

**The Role of Quality Standards
in Innovative Service Companies:
An Empirical Analysis for Germany**

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Abstract

Proceeding from theoretical hypotheses, driving forces for the introduction of the ISO 9000ff series in innovative service companies are analysed. Based on the European Community Innovation Survey (CIS), a probit model is estimated with different explanatory variables based on a sample of innovative German service companies. The first analysis of the role of the quality standard ISO 9000ff in German innovative service companies, based on general hypotheses concerning the role of quality standards, produced elucidating results. Besides sector- and size-specific differences, the use of "risky" technologies positively influences the probability of introducing ISO 9000ff. This quality standard has another twofold impact: first, as expected, it is a quality seal for the customers of the service company, especially in markets with homogeneous products and average qualities. Second, the introduction of ISO 9000ff has impacts on the internal processes of the service companies. In contrast to a conventional product standard, it supports the management in being flexible especially towards the preferences of the customers and in reaching project deadlines. However, the introduction may also increase the pressure on the employees, who are therefore evidently more reluctant about its introduction. Consequently, the empirical results underpin most of the theoretical hypotheses on the role of quality standards in service companies.

JEL-Classification: C25, D82, L15, L80

Keywords: Service companies, survey, quality standard, ISO 9000

1. Introduction

A prominent feature of the current structural change in the economy and society is the growing significance of the service sector in terms of competition and labour market, reflected in the growing share of services in the gross national product and employment. The services sector is the largest single employer in all EU member states: in 1996, for example, 60% of the workforce in the European Union were employed in this sector. Its share in the gross domestic product within the EC amounted to 62% in 1996, while that of industry and agriculture was only 35% and 3 %, respectively. Active participation in this structural change presents a great challenge. Services are going to be a crucial factor in international competition for markets and locations. Commissions for services will not be restricted by national frontiers. Globalisation and regionalisation describe a process in which global presence is linked with the delivery of services individually tailored to meet local needs.

In line with this trend, standardisation is also extending its range beyond its traditional, technical fields to include the service sector. Where such activities do not originate as European or international standardisation projects, national standards may, in appropriate areas (e.g. where services are offered across national borders), later be submitted to CEN or ISO as the basis for a draft proposal. In the past, standardisation was mainly directed at products and production processes. Services, however, form an emerging field for standardisation. Standardisation is generally defined as the "activity of establishing and recording a limited set of solutions to actual or potential problems directed at benefits for the party or parties involved, balancing their needs and intending and expecting that these solutions will be repeatedly or continuously used during a certain period by a substantial number of parties for whom they are meant."¹

After becoming the most important sector in the industrialised countries, the service sector is meanwhile attracting the focus of academic and empirical research. The same is true for standardisation. However, the focus of our paper is not on standardisation in services in general², but especially on the diffusion of the quality standards ISO 9000ff series in innovative service companies.³ After describing the genesis of ISO 9000ff and its contents in chapter two, theoretical hypotheses are postulated concerning driving forces for the introduction of ISO 9000ff. In the fourth chapter, the data source is described, before in chapter five first descriptive statistics and in chapter six results based on probit estimations are presented. The paper concludes with a short summary and perspectives for future research.

2. The History and Content of ISO 9000ff⁴

The International Organisation for Standardisation (ISO) is the specialised international agency for standardisation at present, uniting the national standards bodies of 91 countries. ISO is made up of approximately 180 Technical Committees. Each Technical Committee is responsible for one of many areas of specialisation, ranging from asbestos to zinc. The purpose of ISO is to promote the development of standardisation and related world activities to facilitate the international change of goods and services, and to develop cooperation in intellectual, scientific, technological, and economic activity. The results of ISO technical work are published in international standards.

ISO Technical Committee 176 was formed in 1979 to harmonise the increasing international activity in quality management and quality assurance standards.⁵ Whereas subcommittee 1 was established to determine common terminology, subcommittee 2 was set up to develop

quality systems standards – the result being the ISO 9000ff series, published in 1987 and revised in 1994.

The ISO 9000ff series is a set of five individual, but related, international standards on quality management and assurance. They are generic, not specific to any particular products. Manufacturing and service industries alike can use them. These standards were developed to effectively document the quality system elements which are necessary in order to maintain an efficient quality system in companies. The ISO 9000ff series standards do not themselves specify the technology to be used for implementing quality system elements.

ISO 9000ff provides the user with guidelines for selection and use of ISO 9001, 9002, 9003, and 9004. ISO 9001, 9002, and 9003 are quality system models for external quality assurance. These three models are actually successive subsets of each other. ISO 9001 is the most comprehensive – covering design, manufacturing, installation, and servicing systems. ISO 9002 covers production and installation, and ISO 9003 covers only final product inspection and testing. These three models were developed for use in contractual situations such as those between a customer and a supplier. ISO 9004 provides guidelines for internal use by a producer developing his own quality system to meet business needs and take advantage of opportunities.

