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Diffusion of Helpdesk Systems – The Influence of Personal Networks on the Level of Adoption

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Abstract

The high importance of the availability of end user computing systems raises the need for effective and efficient helpdesk systems. However, research shows that the adoption and diffusion of such systems is surprisingly low. Classical approaches to deal with this problem solely focus on the system itself, especially by focusing on the quality of the helpdesk. But this neglects the fact, that problem solving often takes place in unofficial personal networks. This aspect gains importance due to the increasing relevance of team-based work structures. Motivated by this, we present a model of adoption of helpdesk system that considers the quality of personal networks as influencing factor for the level of adoption.

Keywords: IT adoption, IT diffusion, Helpdesk systems, Social networks

1. Introduction

As information systems are vital parts in most organizations, today, the availability of end-user computing systems gains importance (Niessink et al. 1998). To maximize the uptime, companies spend effort and money to implement helpdesk systems (Bouman et al. 1999). Those systems aim to assist end users by providing support whenever users are not able to continue working due to hardware or software errors. Typically those helpdesks are organized in multiple levels (Office of Government Commerce (OGC) 2000). In this context the number of helpdesk calls is usually considered as indicator for the amount of problems end-users face (Potgieter et al. 2004).

However, research shows that the adoption of such helpdesk systems is often lower than expected and the number of helpdesk calls does not reflect the true amount of desktop computer problems that a user struggles with (Heckman et al. 1998). We argue that there are two major reasons for this. First, various types of helpdesk systems exist, ranging from helpdesk support for hardware problems (e.g. hard drive crash) up to application development support (e.g. development of excel macros). The user is more likely to use helpdesk systems when faced with hardware problems opposed to when the user is faced with software problems. In the latter case it might happen that the user tries to solve the problem by himself instead of using the expert knowledge as provided by the helpdesk (Niessink et al. 2000). This relates directly to the second reason why the adoption of

helpdesk systems is often lower than expected. In case of a 'strong' social network of coworkers, employees tend to try to solve problems within their peer group rather than contacting the helpdesk. However, those unofficial problem solving may lead to an increased time to resolution compared to calling the helpdesk and can also lead to higher costs, as the peer group of coworkers trying to solve the problem is hindered in conducting their normal work (Heckman et al. 1998).

The aspect of unofficial problem solving becomes even more important when considering the increasing importance of project-based teamwork (Anderson et al. 2004; Mankin et al. 1996; West 2004). The use of teams as work pattern has notably spread through all kinds of organizations in all industry groups (Campion et al. 1993) and companies tend to restructure work around teams instead of individuals (Hollenbeck et al. 2004).

Based on those findings we formulate the following research questions:

- ▶ *What are the different types of helpdesk systems that can be identified and what influences have those types on the level of adoption?*
- ▶ *What is the influence of the employees' social network structures on the level of adoption of helpdesk systems?*

We believe that this research can have important implications despite the fact that it is in a very early stage. It adds to the literature on IT diffusion and adoption of helpdesk systems by adding the type of system and especially the social network structure as influencing factor for the level of adoption. We also hope that this research can support practitioners when considering the implementation of helpdesk systems.

The remainder of this paper is structured as follows. First, the validation approach is presented, followed by a literature review aiming to evaluate the diffusion of helpdesk systems as discussed in literature. Building on this, a classification of helpdesk systems is derived and its influence on the level of adoption discussed. Then, the influence of social networks on the adoption of helpdesk systems is discussed, based on a literature review as well as on results from expert interviews. We use our findings to develop a model showing the influence of the discussed factors on the level of adoption. The paper closes with a conclusion and potential areas for future research.

2. Study design and indicative validation

The aim of this paper is to present a model showing the influence of the type of a helpdesk system and the social network structure within a company on the level of adoption of helpdesk systems. Models generally represent a simplified extract of a real-world situation, used to design a problem and its solution space (Simon 1996). Following the principles of design science in IS research, the model that is presented in this paper is supposed to be a purposeful artefact for the problem domain of helpdesk systems. The paper does not provide a quantitatively verified model but rather represents an idea and adds to the related knowledge base with the aim to support practitioners (Hevner et al. 2004).

