassified sectors have been corrected. We read this result a substantial improvement of the typology[8] although some problematic assignments remain primarily because of missing data in the national accounts statistics (e.g. space transport).[9] In contrast to OCS, KICS, OBS,

[8] Other examples are scheduled air transport or veterinary activities or wholesale that have changed correctly from operational consumer services (OCS) to knowledge-intensive business services (KIBS).

[9] Our service typology is based on the three-digit level of sector classification; input–output tables were used to distinguish between consumer and business services. But the national account system does not break all branches down to the three digit-level. For some branches, demand orientation is only available at the two-digit level. Space transport for example relates to non-scheduled flights, data is only available for both services together (62.2-3). As the national account system joins non-scheduled flights and space transport (62.2-3) both are classified as consumer services, although space transport should be classified as a business-oriented service sector. Given the fact that the national account system does not provide data on a three-digit level for every service branch, we use two-digit data for the following ten sectoral groups to estimate value at the three-digit level: wholesale and commission trade, retail trade, financial intermediation, insurance and pension funding, activities auxiliary to financial intermediation, computer and related activities, public administration and defense, sewage and refuse disposal, activities of membership organization as well as other service activities (NACE-Code: 51, 52, 65, 66, 67, 72, 75, 90, 91 and 93). For the stated economic activities we assigned the ratio of demand orientation to the three-digit level.

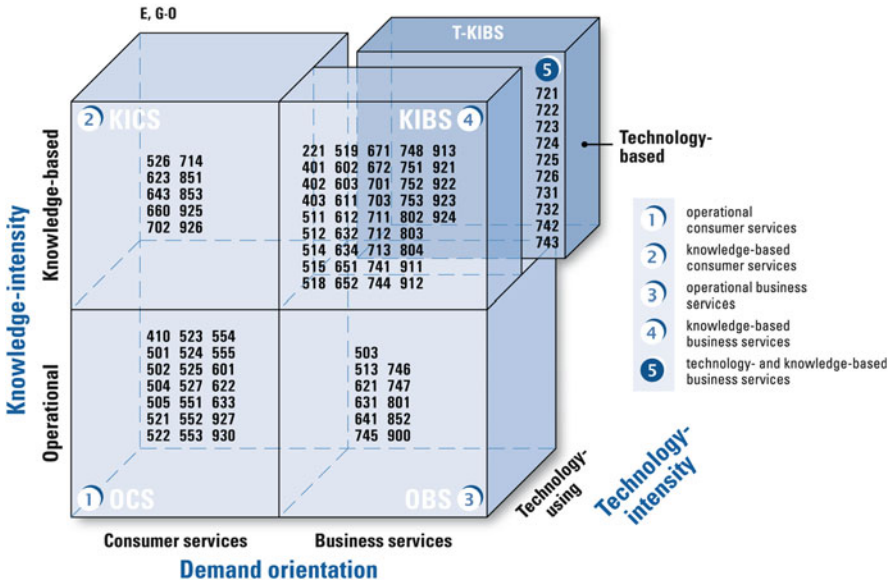

Fig. 14.2 Five service types in the service economy. [In the standard European industry classification, NACE 22.1 (publishing) forms part of the manufacturing sectors (22 publishing, printing and reproduction). Within this complex, publishing is an activity that essentially mediates the generation of content between creators and the final producers of physical or digital media (printing). In compliance with existing empirical studies on the media services sector (München & Oberbayern, 2003), we identify publishing (22.1) as a service and have therefore included it into the service classification. This corresponds also with the 2008 Revision of NACE Rev.2: publishing activities are now explicitly separated from printing and are classified into section J - Information and communication activities.]

Table 14.1 Change of service sectors between the old and the new classification

	# Sectors in the old classification	# Sectors changing with OCS	# Sectors changing with KICS	# Sectors changing with OBS	# Sectors changing with KIBS	# Sectors in the new classification
OCS	46	–	3	6	18	21
KICS	15	2	–	1	8	10
OBS	12	0	2	–	4	11
KIBS	10	0	1	0	–	41
T-KIBS	10	0	0	0	0	10

the sectoral composition of TKIBS remains identical. Since we lack original information on the R&D-intensity for each service sector, we rely on the Haukness and Antonelli's (1997) classification of technology-intensive services.