The choice of which model to implement depends on the scope of the operation. For example, if the company designs its own product or service, it should consider ISO 9001. If it only manufactures (working off someone else's design), it may wish to think about ISO 9002. Finally, if the firm neither designs nor manufactures, it may wish to consider ISO 9003.

In order to introduce ISO 9000ff, it is necessary to have an independent third party conduct an on-site audit of the company's operations against the requirements of the appropriate standard. Upon successful completion of this audit, the company will receive a registration certificate that identifies its quality system as being in compliance with ISO 9001, 9002, or 9003. The company will be listed in a register maintained by the accredited third-party registration organisation. It is possible to publicize the registration and use the third-party registrar's certification mark and the accreditation body's mark on the advertising, letterheads, and other publicity materials, but not on the products. The accredited third-party registrar will perform periodic inspections to assure that the quality system is being maintained. Many registrars also require a full re-audit after a specified time. If the company fails to maintain the quality system, the registrar will suspend or cancel the registration.

There are several benefits for companies in implementing this series. For example, it will guide management to build quality into their products and services and avoid costly after-the-fact inspections, warranty costs, and reworking. In addition, it may also be able to reduce the number of audits customers perform on the operations. Increasingly, customers are accepting supplier quality system registration from an accredited third-party assessment based on these standards. In order to set up a system of driving forces, theoretical hypotheses concerning the introduction of ISO 9000ff are deliberated in the following chapter.

3. Theoretical Hypotheses about the Role of Quality Standards for Service Companies

In order to focus on the role of ISO 9000ff as a quality standard in service companies, an iterative procedure will be performed. In a first step, the general role of quality standards⁶ will

be outlined, while in the second step the special standardisation issues in providing services are elaborated. Based on these preliminary thoughts, theoretical hypotheses concerning driving and hindering forces for the introduction of ISO 9000ff can be derived in the last step.

a.) The Role of Quality Standards in General

First benefits of the ISO 9000ff have already been sketched. Nevertheless, to be able to determine service sectors or even service companies in which a need for ISO 9000ff might be expected, general theory on service marketing and service quality is combined with general knowledge about quality standards.⁷

In most markets, we observe information asymmetries between the consumers and the suppliers of goods and services. Secondly, inside the company, we observe information deficits of the company owner or management concerning the performance of the employees. A remedy for both problems, internal and external, can be found in quality standards.

In a first step, the more common external information problem will be discussed. Information asymmetries between producers and consumers of goods and services are abstracted from the standard economic-textbook case of homogeneous goods with completely transparent product characteristics. However, in most cases this assumption does not hold. Especially, the attributes of services are difficult to grasp in advance, as we will elaborate in more detail later. Besides the information screening activities of the demand side, the supply side may use signals to reduce the information asymmetries. Signals can be voluntary warranties about the characteristics or performance of the products. When product attributes are difficult to observe prior to purchase, consumers may plausibly use the quality of products produced by the firm in the past as an indicator of present or future quality. Furthermore, the company can commit itself to a regular investigation of its production process by a independent and officially authorized third party which awards the tested company or products with an official certificate.

Due to these effective mechanisms for reducing information asymmetries, even in a competitive market, high quality goods can be sold over cost because of the cost of building up a reputation. As the time lag between successive sales of the product and hence the period after which consumers detect the real product quality approaches zero the price-quality schedule comes close to the one under perfect information.⁸ The information problems are most acute when products are infrequently bought, long lags in the detection of quality exist, reputations are slowly updated, and quality attributes are difficult to be detected.

The more severe these issues are in a market or for a product or service, the more monopolistic product differentiations, obligatory public minimum quality standards or supply-side strategies of quality commitments can be observed.⁹ Quality standards are an instrument for signalling the quality of products and services. Depending on the market conditions, a service company is confronted with signalling as an effective strategy to keep or expand its market share. Therefore, the likelihood or the probability of introducing ISO 9000ff depends on the sector of the service industry and its characteristics. Additionally, if the majority of the competitors is establishing ISO 9000ff as a quality signal, then the company will be forced to do the same in order to keep up with the others.

Besides this external effect of quality standards because of information asymmetries between suppliers and customers, information problems also exist inside an organisation like a company.¹⁰ Here, the principal-agent theory has to be cited. With quality standards, the manage-

ment or the proprietors of a company own an instrument to control the performance of their employees better.¹¹ The more difficult it is to observe the quality of a product or a service delivered by the employees, the higher is the pressure to introduce a system of quality standards which makes sure that in each phase of the production or service-providing process a certain minimum quality is guaranteed. Because of the intangible nature of services and the so caused information asymmetries between management and service provider, the need to introduce quality standards for each stage of the service production is especially high. Standards also have the function to ensure compatibility between the different components of a product. In the case that a product or a service goes through different production stages, quality standards guarantee especially in the case of services a process with little friction between the involved employees or organisational units, whereas for products compatibility standards are additionally more suitable and easier to control.