The basic assumptions of this paper were developed based on findings in the literature about IT adoption and diffusion, and based on own theoretical considerations.

Afterwards, the initial ideas were further augmented by interviews that we conducted with an expert group on partner level of a leading strategy IT consultancy. Those interviews seem to be the best way for developing such a model for two reasons. First, to

the best knowledge of the authors, literature does not yet offer a clear answer to the problem described in this paper. Second, the interviewed consultants were experienced in the implementation of helpdesk systems and could thus give qualitative feedback about the structure of the model and the relevance of our research. This again relates to the chosen design science approach as we aim to create an innovative artefact that solves a practitioner's problem (Hevner et al. 2004).

The interviews were conducted by two researchers using an iterative approach. Further empirical evidence was gathered from two other IT consultants to verify our findings so far. The procedure followed the suggestions for building theories from case study research of Eisenhardt (1989) and Yin (2003).

3. The diffusion of helpdesk systems

During the last years a lot of articles have been written about the adoption and diffusion of innovations in general and information systems in particular (Rogers 1983; Taylor et al. 1995; Venkatesh et al. 2000). Two important theoretical concepts in this context are the Diffusion Of Innovation theory (DOI) (Rogers 1983) and the Technology Acceptance Model (TAM) (Davis 1989). In this paper we aim to add to those theories by evaluating the influence of personal networks on the adoption of helpdesk systems.

3.1. Helpdesk systems in end-user computing

Any information system can only reach its full potential, when it is working properly. This may include servers, networks, applications, and end-user computers like desktops and notebooks. Server hardware and software as well as networks are often monitored centrally, so that incidents, resulting in a malfunction, are detected quickly. To a certain extent, end-user computers can also be monitored for defects, however the user may be aware of an incident much earlier than any reporting software (e.g., a hard drive making strange noises). Furthermore, user may have incidents and questions, that cannot be resolved automatically, either because they are not detectable (e.g., a wrong algorithm in a business application) or because they are no real defects (e.g., user does not know how to install a printer) (Heckman Gusky). To ensure that the end-user computing system including the user is 'working', some kind of support has to be established. In most companies today, this is achieved by helpdesk systems (Niessink 1998).

Integral part of a helpdesk usually is a call center with IT experts which users can call in case of an incident and which try to resolve the problem either directly on the phone, by calling back with the solution, or by sending out the field service in case physical presence is required. The IT Infrastructure Library (ITIL) follows this resolution oriented classification by distinguishing first, second, and third level support (Office of Government Commerce (OGC) 2000). First level support is provided when the incident can be resolved directly on the phone when the user calls. A high first level resolution rate is highly desired, as it keeps downtime and costs significantly low. However, more complex issues have to be routed from first to second level support, where usually more skilled experts or the field service try to resolve the problem offline. As this may take from several minutes to several days, this procedure is much more time consuming and expensive. Third level support is only required, if the problem cannot be resolved within the helpdesk, and external experts, e.g. from the software provider have to be involved.

However, implementing a helpdesk system does not automatically mean that all users use this service, as the level of adoption may depend on various factors. Typically, the helpdesk is not the only possible source where the user can resolve incidents with his computer. He may as well try to resolve the problem on his own, by accessing other sources of information (e.g., books, internet), or by asking fellow workers (Niessink 2000). Usually, this unofficial incident resolution is not desired, as this is not the user's main job and, therefore, a loss of valuable working time. Thus, the level of adoption may be impacted by the helpdesk quality (Potgieter et al. 2004), the extent of support, and even the type of the social network of the user. In the following, a classification of helpdesks is proposed that fits the needs to better understand the diffusion of helpdesk systems.