The typology provides a complete classification of all service branches and thus produces a complete picture of the service economy. The typology has been developed from three partial classifications which are widely accepted in services research and which respond to critical aspects of economic analysis: The demand

orientation responds to growth differentials between consumer and business services over the last decade; knowledge-intensity captures the different levels of innovativeness, standardization and value-added between operational and knowledge-intensive services; finally, technology-intensity captures the different opportunities for productivity gains between non-technological or technology-using services and technology-based services. Apart from reconciling existing typologies into one coherent typology, the purpose of this paper is to assess the empirical viability and pragmatic use-value of this typology. Given that the service economy is extremely heterogeneous, the paper aims at capturing a significant part of the diversity in sectoral and regional employment structure and dynamics with the five service types.

3 Data and Methods

The empirical analysis uses the employment statistics of the German *Bundesagentur für Arbeit*. The statistics include the full population of employees subject to social insurance contribution, a group that corresponds with around 65 % of the total active workforce in Germany. Other forms of work for which social security is not mandatory and which are therefore not included in these data, are state officers, self-employed, freelancers, unpaid mutual help and people employed in policy programs of so-called mini-jobs (Destatis, 2007). Employment data were collected for the years 1999, 2002 and 2005[10] and were clustered by three-digit NACE codes into the five service types deduced in the previous section. The data are subject to some limitations. Data for the city-states Bremen, Hamburg and Berlin are incomplete. In addition, some sectors such as space technologies had to be excluded because of a lack of data for most regions. For reasons of anonymity, data are kept blind whenever a sector is represented by less than three local plants in a spatial unit (here NUTS-3). These missing data may produce errors in aggregate counts which are mostly small but may lead to 50 % deviation in very rare cases. The analysis covers service employment in Germany at the NUTS-3 level[11] of 412 regions (*Kreise*). In later analyses, these regions are categorized into nine settlement types as defined by the BBR classification of settlement structures.[12] The settlement types are defined by the size and density of the regional population as well as by the functional centrality of the settlements (Table 14.2). Service

[10] The month of reference was 31 June for each year.

[11] The Nomenclature of Territorial Units for Statistics, (NUTS) is a geocode standard for referencing the administrative divisions of countries for statistical purposes. The standard was developed by the European Union, and thus covers the member states of the EU in detail. NUTS level 3 corresponds with the administrative level of *Kreise* in Germany.

[12] The BBR (*Bundesministerium für Bauwesen und Raumordnung*) is the German Federal Office for Building and Regional Planning.

Table 14.2 Service employment by service types, in different years (own calculations)

	Employees 1999	Employees 2002	Employees 2005	Share in services	Abs. change (1999–2005)	Rel. change (1999–2005)
Total economy	27,402,367	27,505,182	26,112,916		−1,289,451	−4.71 %
Non-services	9,955,345	9,337,564	8,471,595		−1,483,750	−14.90 %
Services	17,447,022	18,167,618	17,641,321	100.0 %	194,299	1.11 %
OCS	3,932,027	3,991,360	3,749,951	21.3 %	−182,076	−4.6 %
KICS	3,447,037	3,655,674	3,664,114	20.8 %	217,077	6.3 %
OBS	1,737,185	1,873,914	1,888,420	10.7 %	151,235	8.7 %
KIBS	7,531,262	7,732,854	7,451,143	42.2 %	−80,119	−1.1 %
TKIBS	799,511	913,816	887,693	5.0 %	88,182	11.0 %

employment varies considerably in its regional distribution and growth dynamics at the level of the *Länder* (NUTS 1).

There have been strong rates of decline in the Eastern regions, a pronounced growth in the South and a more heterogeneous development in central and northern Germany. Eastern regions have lost jobs in the order of 10 % and higher since 1999. Even the high-growth types of KIBS and TKIBS have been under decline in the East. Only KICS experienced an increase over the period. In contrast, the southern regions of Bavaria and Baden-Wuerttemberg as well as North Rhine-Westphalia have experienced a far above average job growth in services and the smallest rates of decline in non-service jobs[13] in Germany. The more balanced regions of central and northern Germany grew moderately in the growth sectors of the service economy (OBS, KIBS and TKIBS) and lost a considerable amount of jobs in the non-service sectors. On balance, these regions suffered from net job losses. In consideration of this regional development, we focus our empirical analysis on the moderate-growth regions in Central Germany, namely North Rhine-Westphalia, Hesse, Rhineland-Palatinate, Lower Saxony as well as on the Eastern regions under economic pressure, namely Saxony, Saxony-Anhalt, Brandenburg and Thuringia. Together these regions represent more than half of Germany's population, 56 % of total service employment and almost 10 of the 18 million service workers.