We leave this general discussion about the role of quality standards in decreasing information asymmetries both externally to the customers and internally between management and employees, and direct the focus of the next chapter to standardisation of services.

b.) Standardisation of Services

In order to build finally hypotheses about the suitability of ISO 9000ff as quality standards for service companies, some general features of services have to be outlined. According to Sirilli and Evangelista (1998) the following attributes are specific for services:

- A close interaction between production and consumption – so-called co-terminality. This makes it difficult to distinguish between processes and products, because the service product is often a set of procedures. Furthermore, due to the non-physical existence of services, the relationship is blurred between what is produced and the means of production.
- A high information content and intangible nature of the service output. The high information content of services has led research to focus on information technologies, especially in innovation in services (Barras 1986). The intangible nature of most services inspires thoughts about strategies which customise service outputs and adapt them to the needs of the users.
- The key role of human capital in the provision of services. Service production depends heavily on the knowledge and skills of the people involved in the process of production and innovation. Despite the fact that many services depend on information and communication or on transport networks, human resources are decisive for the success of the production and innovation of services.
- A critical role played by organisational factors in firms' performance. Product innovations in services are related to the improvement between the user needs and the services supplied.

Services and the service process are characterised by their high degree of individuality, represented in the recent tendency towards customisation of services in order to meet clients' preferences better. Another conflicting goal is to increase the productivity in the service production by standardisation, or industrialisation of services respectively. In the following, different aspects or stages of standardisation in the service process are discussed, in order to derive final hypotheses concerning the use of ISO 9000ff in service companies:¹²

- **Standardisation of the Performance Capacity**

Human and physical capital are necessary for the production of services. Therefore, standardisation can take place already in the selection of the technical equipment and the em-

ployed service providers by checking the compliance with technical standards and formal qualifications of the employees. Especially, concerning the human capital respectively the employees, congruence between their formal qualifications and their actual performance in providing services is not guaranteed.

- **Standardisation of the Service-providing Process**

Therefore, the standardisation of the process of providing services seems to be more effective. Here, quality management by ISO 9000ff is adequate. However, too strong regulation can be demotivating for the employees.

- **Standardisation of the Service Output**

Thirdly, standardisation of the results of the service process is possible. Here, the supplier may define quality criteria which have to be met or which the customer is expecting. The former approach is easier to realise because of the uncertainty concerning the degree of satisfaction of the customer.

- **Standardisation of External Factors and of Situative Circumstances**

Fourthly, the external factor can be standardised by standardisation of the expectations of the customers. The more markets can be segmented, the more homogeneous they become. Because of the high credence qualities¹³ of services the communication with the suppliers is very important. If certain quality features are promised, probably only those customers will react to this, who expect just these features. However, by segmenting the market into too small niches, the market potential is low and the danger of cannibalisation is high, if fencing is not effective. Finally, the situative factors like the location and the time of the service provision can be standardised.

Although some of the factors mentioned in the process of service provision may be standardised just with products complying with adequate technical standards or staff having the formal qualifications, the immaterial and intangible nature of services makes an integrated approach containing a set of quality standards still sensible. The less the above mentioned formal technical and qualification standards concerning the input factors play a role, the more an integrated system of quality standards covering the whole service process makes sense.

c.) Driving and Hindering Forces for the Introduction of ISO 9000ff

The general discussion of quality standards and standardisation of services allows us now to derive hypotheses concerning the use of ISO 9000ff in service companies. The different aspects of standardisation of services lead to the following hypotheses:

ISO 9000ff is less important in services which are more likely to hire highly qualified people and use technology-intensive equipment. Furthermore, too much regulation by standards is a disincentive in markets where creativity is required. Contrary, service provider which need only lowly qualified employees would require standards for the performance potential of the engaged human resources.

When services are characterised by missing or hardly recognisable feed-back loops between the service providers and the customers, ISO 9000ff may help to standardise the service results at least from the perspective of the supply side.

Finally, the expectations of the customers in niche markets are more homogeneous which make the introduction of ISO 9000 less necessary. Because of the heterogeneity of services,

the relationship between service provider and customer is different in the subsectors. Official quality certificates become more important when the distance between the two is greater than in cases where the service is produced in a close cooperation between the two. Therefore, sectors offering business services will show a higher propensity to introduce ISO 9000ff than sectors offering consumer services with high frequencies of personal contacts.¹⁴

Nowadays, services are based very often on an intensive use of technologies. These technologies also affect the quality of the service and therefore the well-being of the customers. However, technologies can be distinguished by the level of risk for health and safety they may cause. Therefore, quality standards are more likely for technologies with a risk potential for the customers or the environment in general, because they are a sign for the safety reputation of the service provider and are able to raise the confidence of the consumer and the supervising governmental agencies in the technology and the service.

