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Understanding the manifold forms of B2B integration - A transaction cost perspective

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IT CONTROLLING IN FEDERAL ORGANIZATIONS

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Abstract

This paper investigates the characteristics of federal and modular organizations and elicits conclusions on their requirements for IT controlling through a literature review. The literature review showed that different organizational structures create specific conditions concerning IT and IT controlling. Although experience in the regulation and controlling of IT in large and complex organizations has been reported, the characteristics of these specific organizational conditions and the resulting requirements for the design of an IT controlling concept have not been extensively researched. Creating the missing link between the characteristics of federal and modular organizations and their requirements regarding IT controlling may serve as a foundation for future research and the development of a comprehensive IT controlling concept which encompasses the characteristics and key drivers of this specific organizational form.

Keywords: IT controlling, IT governance, federal organizations, modular organizations.

1 INTRODUCTION

Alignment between business strategy and information technology (IT) strategy is regarded as a key driver for realizing value from IT investments (Henderson and Venkatraman 1999, Luftman 2006). This high level of importance may result from the fact that IT investments constitute a major part of IT costs but the benefits of IT usage are not always obvious and therefore difficult to justify. This phenomenon is often described as ‘productivity paradox’ (e.g. Brynjolfsson 1998, Carr 2003). Nevertheless some organizations manage to specify accountabilities for IT-related business outcomes better than others because of more effective IT governance (Weill and Ross 2004). Weill and Ross have researched forms of IT governance and classified underlying structures by the location where IT decisions are made. According to this classification, six types of decisions from ‘central decisions’ to ‘decentralized decisions’ are to be distinguished:

- Business monarchy: Decisions taken by a member of the management or a group of managers;
- IT monarchy: Decisions taken by the IT director or a group of IT directors;
- Federalism: Decisions taken by executives of the middle management of all operative divisions and the integration of the IT direction is also considered;
- IT duopoly: Decisions taken by IT direction and a group of members of the management;
- Feudalism: Decisions taken autonomously by respective divisions;
- Anarchy: Decisions taken autonomously by a user or a group of users.

This classification is not only relevant for decision making but also to inform decision makers about the origin of input (Weill and Ross 2005). A study conducted on 197 mainly ‘Global 1000’ companies showed that firms with a federal IT organization had a significantly higher IT/business alignment maturity than others (Luftman and Kempaiah 2007). A cluster analysis of 40 companies by Gordon and Gordon (2002) showed similar results. Nevertheless a federal IT organization is “no silver bullet” (Luftman and Kempaiah 2007) and federal IT governance is described as demanding a great deal of management attention (Weill 2004). For example, in large and complex multiunit organizations with interdependent information resources where federal IT is particularly useful, conflicts and coordination difficulties are likely to occur. Tsai (2002) describes the phenomenon of “coopetition” in which subunits of large multiunit organizations which are supposed to cooperate become instead competitors when it comes to using internal resources and are therefore likely to reject information sharing.

How can a federal organizational form for structuring IT be attained while avoiding its disadvantages? One solution is using a shared controlling concept across units to enable federal organizations to make use of the advantages of a federation and to steer clear of intra-organizational competition (Wenninger-Zeman 2003). Current research, however, has not considered specific IT controlling styles as they relate to the organizational and governance perspectives that characterize organizations. The available literature offers a broad range of tools and concepts for controlling IT (e.g. Krcmar 2005, Weill and Ross 2005) and has developed various approaches for avoiding intra-organizational competition in multiunit organizations (e.g. Brass et al. 2004, Schaefer 2008). Still, there is a lack of research evidence which supports combining IT controlling concepts with the special requirements of federal organizations.

The objective of this paper is to understand the reasons for the contradictions that exist between the theories and practice of IT controlling in federal organizations. On the one side, many IT controlling concepts and elaborated general organization types do exist. On the other side, the interrelation between a specific organizational form and the need for IT controlling is missing and thus many organizations are not capable of effectively controlling their IT. This paper uses organizations governed by federalism as an example and describes the key drivers of federally governed organizations and their specific needs for IT controlling. Further, existing IT controlling concepts are compared and their suitability for federal organizations is evaluated. The following research questions are addressed in this paper:

1. What are the constitutive elements of federal organizations and which key drivers characterize their specific (IT) controlling needs?

2. Which experiences, approaches and implementations for structuring and designing IT controlling already exist?
3. What are possible appropriate approaches and concepts for successful IT controlling in federal organizations?

2 LITERATURE REVIEW

2.1 Parameters of Federal and Modular Organizations

The word federalism is derived from Latin 'foedus' (confederation, confederacy, treaty, alliance) (Rudolf 1981). Frantz (1962) called federalism the leading principle for the social, governmental and international organization. According to him, the structure of a state has to be federative to achieve political freedom. Such a structure is characterized by districts and provinces having their own legislation which they advance autonomously (Frantz 1949). The larger a state is, the stronger the central power needs to be. Federalism described from the political perception includes larger autonomous political entities formed by the union of smaller political units who maintain their autonomy as well as the existence of coequal statehood of the whole state and the member states (Thöni 2005). A pure political perception of the term is not sufficient (Kinsky 2004); federalism as aggregation of uniformity and diversity can rather be a model for a great number of societal structures even beyond the state, for example in companies, associations, clubs or unions.