3.2. A classification of helpdesk systems

As discussed in the previous section, the level of adoption of helpdesk systems is also dependent on the type of system, i.e. the extent of support. Whereas the user is basically dependent on professional help in case of a hardware defect, he might not be willing to accept application development support as he might want to first try to solve the problem by himself. In the following, we distinguish four types of helpdesk systems along the dimension of the extent of support. Compared to the traditional separation into first, second and third level support, as discussed in the previous section, this offers an additional view on these systems required for this paper. It should be noted that the four types mentioned below are not meant to be strict as in reality of course hybrid forms can occur, but those types are supposed to serve as indicators for the different levels of support. Typically those types build up on each other such that helpdesk systems of type 2 are introduced together with or after type 1 systems and type 3 systems also include type 1 and type 2 functionality and so forth:

▶ *Type 1: Support for hardware defects*

This is the most rudimentary type of helpdesk support. It covers support for hardware defects such as hard drive errors, network problems, or server crashes. Such kinds of type 1 helpdesk systems are offered by most firms and the level of adoption for such systems tends to be rather high. There are two major reasons for this. First, those events typically render the user inactive until the problem is solved. It is therefore crucial, that in the case of an incident, functionality is restored quickly. Second, hardware errors are potentially difficult to troubleshoot and require a significant amount of technical skills.

▶ *Type 2: Support for software defects*

Besides hardware errors, this type of helpdesk systems also covers software defects and incidents. Those are mainly software bugs or installation and configuration support. Similar to hardware defects, software defects are potentially difficult to troubleshoot, but offer more room for try-and-error approaches.

▶ *Type 3: Application usage support*

Those type of helpdesk systems provide support for application usage, e.g., through information and instructions how to correctly use a financial reporting tool or a purchasing system. This support is typically provided by application experts that help users to accomplish their tasks through call center, remote administration, or on site support. Adoption of this kind of support system is lower, as often the user even does not perceives that he actually has a problem.

► *Type 4: Application development support*

This type of helpdesk system covers the widest range of support. It includes providing expert resources to help the users in developing applications (e.g. Microsoft Excel macros or small programs) on site or off site. The tendency to accept and request this kind of support is potentially lower than for any other type of helpdesk systems. Similarly to application usage support, the user may not even be aware, that this task could potentially be solved more effectively by dedicated experts than by himself, but may understand the task as part of his job assignment.

As already stated above, we assume that the level of individual adoption of a helpdesk system depends on its type. Type 1 systems are more likely to be adopted by employees as type 4 systems. The relation between the type of helpdesk system and the level of adoption is depicted in Figure 1.

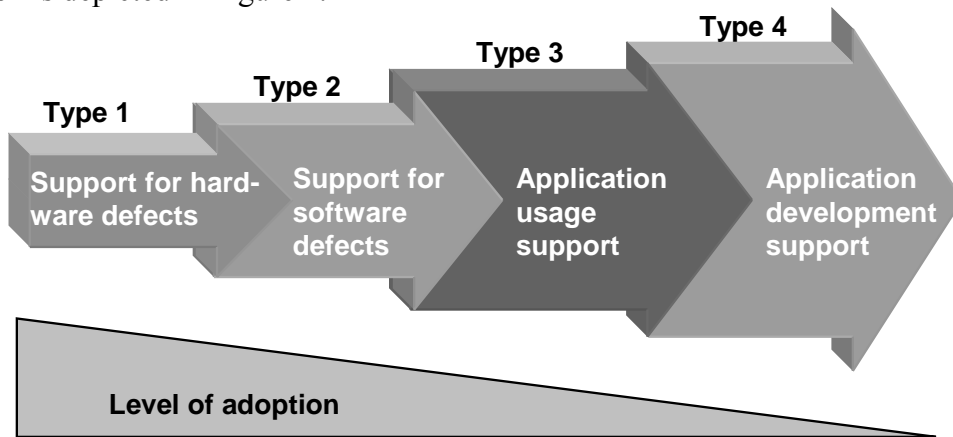


Figure 1. Four consecutive types of helpdesk systems

Of course, there are other factors that affect the level of adoption and that are extensively discussed in literature. However, we conclude that, when holding all those other effects constant, the level of adoption is indeed influenced by the type of the system.

Considering the increased importance of team-based work structures, we believe that the level of adoption is, furthermore, influenced by the quality of the social network of employees, which hasn't been discussed in literature so far. This idea is further elaborated in the following section.

4. The influence of social networks on helpdesk adoption

We argue that when faced with some kind of desktop computer problems, users might try to solve, for example, a printer installation issue within their peer group or by calling other 'experts' outside the helpdesk. Due to organizational trends which promote team-based work structures this problem gains importance. In the following we, therefore, first analyze those trends before we discuss the influence of teamwork and social network structures on the level of adoption. We then use our findings to derive managerial guidelines.