Another discriminatory factor is the company size. In small service companies, the customers are more likely to be served by the same employees. Therefore, they get experience about the service supplied by the staff and the need to standardise is lower compared to search goods anonymously provided by large firms. Additionally, for small and medium-sized companies the costs of ISO 9000ff registration, from training the staff to final registration, have been reported to be from \$50,000 to over \$250,000.¹⁵ These costs will reduce the inclination of small and medium-sized companies to introduce ISO 9000ff compared with large companies.

However, both large and small companies with international business perceive the ISO 9000ff series as a route to open markets with an improved competitiveness. ISO 9000ff is an international standard generated by the international standardisation organisation and agreed on by the over one hundred member states. Because of the higher information asymmetries between the home country and foreign countries, companies with ISO 9000ff have a quality signal which is accepted all over the world, which makes it easier for them to export services abroad. On the other hand, foreign service companies with ISO 9000ff will have an easier access to the domestic German market. The domestic service companies also have to introduce ISO 9000ff to keep up with these foreign competitors. Therefore, companies exporting services or expecting increased international competition are supposed to introduce ISO 9000ff sooner or more frequently.

Finally, in the age of globalisation and internationalisation, many multinational enterprises have emerged which are active in different national markets. In order to present a common quality standard to their customers and to unify their internal service quality control as well, the introduction of ISO 9000ff in the affiliates all over the world makes sense.

In service markets with a high price competition, companies are more likely to introduce ISO 9000ff. In markets with small price margins and nearly homogeneous services, ISO 9000ff serves two functions. First, it is an additional quality signal, which may make the difference to other competitors without a further attribute. Second, ISO 9000ff may help to support a cost efficient production of the services, which may increase the company's profit margin above the sector average. In high quality segments of the service market, ISO 9000ff does not play any significant role, because ISO 9000ff represents a minimum quality standard which does not have any meaning for customers who demand high quality services.

Where flexibility and in-time production is demanded the service companies are more likely to introduce ISO 9000ff. Here, the positive internal effects of ISO 9000ff have a positive in-

fluence on the above demanded product characteristics, although, ISO 9000ff requires sustainable high quality work from the employees, which consequently puts a certain pressure on their performance. This perspective may cause rigidities in the organisations against ISO 9000ff and other innovations.

Concluding the explanations of the theoretical hypotheses concerning factors for the introduction of ISO 9000ff, it has to be stated that from the theoretical point of view, positive and negative forces exist. In our empirical analysis, we try to verify the different theoretical hypotheses based on a survey of companies in the service industries .

4. The Data

Surveys of companies in the service sector on topics connected with technological and organisational change used to be very uncommon. The Oslo Manual (OECD, 1997), conceived as a handbook for innovation surveys in the industrial sector, mentions that there are problems involved in simply transferring the definitions and concepts related to the service sector. In order to identify the specific features of this sector, and to test provisional definitions and concepts, the survey was preceded by a detailed pilot phase (Licht et al., 1997). Development of the questionnaire was greatly facilitated by empirical feedback from the Mannheim Innovation Panel (MIP). The current database of the VVC (German Confederation of Associations for Credit Reform) was used to build up the gross random sample,. The files contained in the database enable us to obtain a random sample of legally autonomous companies, weighted by size and industry.

After a pretest in July 1995, questionnaires were sent out to the 11,600 companies randomly selected in early October 1995. After several reminders, 2,896 companies finally returned the questionnaire.

For our analysis of driving forces for the introduction of ISO 9000ff, we use the subsample of over 2,100 innovators¹⁶, because only for them do we have data about their introduction of ISO 9000ff in the past three years.¹⁷ Furthermore, we leave out the banking and insurance services in the probit estimations, since in these sectors there are either zero companies or only a very small number of innovators who plan to introduce ISO 9000ff.

5. Descriptive Statistics

In order to give first insights about the role of ISO 9000ff in different size groups, service industries and technology user groups, the following figures are presented.

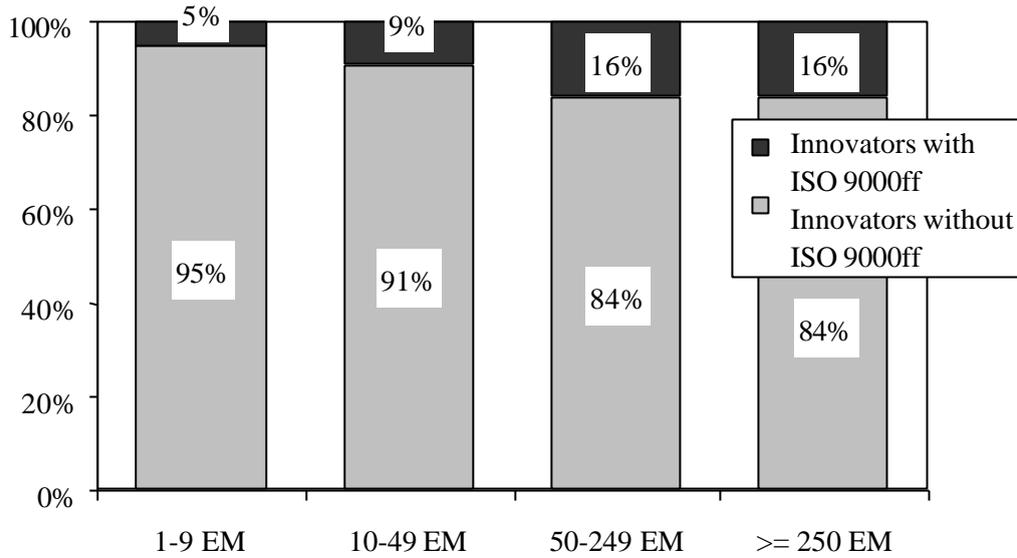


Figure 1: ISO 9000ff and the size of the companies in number of employees (EM)