Although, the term federalism is rarely used in a context outside of societal structures, the underlying principles of autonomy, cooperation, solidarity, contractual or consensual conflict resolution, two-way control and distribution of power, subsidiarity and participation, are the same. *Autonomy* is based on self-determination of the particular members of a federal structure as well as the voluntary collaboration within the federal organization. *Cooperation* means that conflicts between units and the federal organization are not being solved by power, but based on specified authorizations. The specific units operate in *solidarity*. Compromises are often the conclusion of *conflict resolution*. *Two-way control* of federal units is realized by equal *distribution of power* between the units. Decisions are, according to the principle of *subsidiarity*, made where they occur. By contrast, competencies have to be transferred to the headquarters where reasonable. *Participation* denotes the units' chance of codetermination in decision-making processes through democratic institutions. In opposition, decentralized units deny publishing information to other units because of the governance of checks and balances and aspects of autonomy and independence (Tsai 2002).

Handy (1995b) expanded the established understanding of federalism to non-governmental environments and described federal organizations independent from purpose and scope of the organization. While the headquarters of a typical organization may be the center of decision-making, it is characteristic for federal organizations that initiative and dynamics result mainly from the subunits. According to Handy, the emergence of federalism in organizations is not conscious but emerges rather because the core of the organization cannot cope with all the information that is being provided by the decentralized units. As many organizations downsize their headquarters, they stop information overload and stop centralized control of the organization. That is when, as stated by Handy, decentralization turns into federalism.

The headquarters of federal organizations only define long-term objectives and leave the implementation of the objectives to the subunits. However when making decisions, headquarters must consider the opinions of the subunits. This is described as a place where persuasion has to be achieved and discussions lead to consensus (Handy 1995a). Constraints will be accepted on a subunit level if the acceptance of constraints benefits the superordinated unit. Picot, Reichwald and Wigand (2003) describe this type of organization as modular characterized by being split in legally autonomous units. The relatively small headquarters takes over coordinating tasks whereas the subunits are capable of acting legally autonomously and handle the more operational tasks (Picot et al. 2003). With few staff, management develops long-term strategy and coordinates cross-sectional activities. Following the creation of units in the modular organization, management must keep the number of interaction dependencies as low as possible (Weber 2001). Small units are characterized by flat hierarchies,

simple structures, and low division of work, which, in combination with personal responsibilities and integration of functions, leads to long range autonomy (Weber 2001). The strengths of both centralized and decentralized units have to be recognized and utilized accordingly. The advantages of specialization are either in the specificity of processes of customers, in the specificity of overall organizational infrastructures, or cross-specific functions (Picot et al. 2003). Therefore, tasks of the first group, where knowledge about specific customer-oriented workflow for problem solving is important, should be handled in the decentralized departments. In contrast, tasks with a high impact of overall methodical and technical aspect for problem-solving should be undertaken by centralized departments (Picot et al. 2003).

Table 1 summarizes the characteristics of federalism and federal and modular organizations leading to the requirements of IT and IT controlling in federal organizations. The structure of an organization is important to the thesis of this paper in terms of analyzing interrelations between the organizational form of federalism and IT controlling. Governance principles are taken into account as they influence controlling decisions (Weill and Ross 2004). The principles of cooperation are important as they are a main source of conflict (Tsai 2002).

	Federal public administration	Federal organizations	Modular organizations
Organizational structure	Association of smaller political units who maintain their autonomy to larger, autonomous political entities;	Aggregation of uniformity and diversity; centralization of strategic decisions; decentralization of operational decisions;	Operational activities: Subunits capable of entrepreneurial acting, legally autonomous Management, long-term planning and coordination of cross-sectional functions: centralized;
Governance principles	Coequality of super ordinate and subordinate units;	Two-way control and distribution of power (checks and balances);	Coordinative function of headquarters;
Principles of cooperation	Authorizations and laws;	Contractual or consensual conflict resolution: large amount of information → handling cannot be centralized;	Split-up the organization in legally autonomous units e.g. by core competencies, business division or region;
Attributes	Autonomy; Independence, being part of two institutions at the same time;	Autonomy, cooperation, solidarity, subsidiarity, participation, initiative and dynamics, subunits – retention of the headquarters, culture of discussions and consensus, being part of two institutions at the same time;	Responsibility of subunits, few interaction dependencies to resign a voluminous interface management; flat decentralized hierarchies, simple structures and low division of work, autonomy, profit responsibility;

Table 1: Characteristics of federalism, federal and modular organizations

The structure of any federal administration, company, or modular organization is crucial for organizational embedding of IT. Thus, the integration of the value-added chain requires organization-wide coordinated IT systems which support the coordination of autonomous units and guarantee the supply of information for each unit (Picot et al. 2003). Subunits responsible for the handling of a special task can be connected via IT infrastructure. To guarantee access to essential data at any time and to guarantee problem-oriented handling of data, a continuous integration and networking of all operational information systems is required (Picot et al. 2003). Coordination and cooperation of the particular units is realized by the means of IT through common and shared information databases and knowledge databases (Picot et al. 2003).