4.1. Teamwork in organizations

Recent organizational trends show that companies tend to restructure work around teams instead of individuals (Hollenbeck et al. 2004). This trend is facilitated by globalization

and the improvements in information and communication technologies that have introduced concepts such as virtual work and virtual organizations which allow tasks to be accomplished in distributed teams (DeSanctis et al. 1999).

In this rapidly changing environment where organizations need to be highly adaptable, organizations promote project-based teamwork because it has the flexibility to combine the knowledge, skills, and abilities of various people according to specific project requirements. The literature confirms that this trend is likely to spread and some authors expect an even more prominent role of project-based teamwork in the future (Guzzo 1996; McClough et al. 2003).

Among the discussed teamworking skills that are required for teams to work effectively, are aspects such as conflict resolution, collaborative problem solving, and communication which all require a high level of interpersonal cooperation (Stevens et al. 1994). It is argued that the required level of interpersonal cooperation in turn requires a high level of trust among the team members (Jones et al. 1998; McAllister 1995). It lies in the human nature that people show more commitment and involvement if they trust each other. Korsgaard, Brodt and Sapienza conclude that trust is a vital precondition for teams to cooperate successfully (Korsgaard et al. 2003).

Thus, organizations promote the creation of a high level of trust among team members through, for example, team building activities (West 2004). However, as discussed above, a high level of trust among team members can lead to the fact that user incidents are tried to be solved within the team instead of using the helpdesk systems that are in place. When evaluating the level of adoption of such a system, those aspects, therefore, need to be taken into consideration.

4.2. Considering social networks for assessing the level of adoption

Based on our findings so far, we conclude that the level of adoption of helpdesk systems depends on the problem solving capacity of the network of co-workers in relation to the problem solving quality of the user helpdesk. If the user assumes that the quality of the helpdesk is lower than the quality of the network of co-workers he will try to solve the problem within his peer group. This relation is depicted in Figure 2, where LOA is the level of adoption, HDQ is the helpdesk quality and SNQ is the social network quality.

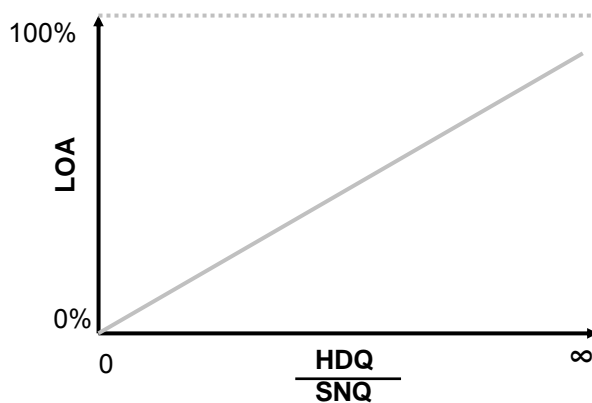


Figure 2. The influence of social networks on the LOA

The helpdesk quality is typically assessed along a set of service level agreements (SLAs), but can more easily be performed by sending out a user survey. The assessment of the social network quality, instead, is a more complex aspect. As stated above, the trust relations that exist in the network are supposed to play a major role in this context. To analyze such kind of relations, social network analysis (SNA) provides a body of qualitative measures (Scott 2000). SNA is a theory that focuses on the relations that exist among individuals (Wassermann et al. 1994). SNA has commonly been used in sociology and organizational studies and gained importance for a variety of topics. Quite recently, Wassermann and Faust proved its applicability for the adoption and diffusion of innovation (Wassermann et al. 1994).

We propose that the socio-centric density of the network of employees has an influence on the number of incidents that are tried to be solved in the group instead of being passed on to the user helpdesk (Scott 2000). Socio-centric density is defined as the number of relations that exist in the whole graph compared to the maximum possible number (Scott 2000; Wassermann et al. 1994). The relations that span up the network are considered as the trust in the skills and will of an individual to help someone in solving his problems. Theoretical considerations let us assume that the higher the socio-centric density in this network, the lower the level of adoption of helpdesk systems. In this case, some amount of employees will try to solve their problems within their peer group of co-workers. Therefore, the level of adoption of a helpdesk system depends on the socio-centric density of the social network of employees compared to the quality of the helpdesk.