The aim of the regional analysis is to compare differentials in employment growth and in the geographical dynamics of this growth. Employment growth is measured as the growth rate of the number of employees per sector j between 1999 and 2005 in percent. Two other measures are used to assess the geographical dimension of job growth. The *coefficient of localization* (Isard, 1960) measures the extent to which an industry is localized compared with the spatial (multi-regional) distribution of all economic activities: $CL_j = \frac{1}{2}\sum_{i=1}^{n}\left|\frac{E_{ij}}{E_j} - \frac{E_i}{E}\right|$, where E indicates the number of employees in region i and industry j. The coefficient CL_j for

[13] Here, non-service jobs represent the residual sectors of agriculture, fishery and forestry, industrial manufacturing, mining and construction (NACE Rev. 1.1 groups A, B, C, D and F).

any industry j is calculated by subtracting the employment share of region i in total employment ($\frac{E_i}{E}$) from the employment share of this region in the respective industry j ($\frac{E_{ij}}{E_j}$). The sum of the positive (or the negative, not both) deviations represents the coefficient which varies between 0 and 1. If most jobs in a sector are highly clustered in only a few regions, the coefficient converges to one. If jobs spread equally across the regions, the coefficient approaches zero. In order to analyse the geographical dynamics, the change rates of the coefficient of localization between 1999 and 2005 are computed and then compared for each service type. Increases in the coefficient of localization indicate processes of spatial concentration and clustering whereas value decreases reflect processes of geographical expansion and diffusion.

4 The New Service Typology in Practice

In this section we aim at assessing the empirical value of the suggested typology to capture part of the heterogeneity of services development in time and space. Concretely, we expect the five service types to systematically follow differential sectoral growth, different structures of geographical localization and different geographical dynamics of locational patterns.

4.1 Sectoral Employment Dynamics in Germany

Research on growth sectors in the service economy has either focused on specific industries such as advertising (e.g. Daniels, 1995; Faulconbridge, 2006), accountancy (e.g. Chaston, Megicks, & Williams, 2005; Daniels, Thrift, & Leyshon, 1989), management consulting (e.g. Armbrüster, 2006; Keeble, Bryson, & Wood, 1992), law firms (e.g. Warf & Wije, 1991), among many others. Or it has taken a rather broad view of services: while some studies put emphasis on the knowledge-intensity (Tether & Hipp, 2002; Windrum & Tomlinson, 1999) others focus on the business orientation of services (Daniels & Bryson, 2005; Miles, 2007; Rubalcaba & Kox, 2007; Wood, 2002b). Partly, business services and knowledge-intensive services overlap in what is called knowledge intensive business services (e.g. Bryson & Rusten, 2005; Chadwick et al., 2008; Strambach, 1994). However, many business services are not knowledge-intensive and many knowledge-intensive services are not directed to firms. Our typology offers a more fine-grained analysis of employment dynamics because the two dimensions of demand-orientation and knowledge-intensity are now integrated and recombined into one typology. We first report descriptive statistics for the distribution of employment dynamics across the five service types in Germany for the period 1999–2005. Afterwards, we seek a more structural account of the diverse growth rates between service activities.

The employment statistics illustrate the overall significance of service work in Germany. In 2005, more than two thirds of the German workforce (67.6 %) was