Figure 1 underlines that the propensity to introduce ISO 9000ff is higher in companies with more than 50 employees. A supply side explanation are the high costs of introducing ISO 9000ff in a company. From the demand side, it can be argued that in small companies the connection between suppliers of the services and their customers is closer. The consequence is a relationship which rests more on informal confidence which makes quality standards obsolete.

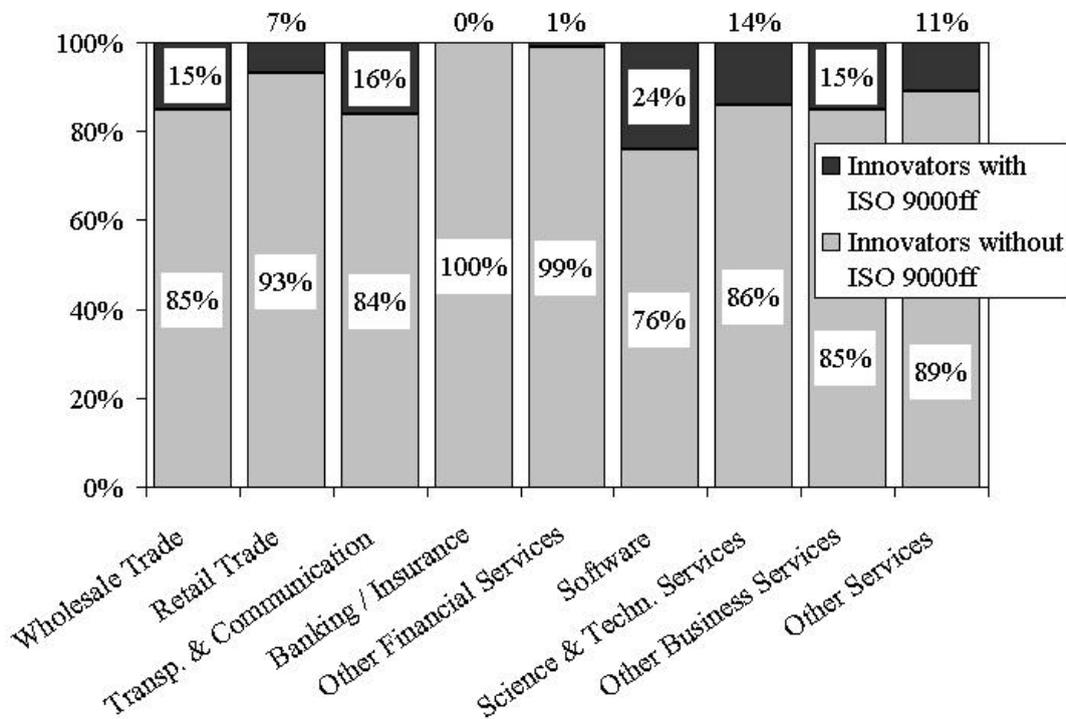


Figure 2: ISO 9000ff in different service sectors

The average propensity of innovators to introduce ISO 9000ff is around 12%. However, especially companies in the wholesale trade, the transportation and communication sector, the software business and other business services are more likely to introduce ISO 9000ff. On the contrary, the whole financial sector is more reluctant to certify their processes after ISO 9000ff.

In figure 3 it becomes obvious that the use of some technologies on the introduction of ISO 9000ff has an impact. Whereas hard- and software use is not a distinguishing factor for the introduction of ISO 9000ff, companies which use very sophisticated communication technologies are more likely to have ISO 9000ff. The same is true for traffic and transport technologies. These results support the above analysis by sectors. Furthermore, the use of measurement and medicine technology makes it more likely for companies to introduce ISO 9000ff. The same is true for environmental technologies. In all three cases, the careful production and delivery of the service is important because in many cases the safety of the customers and other people can be endangered. However, the use of multimedia increases the likelihood of not introducing the standard, which may be explained by the little safety and risk impacts of this technology.