Figure 3 summarizes our findings in an integrated model.

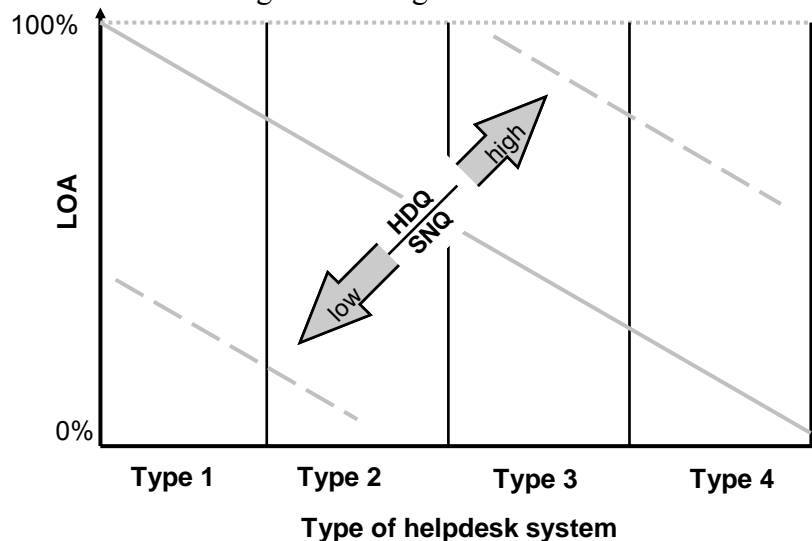


Figure 3. LOA influenced by helpdesk type and social network characteristics

As can be seen in the figure the level of adoption is influenced by the type of the helpdesk system. However, the LOA is furthermore dependent on the quality of the helpdesk in relation to the quality of the social network which can be assessed using the socio-centric density of the network of employees (Hinz et al. 2006; Scott 2000). Thus, if the quality of the social network is high, there can be a tendency towards a lower level of adoption, whereas the opposite is true if, instead, the quality of the helpdesk is recognized as being superior to the problem solving capabilities of the network of employees.

These findings may influence the way managers can support the successful adoption and diffusion of helpdesk systems.

5. Conclusion

This paper develops a model, aiming to describe the influence of the problem solving capacity of social networks on the level of adoption of such systems.

Based on findings from expert interviews we conclude that current results from adoption and diffusion research only partially explain the level of adoption of helpdesk systems. First, the type of helpdesk system is an important influencing aspect. Within this paper we develop a type-taxonomy of such systems and discuss the influence of those types on the level of adoption.

Furthermore, findings from the literature revealed that the density of the social network of employees has an influence on the level of adoption, such that if the perceived quality of the problem solving capacity of this social network is higher than the perceived quality of the helpdesk system, users rather tend to solve their problems within their peer group of co-workers. These findings were supported by expert interviews and used to develop a model, visualizing the relations between the mentioned aspects.

Further research should try to support our findings with empirical data by conducting field experiments with companies that introduce helpdesk systems. Also, it makes sense to evaluate whether other SNA measures such as connectivity or betweenness can be used to evaluate the problem solving capacity of social networks.

The paper adds to research in the area of IT adoption and diffusion by considering personal network structures and its effects on individual adoption. Due to the increasing importance of team-based work patterns, we believe that the impact of social network structures on individual adoption decisions will further gain importance.