employed in sectors of the service economy (Table 14.2): The majority of service jobs is found in knowledge-intensive business services such as publishing, financial activities, real estate activities, banking, health and educational services (KIBS). Operational consumer services are the second large type (OCS). Here, many jobs are related with retail sale, food services or transport activities. In comparison with operational services, knowledge intensive services (KIBS, KICS, and TKIBS) employ still a substantial share of service workers (68 %). Otherwise operational business services (OBS) and technology intensive business services (TKIBS) have experienced strong growth since 1999. TKIBS grew strongest since 1999 closely followed by operational business services. However, differences in employment growth are less obvious between operational and knowledge-intensive services. In absolute terms, employment grew in all service types between 1999 and 2002, a period characterized by strong economic growth during the "new economy" wave. Between 2002 and 2005, however, only KICS and OBS continued to grow, but at a much lower growth rate than between 1999 and 2002. At the same time, all other types suffered from employment decline. In OCS and KIBS the employment loss outweighs prior growth leading to a net loss over the whole period. Notably, job losses were the highest in operational consumer services. A big share of overall employment growth rests on a few service sectors in each service type. The largest employment group, KIBS, illustrates the heterogeneity of these dynamics: apart from continuously growing (e.g. renting of automobiles or financial services) and shrinking sectors (e.g. real estate activities or monetary intermediation), there is another set of sectors experiencing oscillations of growth and decline during the period 1999–2005 (e.g. publishing, wholesale on a fee or contract basis, sea and coastal water transport). The few growth sectors accounted for more than 92 % of all new jobs in this type. Across the entire German service economy, only 13 out of 93 sectors accounted for 86 % of net job growth.

Employment growth in the knowledge-intensive consumer services and operational business services (KICS and OBS) have been higher in absolute numbers than in the other services (OCS, KIBS and TKIBS), mainly because service work in these sectors is very labour-intensive (human health activities, social work activities, transportation, retail sale or library, archives, museums and other cultural activities). Together, OBS and KICS represent nearly one third of the entire workforce in the service economy. In relative terms, however, business services like OBS and TKIBS have grown remarkably stronger than consumer services. The increasing demand for business services is most visible in the steep increase of jobs in operational business services (OBS) and technological knowledge-intensive business services (TKIBS). Within this sectors, labour recruitment and provision of personnel account for a major part of job growth. A few service sectors accounted for the lion share of job growth in the entire service economy: social services (KICS), health services (KICS), consulting (KIBS) and software development (TKIBS). Conversely, also the declining sectors spread across the types, such as specialized retailers (OCS), credit institutes (KIBS), or publishers (KIBS).

What is the underlying association to account for these growth differences? Employment growth proves to be statistically independent from the employment size of a sector. This is important to note since it refutes simple life cycle effects of young and small sectors growing strongly and big and older sectors undergoing decline. Instead, job growth in services varies significantly across the service types. Statistical tests for mean differences demonstrate that the average growth rates of the sectors differ significantly such that each type seems to entail specific employment effects (Table 14.3). Operational consumer services lost employment in all NUTS-1 regions (*Länder*) under research. Operational business services (OBS) and technology-intensive business services (TKIBS) experienced the strongest job growth in the northern and central regions of Germany as well as in the new Eastern *Länder*; especially TKIBS overtook all other service types with growth rates between 24 % and 132 %. However, the dynamics of job growth differ between regions in the East of Germany and the other regions under research. Especially in Saxony and Thuringia, TKIBS such as hardware and software consultancy or data processing doubled in employment between 1999 and 2005. Similar to TKIBS, operational business services grew strongly although this development varies between the Western and Eastern regions. In the former, OBS grew more than 10 % while in the latter operational business services saw only slight employment growth. The slow growth of OBS in the new Eastern *Länder* of Germany has also been found by other studies (Geppert, 1999), although with another classification of operational business services. In our previous work we found high growth rates in KIBS as well as in all business services (Glückler & Hammer, 2011). However, the improved service typology leads to higher heterogeneity within KIBS mainly because the number of service sectors has quadrupled. Different growth dynamics of single service sectors such as financial intermediation or real estate activities weakens the results concerning the growth dynamics.

4.2 Locational Structure of Services

The former section has demonstrated differential sectoral growth for the defined service types. The next two sections will examine the differential locational structure and geographical dynamics of service employment in the German *Länder*. Service sectors are not distributed equally across the regions of a territory because they differ in the spatial reach of delivery. The economic base-model offers a regional income perspective and distinguishes two types of services: they are basic if they increase regional income by means of exportation beyond the region (e.g. call centres, tourism). In contrast, they are non-basic if demand is only local and can therefore not support interregional trade (e.g. restaurants, retail). Given the farther reach of basic services, they are expected to display higher levels of spatial concentration than non-basic sectors. This simple model has been modified because the qualification of basic or non-basic depends on the