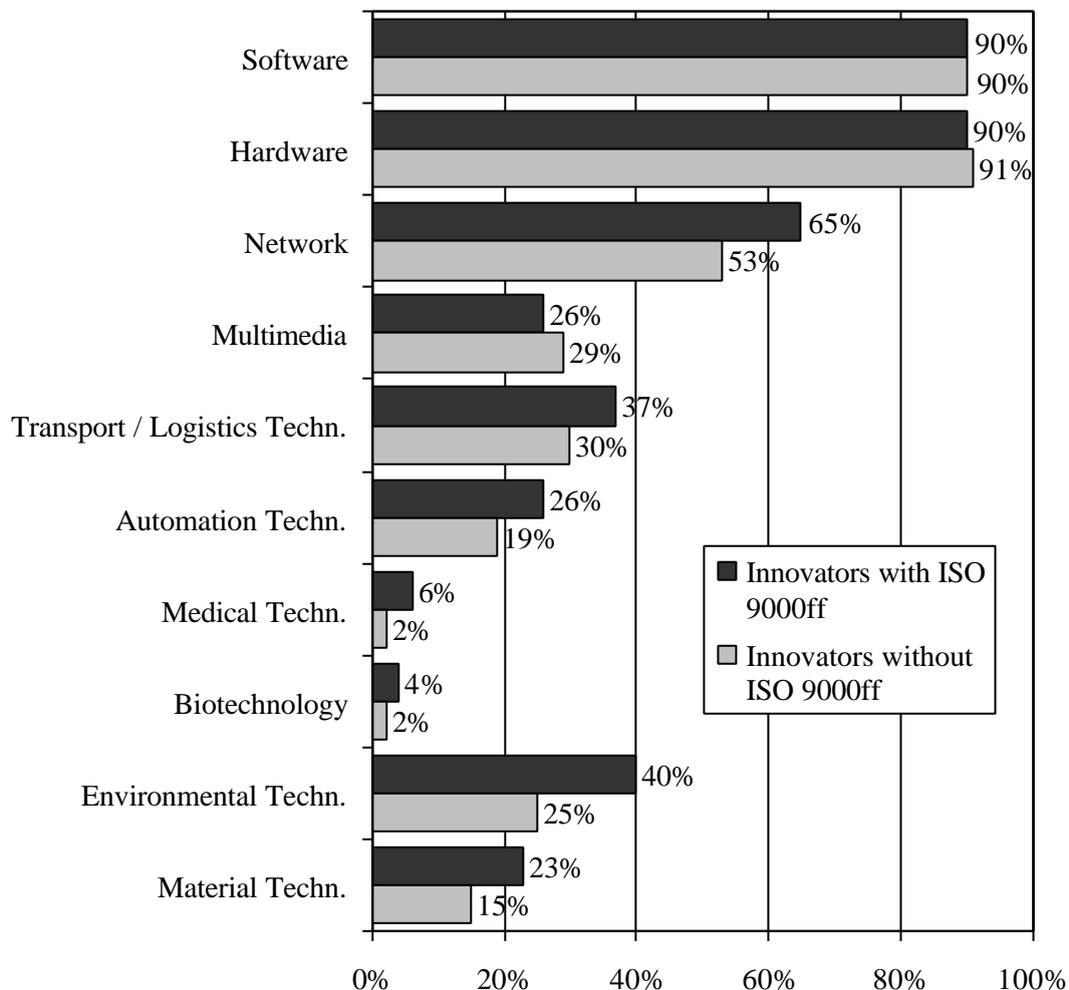


Figure 3: Importance of different technologies for innovators with resp. without ISO 9000ff

First preliminary conclusions can be drawn from the descriptive statistics. The size effect is obvious, which is caused by both the high introduction costs of ISO 9000ff and the greater

information asymmetries between service provider and customer in larger companies. The last consideration leads also to the differences between the analysed service sectors. Finally, health- and safety-relevant technologies are as well encouraging the introduction of the quality standard.

6. A Comprehensive Probit Model of Driving Factors for ISO 9000ff

After the simple descriptive statistics, a comprehensive probit model is tested. Probit specifications are designed to analyse qualitative data reflecting the choice between two alternatives. The endogenous variable is either one for companies introducing ISO 9000ff and zero for not considering ISO 9000ff.¹⁸ The probit specification models the probability of the event (= introduction of ISO 9000ff) as depending on a linear combination of the observed exogenous variables. This information is taken from the answers to the questionnaire on several innovation-related questions.

First, dummy variables for the industry, the size, and the technology used should explain the probability of introducing ISO 9000ff. Second, the external sources of knowledge are additional explanatory factors. When the service company is embedded in a tight network of knowledge flows from customers (manufacturing and services) and suppliers and integrated in a whole group of enterprises, then the likelihood of introducing ISO 9000ff should be significantly higher. Therefore, in order to meet the needs and preferences both of the customers and the suppliers, the service companies tend to implement quality standards. Third, the impact of some desired effects of innovations as driving forces for ISO 9000ff, like flexibility, improved productivity both of customers and employees, is integrated. Innovations are often hindered by several factors. Information is used about the importance of the role of internal resistance against innovations, which may be caused by anticipated performance pressure through the introduction of a quality ensuring system. Secondly, another disincentive for innovations is the danger of easy imitation by competitors. In these cases, a quality certificate can help to distinguish the own product or service from those of the competitors. Finally, some features for the success of the services, like low prices and high quality, are used as exogenous variables for explaining the probability to introduce ISO 9000ff.