References

- Anderson, N., Lievens, F., van Dam, K., and Ryan, A.M. "Future Perspectives on Employee Selection: Key Directions for Future Research and Practice," *Applied Psychology: An International Review* (53:4), 2004, pp. 487-501.
- Bouman, J., Trienekens, J., and Zwan, M.v.d. "Specification of Service Level Agreements, Clarifying Concepts on the Basis of Practical Research," *Proceedings of the Software Technology and Engineering Practice (STEP)*, Pittsburgh, 1999.
- Campion, M.A., Medsker, G.J., and Higgs, A.C. "Relations between work group characteristics and effectiveness: Implications for designing effective work groups," *Personnel Psychology* (46), 1993, pp. 823-850.
- Davis, F.D. "Perceived usefulness, perceived ease of use, and user acceptance of information technology," *MIS Quarterly* (September), 1989, pp. 318-340.
- DeSanctis, G., and Monge, P. "Introduction to the special issue: communication processes for virtual organizations," *Organization Science* (10:6), 1999, pp. 693-703.
- Guzzo, R.A. "Fundamental considerations about work groups," in: *Handbook of workgroup psychology*, M.A. West (ed.), Wiley, Chichester, UK, 1996, pp. 3-21.
- Heckman, R., and Guskey, A. "Sources of Customer Satisfaction and Dissatisfaction with Information Technology Help Desks," *Journal of Market Focused Management* (3), 1998, pp. 59-89.

- Hevner, A.R., March, S.T., Park, J., and Ram, S. "Design Science in Information Systems Research," *MIS Quarterly* (28:1), March 2004, pp. 75-105.
- Hinz, D., and Malinowski, J. "Assessing the Risks of IT Infrastructure – A Personal Network Perspective," *39th Hawaii International Conference on System Sciences*, Hawaii, 2006.
- Hollenbeck, J.R., DeRue, D.S., and Guzzo, R. "Bridging the gap between I/O research and HR practice: Improving team composition, team training, and team task design," *Human Resource Management* (43:4), 2004, pp. 353-366.
- Jones, G.R., and George, J.M. "The experience and evolution of Trust: Implications for Cooperation and Teamwork," *The Academy of Management Review* (23:3), 1998, pp. 531-546.
- Korsgaard, M.A., Brodt, S.E., and Sapienza, H.J. "Trust, identity, and individual attachment: Promoting individual's cooperation in groups," in *International handbook of organizational teamwork and cooperative working*, M.A. West, D. Tjosvold and K.D. Smith (eds.), Wiley, Chichester, UK, 2003, pp. 113-130.
- Mankin, D., Cohen, S., and Bikson, T. *Teams and Technology: Fulfilling the Promise of the New Organization* Harvard Business School Press, Boston, MA, 1996.
- McAllister, D.J. "Affect- and cognition-based trust as foundations for interpersonal cooperation in organizations," *Academy of Management Journal* (38), 1995, pp. 24-59.
- McClough, A.C., and Rogelberg, S.G. "Selection in Teams: An Exploration of the Teamwork Knowledge, Skills and Abilities Test," *International Journal of Selection and Assessment* (11), 2003, pp. 56-66.
- Niessink, F., and Van Vliet, H. "Towards Mature IT Services," *Software Process - Improvement and Practice* (4), 1998, pp. 55-71.
- Niessink, F., and Van Vliet, H. "Software maintenance from a services perspective," *Journal of Software Maintenance: Research and Practice* (12), 2000, pp. 103-120.
- Office of Government Commerce (OGC) *ITIL Service Support* The Stationary Office Books, 2000, pp. 323.
- Potgieter, B.C., Botha, J.H., and Lew, C. "Evidence that the use of the ITIL framework is effective," *National Advisory Committee on Computing Qualifications (NACCCQ)*, 2004, pp. 160-167.
- Rogers, E.M. *Diffusion of Innovations*, The Free Press, New York, USA, 1983.
- Scott, J. *Social Network Analysis*, Sage Publications, London, 2000.
- Simon, H.A. *The Sciences of the artificial*, MIT Press, Cambridge, MA, 1996.
- Stevens, M.J., and Campion, M.A. "The knowledge, skill, and ability requirements for teamwork: Implications for human resource management," *Journal of Management* (20), 1994, pp. 503-530.
- Taylor, S., and Todd, P.A. "Understanding Information Technology Usage: A Test of Competing Models," *Information Systems Research* (6), 1995, pp. 144-176.
- Venkatesh, V., and Davis, F.D. "A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies," *Management Science* (46:2), 2000, pp. 186-204.
- Wassermann, S., and Faust, K. *Social Network Analysis: Methods and Applications*, Cambridge Uni Press, Cambridge, 1994.

West, M.A. *Effective teamwork, 2nd edition*, The British Psychological Society
Blackwell Publishing Ltd., Leicester, UK, 2004.