Table 14.3 Test for mean differences of employment growth rates (in percent) by service types

Region	Type	No. sectors	Mean	S.E.	*F*	d.f.
Lower Saxony	OCS	21	−3.94	10.12		
	KICS	9	9.77	9.63		
	OBS	11	20.89	22.76		
	KIBS	41	0.48	23.44		
	TKIBS	10	24.39	62.41	3.093*	91
North Rhine-Westphalia	OCS	21	−0.35	18.28		
	KICS	9	4.59	12.81		
	OBS	11	11.78	15.90		
	KIBS	41	0.36	23.35		
	TKIBS	10	46.03	81.63	4.356**	91
Hesse	OCS	21	−1.03	18.68		
	KICS	9	4.24	13.06		
	OBS	11	11.33	24.78		
	KIBS	41	5.70	20.77		
	TKIBS	10	31.41	52.54	2.935*	91
Rhineland	OCS	21	1.68	21.91		
Palatinate	KICS	9	10.93	12.15		
	OBS	11	5.51	32.23		
	KIBS	40	9.95	50.46		
	TKIBS	9	64.55	103.81	2.841*	89
Brandenburg	OCS	21	−2.97	25.28		
	KICS	9	−6.88	15.29		
	OBS	11	−0.74	34.67		
	KIBS	41	−4.32	44.10		
	TKIBS	9	71.02	140.67	3.730**	90
Saxony	OCS	21	−6.23	31.77		
	KICS	9	−10.60	14.05		
	OBS	11	4.71	25.75		
	KIBS	41	−5.89	37.84		
	TKIBS	10	132.01	360.69	2.923*	91
Saxony-Anhalt	OCS	20	−16.61	20.74		
	KICS	9	−2.70	18.50		
	OBS	10	2.25	25.48		
	KIBS	40	−1.44	40.77		
	TKIBS	9	34.16	48.21	3.343*	87
Thuringia	OCS	21	−14.91	20.47		
	KICS	9	−10.32	18.64		
	OBS	11	3.30	38.16		
	KIBS	39	−11.51	23.57		
	TKIBS	9	126.85	366.17	2.899*	88

Note: *d.f.* degrees of freedom, *S.E.* standard error
*$p < 0.10$; **$p < 0.01$

geographical scale of a region. It is easier for a service to be basic if a region is defined at the municipal level rather than at the national level. Moreover, many services which are not directly exported may still leverage exports in the basic sectors indirectly (Illeris, 2005). Many producer services, for instance, enhance the competitiveness of manufacturing sectors and thus contribute to industrial exports indirectly. Our typology provides an alternative perspective by focusing on the knowledge-intensity of services. High qualifications are less frequent and less equally distributed in society and space. Our typology expects knowledge-intensive services (KICS, KIBS and TKIBS) to display higher levels of geographical concentration than operational services (OCS and OBS).

The degree of locational concentration of a sector is measured by the coefficients of localization (c_L) at the level of NUTS-3 regions (*Kreise*). This coefficient is subject to a scale effect. The more people employed in a service sector, the smaller is its geographical concentration. Accordingly, many large sectors (e.g. retailing, gastronomy or logistics) follow more even distributions across the regions in Germany. Despite this scale effect, the locational concentration is also associated with the type of service as defined in our typology. Operational services (OCS and OBS) are distributed more evenly across the regions whereas knowledge services are significantly more concentrated in space (KICS, KIBS, TKIBS). This difference is obvious for North Rhine-Westphalia, Hesse and Saxony-Anhalt. In the other countries, the spatial distribution of services differs. In Saxony, Rhineland-Palatinate, Brandenburg, Saxony and Thuringia, consumer services are more distributed than business services, a result similar to prior investigation (Glückler & Hammer, 2011). A test for mean differences of the coefficients of localization demonstrates that operational business services (OCS) are most evenly distributed across space with a coefficient ranging from $c_L = 0.23$ in Saxony to $c_L = 0.31$ in Rhineland-Palatinate (Table 14.4). These findings correspond with the economic-base model as well as with results presented by Alecke und Untiedt (2008) who found that consumer services are widely distributed across space. Given the fact, that consumer services primary serve households, the spatial distribution of this service type can be explained by the spatial distribution of demand. The distribution of operational services differs in Germany. Employment in operational business services spreads across space with a $c_L = 0.29$ in Saxony-Anhalt and a $c_L = 0.37$ in Rhineland-Palatinate and Thuringia. This includes services such as wholesale trade, post and courier activities or cargo handling and storage. Knowledge-intensive services are spatially more concentrated than operational services. For KIBS the coefficient of localization ranges from $c_L = 0.35$ to $c_L = 0.43$ and even higher for TKIBS. However, the increased spatial concentration of knowledge-intensive service sectors does not apply to KICS. Depending on the federal state, KICS are sometimes more concentrated than OBS, for example in North Rhine-Westphalia ($c_L = 0.48$) or Saxony-Anhalt ($c_L = 0.48$), sometimes they are less concentrated such as in Brandenburg ($c_L = 0.48$) or Lower Saxony ($c_L = 0.48$). This finding does not fully correspond with the spatial implications of the economic base model. While the economic base model does also find operational services to be basic, e.g. call centres and tourism, our typology illustrates that knowledge-intensity increases