The results of the probit estimation are presented in table 1. With the retail trade and the size group of 50 to 249 employees as basis, all other industries have a significantly higher propensity to introduce ISO 9000ff, with the highest probability being software companies. Furthermore, small- and medium-sized companies are less likely to introduce the standard. Concerning the use of technologies, only communication networks, medical and environmental technologies cause a higher inclination for ISO 9000ff. These technologies are supposed to have a higher and immediate impact for health and safety. Especially, communication networks are confronted with the risk for safety, which cannot be observed immediately or at all. In contrast, multimedia use reduces the chance for ISO 9000ff, because obviously no strong risk endanger the users. The other technologies do not have any impact on the use of the quality standard.

A significant influence from the competitors does not exist, therefore the introduction of ISO 9000ff seems not to be an imitation strategy. Furthermore, close connections to customers in the producing sector and to suppliers are not significant. In the case of being in close contact to customers from the service sector then the introduction of ISO 9000ff is more likely. The assurance and the signalling of a certain quality level for customers of the service sector is obviously caused by a tight integration in the knowledge flows of the service sector. However, if the company is advised by marketing agencies or consultants, then the likelihood

for ISO 9000ff decreases slightly. The only explanation for this phenomenon could be that these companies have already introduced ISO 9000ff because of the advice of the consultants.

Table 1: A Comprehensive Probit Estimation

A Comprehensive Model		Coeffic.	Signif.
Industry	Wholesale trade	0.9385	0.000
	Retail trade (base)	-	-
	Transportation/communication	1.0943	0.000
	Software	1.5370	0.000
	Science and technical services	1.1379	0.000
	Other business services	0.9747	0.000
	Other Services	0.7429	0.000
Size group	1-19 employees	-0.5313	0.002
	20-49 employees	-0.2601	0.032
	50-249 employees (base)	-	-
	250 and more employees	0.2046	0.101
Technology	Software	0.0810	0.651
	Hardware	-0.1791	0.316
	Networks	0.2926	0.007
	Multimedia	-0.2851	0.014
	Transport / logistic technology	-0.0700	0.573
	Automation technology	-0.0769	0.541
	Medical technology	0.6714	0.005
	Biotechnology	-0.3613	0.184
	Environmental technology	0.2762	0.020
	Material technology	0.0186	0.894
External sources of knowledge	Customers (manufacturing)	0.0432	0.722
	Customers (services)	0.2185	0.038
	Suppliers	0.1152	0.285
	Competitors	-0.1241	0.246
	Enterprises within the group	0.2181	0.026
	Marketing or consultancy	-0.1775	0.143
Effects of innovations	Improved internal flexibility	0.1295	0.292
	Improved user-friendliness	0.0632	0.538
	Improved reliability of the services	-0.1071	0.367
	Improved time availability of the services	-0.0451	0.679
	Improved speed of the production / delivery	0.0686	0.570
	Improved capability to meet safety requirements (technical regulations, data protection)	0.2676	0.008
	Improved ecological, medical, ergonomic features	-0.1458	0.303
	Improved performance of the customer	-0.1083	0.338
	Improved productivity of the customer	0.0806	0.493
Improved productivity of the employees	-0.1921	0.106	
Factors hampering innovation	Too easy to copy innovation	-0.3133	0.037
	Organisational rigidities	0.2513	0.011
Features for the success	Low prices	0.0304	0.751
	High quality	-0.3413	0.035
	Flexibility	0.2969	0.079
	Schedule effectiveness	0.3811	0.030
	Image	0.9077	0.427
	Novelty of the product	0.1687	0.097
Foreign competition	in the home market	0.2898	0.004
	Sale of services in foreign markets	0.0912	0.398

Prob>chi2 = 0.000 Pseudo R2 = 0.1820 Constant = -2,7640*** Number of obs = 1436

Source: ZEW/FhG-ISI: Mannheim Innovation Panel - Service Sector

Most of the consequences of innovations are not significant. However, the reliability of the services and the ability to meet safety requirements are expected significant results, because ISO 9000ff makes it easier for the companies to reach these goals and it serves as well as a seal of approval in order to increase the confidence of the customers. Additionally, quality standards are surprisingly intended to improve the productivity of the customer more than the productivity of the own employees. This result underlines that ISO 9000ff serves more the image of the company among the customers and regulatory bodies than the productivity of the service provision.

However, most of the innovation obstacles are not significant explanatory variables for the introduction of ISO 9000ff. Nevertheless, two significant results become visible and can be explained on the ground of the theoretical hypotheses. First, when organisational rigidities usually prohibit innovations, then the likelihood of introducing ISO 9000ff decreases also, because of this internal resistance. Second, the greater the problem of innovations being imitated by competitors, the higher the probability to introduce ISO 9000ff. This makes evident that in market with homogeneous service products and narrow price margins, the certification according to ISO 9000ff represents a strategy to save the market share by having a quality seal which segments the market in service providers with and without quality certifications and allows therefore even a little price mark-up.

