Economies of scale in ICT: how to balance infrastructure and applications for economies of scale in ICT and business
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Nowadays information and communication technology (ICT) plays a more and more important role in organizations. This requires an increasing availability of a complex system of hardware/software and an ICT organization with human resources that have the right knowledge. The complexity of the hardware/software system is a result of the way in which standardized components are assembled into an organization-specific ICT system. The more complex the hardware/software system, the higher the ICT expenditure, not only for hardware/software, but also for ICT human resources. In this thesis I will demonstrate why standardization of hardware/software is the key to limit ICT complexity and therefore ICT expenditure. The complexity of the ICT organization can be limited by the structuring and standardization of the organizational processes. It is in general assumed that a higher level of standardization of ICT processes will lead to a more efficient ICT organization and therefore lower expenditure for ICT human resources. In this thesis I will investigate how the complexity of hardware/software and the complexity of the ICT organization can be limited by standardization in hardware/software and by standardization of organizational processes. This is the first research as I know in which the relation between scale and complexity in ICT is explicitly defined and measured. Economies and diseconomies of scale are conceptualized as a result of the relation between scale and complexity.

The technological development in ICT provides a continuous supply of new products that must be integrated in the hardware/software system of an organization. Thanks to Moore’s law the technical and economic lifetime of existing products is relatively short and the ICT organization is permanently faced with the dilemma of integration versus replacement. Very often new applications have overlapping functionality with existing applications and use another infrastructure platform, which makes this dilemma more difficult. There is often a disagreement between the ICT organization and the user organization about the desirability of these applications: users emphasize the importance for the business and ICT people underline the complexity and the cost of ICT management. The users think in terms of business yield and expenditure, while ICT people in general think in terms of ICT yield and expenditure. Users want to optimize applications and ICT people want to optimize infrastructure, which leads to less ICT complexity. In organizations with low ICT budgets there is always a tension between the spending on applications and on infrastructure. If the infrastructure is neglected, then high ICT complexity and corresponding expenditure for ICT human resources will be the consequence. On the other hand, too low spending on applications leads to insufficient business support by applications. Therefore the balance of infrastructure and applications is important for economies of scale in ICT and business.

A more fundamental way to reduce the ICT complexity is standardization of business processes and standardization of data. If business processes are redesigned according to the possibilities of standardized applications (like SAP), then the number of applications can be reduced. If interfaces between applications can be standardized (for example according to the rules of an international standardization organization), then the number of interfaces between applications can be reduced. An example is the initiative of the IHE (2010) which aims to reduce complexity integrating the healthcare enterprise. This approach to reduce complexity lies however outside the scope of this research.

In chapter 1.5 an overview is given of this thesis.