Table 14.4 Test for mean differences in coefficients of localization between the service types and by region

Region	Service type	No. sectors	Mean	S.E.	*F*	d.f.
Lower Saxony	OCS	21	0.27	0.16		
	KICS	9	0.30	0.15		
	OBS	11	0.31	0.18		
	KIBS	41	0.38	0.22		
	TKIBS	10	0.50	0.17	2.932**	91
North Rhine-Westphalia	OCS	21	0.26	0.18		
	KICS	10	0.37	0.27		
	OBS	11	0.30	0.19		
	KIBS	41	0.38	0.21		
	TKIBS	10	0.45	0.13	2.074*	92
Hesse	OCS	21	0.28	0.18		
	KICS	9	0.32	0.14		
	OBS	11	0.31	0.16		
	KIBS	41	0.40	0.18		
	TKIBS	10	0.41	0.15	2.177*	91
Rhinland-Palatinate	OCS	21	0.31	0.19		
	KICS	9	0.36	0.18		
	OBS	11	0.37	0.23		
	KIBS	41	0.43	0.23		
	TKIBS	10	0.53	0.18	2.260*	91
Brandenburg	OCS	21	0.26	0.17		
	KICS	9	0.29	0.18		
	OBS	11	0.32	0.23		
	KIBS	41	0.40	0.21		
	TKIBS	10	0.47	0.22	2.845**	91
Saxony	OCS	21	0.23	0.16		
	KICS	9	0.31	0.19		
	OBS	11	0.32	0.22		
	KIBS	39	0.35	0.18		
	TKIBS	10	0.46	0.14	2.915**	89
Saxony-Anhalt	OCS	20	0.24	0.15		
	KICS	9	0.36	0.22		
	OBS	10	0.29	0.14		
	KIBS	40	0.39	0.19		
	TKIBS	10	0.53	0.21	4.792***	88
Thuringia	OCS	21	0.24	0.14		
	KICS	9	0.36	0.21		
	OBS	11	0.37	0.23		
	KIBS	39	0.38	0.18		
	TKIBS	10	0.57	0.21	5.381***	89

Note: *d.f.* degrees of freedom, *S.E.* standard error
*$p < 0.10$; **$p < 0.05$; ***$p < 0.01$

the mean level of geographical concentration significantly. In this respect, the base model complements with our perspective on locational service concentration by capturing also the clustering of some operational service sectors.