Concerning market characteristics, due to the productivity-enhancing effects of a quality standard system, flexibility towards customers' preferences and schedule effectiveness are positive determinants for ISO 9000ff, whereas the need for high quality services does not positively but negatively influence the introduction of the ISO 9000ff as a kind of minimum quality standard. When the re-organisation of internal processes in order to reduce costs is a feature for the success of the service company, then it tends to introduce ISO 9000ff as a quality management standard to support the internal business processes.

The empirical result underlines the sector-, company size- and technology-specific results of the above analysis by the relatively high pseudo R^2 of over 18%. Respecting the external sources of knowledge the customers in the service sector are important for the introduction of ISO 9000ff, which underlines its role as a quality seal. In groups of enterprises ISO 9000ff assures the compatibility of internal business processes between the different affiliates. Furthermore, ISO 9000ff is obviously supporting the capability to meet safety requirements from legal regulations. Still, organisational rigidities are a negative factor for introducing ISO 9000ff. In line with the theoretical hypotheses, it can be postulated that ISO 9000ff has the image of a minimum standard, but it is not a seal for high quality services, because service companies active in these market segments are unlikely to introduce the standard. However, in markets with homogeneous and easily imitated services, ISO 9000ff serves as an additional quality sign in order to protect market shares. Moreover, the quality standard ISO 9000ff seems to increase the flexibility and the schedule effectiveness of the service companies.

7. Conclusion

The first analysis of the role of the quality standard ISO 9000ff in German innovative service companies, based on general hypotheses concerning the role of quality standards, produced elucidating results. Besides sector- and size-specific differences, the use of "risky" technologies positively influences the probability of introducing ISO 9000ff. This quality standard has another twofold impact: first, as expected, it is a quality seal for the customers of the service company, especially in markets with homogeneous products and average qualities. Second, the introduction of ISO 9000ff has impacts on the internal processes of the service compa-

nies. In contrast to a conventional product standard, it supports the management in being flexible especially towards the preferences of the customers and in reaching project deadlines. However, the introduction may also increase the pressure on the employees, who are therefore evidently more reluctant about its introduction.

Based on these interesting first results, the analysis of further driving forces for the introduction of ISO 9000ff is recommended. However, the survey was not designed explicitly to analyse the introduction ISO 9000ff and because of this, we are able to analyse the driving forces of the introduction of ISO 9000ff only in innovative service companies. Comparisons with non-innovative companies and firms of the producing sector are not possible. Therefore, specific surveys based on questionnaires on this topic and interviews with relevant companies would support the empirical research in this field. Especially, firms which audit and certify companies according to ISO 9000ff are certainly interested in new insights about their potential market.

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- 1 De Vries (1997a), p. 312, and for a general discussion concerning the different definitions cf. De Vries (1997b).
- 2 Cf. Muehlbauer (1999) for the actual standardisation projects in service industries and Tether et al. (1999) for standardisation and specialisation in services.
- 3 Cf. Hipp et al. (1999) on general incidences and effects of innovation in services.
- 4 Cf. Resetarits (1997), pp. 97ff, for the description of ISO 9000ff.
- 5 See Tamm Hallstrom (1996) for an explanation of the evolution of ISO 9000 as a management standard.
- 6 The analysis of the impact of the other management standards Total Quality Management (TQM) and Just-In-Time (JIT) on ISO 9000 implementation in 500 US firms by Withers et al. (1997) revealed a positive interdependence. However, the complementary or substitutive relationships between different quality management systems will not be further discussed in this paper.
- 7 For specific literature about standardisation in service sectors, see CEN (1996), Hartlieb and Behrens (1996) and ISO (1995).
- 8 For the formal proof see Shapiro (1983), p. 669 and the following p. 673.
- 9 Cf. Hauser (1979), p. 756f.
- 10 For a discussion of the role of ISO 9000 within a firm in order to assure quality, see Davis (1997).
- 11 Another principal-agent exists between the shareholders and the management of a company. Concerning the positive reaction of U.S. firms' stock price to the announcement of ISO 9000 registration see Docking and Downen (1999).
- 12 Cf. Pepels (1999), pp. 703f.
- 13 Cf. Nelson (1970).
- 14 Cf. De Vries (1997a), p.318.
- 15 Cf. Reserarits (1997), p. 100.
- 16 Innovators are identified by a filter question in the survey which allows a self-assessment of the companies concerning the introduction of innovative products, processes or organisational structures.
- 17 A distinction between ISO 9001, 9002, 9003, and 9004 is due to the data restrictions not possible.
- 18 However, we are not able to determine whether or not ISO 9000ff was already introduced. Therefore, we assume that the probability to introduce ISO 9000ff remains constant for the remainder of the companies.