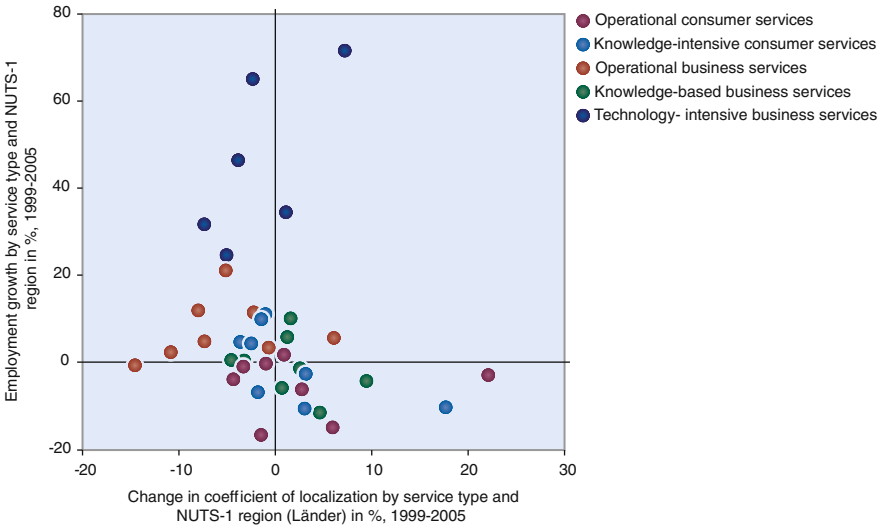

Fig. 14.3 Changes in employment and the coefficient of localization (in percent) between 1999 and 2005 for the five service types in eight German regions (Länder)

4.3 Spatial Dynamics of Locational Structure

How does the locational pattern of concentration change over time? One first assumption would be to expect growing service sectors to expand over space and to experience dynamics of relative decentralization. Do regions benefit equally from the high growth in operational, knowledge-intensive and technological services? In contrast to this expectation, however, the employment growth of a service sector is statistically independent from its geographical dynamics. Growth sectors do not necessarily expand spatially. Instead, the analysis of the geographical dynamics suggests different effects of concentration and decentralization for all five service types. While employment in OCS, KICS and KIBS had experienced a continuous spatial concentration, employment in OBS and TKIBS underwent a process of geographical diffusion. The job growth of OBS and TKIBS leads to a spatial distribution of new service jobs (Fig. 14.3). "Labour recruitment and provision of personnel," for instance, has evolved mainly in urban areas because of agglomeration effects. With the increasing suburbanization those services have been leaving the inner cities toward the urban fringes. Low market entry barriers promote this process (Buch, Groll, & Niebuhr, 2008; Jahn & Wolf, 2005). These results are significant for all eight *Länder* we analyzed. Notwithstanding, knowledge-intensive business services (KIBS) have continued to grow in urban centers and the coefficient of localization has slightly, yet further increased between 1999 and 2005 (1.5 %). This finding is in line with earlier research on the relation between strong sectoral growth at increasing rates of geographical concentration, for instance, in the management consulting business (Glückler, 2004). Much in contrast, OBS had also grown strongly but instead of concentrating in space, new jobs emerged in all

Table 14.5 Employment growth in the German NUTS-3 regions by service and settlement types, 1999–2005

	Area types	OCS	KICS	OBS	KIBS	TKIBS
Agglomeration	Central cities	−9.3 %	−4.4 %	−0.1 %	−4.1 %	3.4 %
	Highly agglomerated counties	0.3 %	10.9 %	13.3 %	1.9 %	22.4 %
	Agglomerated counties	−3.4 %	9.0 %	14.7 %	1.2 %	5.1 %
	Rural counties	−7.0 %	9.3 %	−5.7 %	−6.6 %	−9.6 %
Urbanized area	Central cities	−9.2 %	6.3 %	11.7 %	−3.7 %	3.0 %
	Agglomerated counties	−3.3 %	8.8 %	14.0 %	−0.3 %	9.9 %
	Rural counties	−6.6 %	6.7 %	2.1 %	−6.4 %	−0.4 %
Rural area	Rural counties with higher density	−6.6 %	6.7 %	13.8 %	−5.4 %	2.1 %
	Rural counties with lower density	−8.7 %	3.9 %	−0.4 %	−12.7 %	−15.2 %

kinds of regions following a process of spatial decentralization. The contrary spatial development of KIBS and OBS as described above, is also found in other countries, for instance in the French metropolitan area (Léo & Philippe, 2007).

The differential geographical dynamics of employment produce different effects for different settlement types and regions in Germany. OCS declined in the central cities of the agglomerated areas and those of their urban hinterland, while they stagnated in the suburban hinterland of the central cities (Table 14.5). KICS grew in all settlement types except for the central cities where they declined remarkably by −4.4 %. OBS grew strongest in the more peripheral areas, i.e. urbanized areas and more sparsely populated regions thus producing a strong effect of geographical diffusion of employment. In contrast, KIBS and TKIBS grew strongest in the densely populated and agglomerated regions.

High-growth sectors such as OBS and TKIBS do not necessarily follow the same pattern of geographical diffusion. Much in contrast, while the former does expand over space, the latter type seems to yield job growth predominantly in agglomerated urban contexts. This finding is important for labour market analysis and regional policy. Regional governments and policy agencies should obtain a more detailed understanding of the geographical effects of sectoral growth in order to detect opportunities and avoid misleading policies to develop activities that run counter their geographical trends.

5 Discussion and Implications for Future Research

In this paper we have further elaborated on an integrative service typology developed in prior research (Glückler & Hammer, 2011) and which responds to important debates about differential economic effects on service activities on the one hand, and to the demand for pragmatic use and analytical power in regional analysis, on the other. By combining three crucial dimensions—demand orientation, knowledge-intensity and technology-intensity—we have defined five different service types: operational and knowledge-intensive consumer services (OCS and

KICS), operational business services (OBS) and knowledge-intensive as well as technological knowledge-intensive business services (KIBS and TKIBS). Based on the European standard of industry classification NACE, we categorized 93 three-digit sectors into these five service types in order to test for significant differences in employment growth, locational structure and geographical dynamics in these sectors. In the context of eight regional economies of Germany, we analyzed service employment between the period 1999–2005 and found considerable support for the typology. The rates of employment growth, locational structures and the geographical processes of concentration and diffusion were shown to be significantly different for each of the service types. The empirical analysis revealed that business services, both OBS and TKIBS proved to be the high-growth sectors in the German service economy—although their growth rates differed significantly. Growth, however, was not associated with uniform geographical development. While OBS expanded across the regions and led to a decentralization of jobs TKIBS, KICS and KIBS developed nearly at the same levels of spatial concentration. In contrast to OBS operational consumer services (OCS) are increasingly concentrated spatially due to consolidation effects. In sum, a service typology of only five basic types manages to capture a considerable proportion of diversity in the heterogeneous service economy. Regional analysts and policy makers may benefit from a pragmatic service typology which translates coherently into the industrial classification standard of the European Union (NACE). It will help identify growth sectors and understand the different geographical dynamics of clustered vs. expansive growth.

In the future, the service typology will have to be adjusted to the European Commission's revision of the industry classification NACE Rev. 2 which was used from 1 January 2008 onwards (Eurostat, 2008). The detail of the revised classification has substantially increased (from 514 to 615 classes). Especially for service activities, this increase is visible at all levels, including the highest one, while for other activities, such as agriculture, the increase in detail affected mostly the lower level of the classification. In future research, the typology may benefit from being adapted to this more fine-grained industry classification of NACE Rev. 2. Another opportunity to improve the significance of the service typology is to disaggregate at the four or five-digit level of the NACE code. This, however, would render its use more costly and complicated. Further application of this typology to other regions in Europe would prove helpful in order to better assess its usefulness for regional analysis.

The typology could not absorb the entire heterogeneity of the 93 service sectors within each of the five service types and it did not work equally well for the observed regions. Part of these variances may be related to differences in the state of regional development and settlement structures in the eight federal regions of Germany. Future research should address more intensively the diversity and heterogeneity inherent in the service economy (Tether & Hipp, 2002). Some of the weaknesses of the typology are based on ambivalent service sectors. To take two examples: renting of transport equipment belongs to KIBS although much of their business is with final demand than other business. Similarly, real estate activities

are assigned to KIBS but many of the activities are for consumers. These and other sectors that serve both, final users as well as other businesses are difficult to classify when the result should be a dichotomized classification. Furthermore, many activities like wholesale (KIBS) employ highly qualified as well as less qualified people, a problem which we do not solve completely with our classification and thus produce noise in the typology. This research has focused on the stylized data about regional and employment statistics. It has to be acknowledged that the locational structure and the geographical dynamics of service sectors are subject to influences not considered here. Institutional, legal and policy frameworks, regulation and fiscal incentives, the structures of competition, demand and labour markets as well as power relations and governance regimes along the services value chains may impact locational choice and processes of firm foundation and relocation. Future research is needed, therefore, to compare service development internationally in order to achieve a more profound understanding of the geography of the service economy. The basic typology seems to be a useful taxonomic tool to inform ongoing research in this direction.

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