In the context of governance of federal organizations, the main aim is the localization of IT and IT controlling decisions (Weill and Ross 2004). Due to changing market conditions, the localization of decisions might be subject to change and different types of federalism can emerge over time. Depending on current governance structures, different requirements for IT and consequently for IT controlling arise. Although headquarters might delegate IT-related responsibilities to subunits, headquarters must retain control of IT in terms of being informed about operations performed in the

organizations to monitor and if necessary take corrective action on IT matters (Weber 2001). Weber (2001) proposes to provide the responsible divisions with a criterion for performance measurement and to communicate at what point headquarters is expected to intervene. To design the process of control comprehensively, individual agreement on the objectives for the unit and the documentation and review of compliance with these objectives is required.

The delegation of service activities is one trait of decentralization that impacts on the functions of controlling in an organization (Horvath 2006). It is assumed that a high level of delegation at the formation of a (controlling) system leads to a higher differentiation of the created system. In addition to spacious and technical characteristics, the organizational aspect of centralization and decentralization of information systems has to be taken into account (Lehner et al. 1991). This aspect specifies the degree of decentralization in planning, implementing and maintaining systems. A central solution has the advantage of a simpler construction of integrated solutions with coordinated data and being able to meet the information demand of management. Furthermore, centralized IT reduces the risk of redundant work and incompatibilities and facilitates the operation of organization-wide application systems. Similarly, creation, implementation and application of tools and standards are simplified and calculating load is optimized using a central IT organization. In contrast, in an organization with autonomous divisions, modifications in IT must be made promptly and units must be flexible in order to satisfy the needs of the decentralized units. Usually, the IT staff in decentralized units is more experienced than staff in centralized IT units in dealing with the problems of a particular division. Table 2 summarizes the requirements regarding IT and IT controlling that result from the characteristics and parameters of federal organizations as found in the literature review and described above.

Characteristics	Requirements regarding IT	Requirements regarding IT controlling
Organizational structure	Integration of decentralized organizational tasks; Coverage of management's information demand; Central provision of organization wide data;	Provision of decentralized information for management; Centralization of controlling or decentralization with central administration;
Governance principles	Coordination of organizational units; Flexibility for prompt reaction on decentralized demands;	Knowledge about decentralized processes for supporting complex problems; Provision of decentralized information for management; Documentation of compliance with strategic objectives by decentralized units; Provision of criterion for performance measurement; Controlling spin-off as a service task;
Principles of cooperation	Decentralized storage and availability of data for special decentralized activities and processes; Coverage of management's information demand;	Agreement on objectives for units; Definition of points of intervention of headquarters; Assignment of responsibilities for operational processes;
Attributes	Decentralized storage and availability of data for special decentralized activities and processes; Provision of information for decentralized organizational units; Coverage of management's information demand;	Provision of decentralized information for management; Monitoring of compliance with operational objectives in decentralized units; Documentation of compliance with operational objectives by decentralized units; Enabling of objectives correction; Enabling of incentive and sanction scheme; Centralization of controlling or decentralization with central administration; Differentiation of the controlling system by the demands of the decentralized units; Provision of a reporting system; Assignment of responsibilities for operational processes;

Table 2: Requirements regarding IT and IT controlling

2.2 IT Controlling

IT controlling is, according to Krcmar (2005), the control of IT-related operations in the organization. The goal is to ensure efficiency and effectiveness of IT operations while providing, quality, functionality and compliance to deadlines in information processing. IT controlling has a monitoring function as well as a coordination function for the management of information.

An institutional and a functional view of controlling can be distinguished (Britzelmaier 1999). A multiplicity of controlling conceptions is discussed in the literature with differing emphasis depending on the application field. Vöhringer (2004) for instance, differentiates between profit-oriented, reporting system-oriented or key figure-oriented, and coordination-oriented controlling conceptions. The Anglo-American research area rarely uses the term controlling at all (Schauer 2006); it is being replaced by the associated contentual questions. This is why there is a differentiation made between IT/IS (Information Systems) (investment) evaluation, IT/IS (performance) measurement, and measurement of IT/ IS costs, and benefits. Table 3 presents IT controlling concepts published within the last five years. The selection of the concepts follows criteria proposed by Schauer (2006): The presented approaches are to give an overview about functions and methods of IT controlling and not to be limited to some aspects. Moreover, the concepts should not be older than five years. They are presented in alphabetical order of the authors.

The controlling concepts presented in Table 3 serve as a basis to research possible criteria and starting points for organization-specific adjustments regarding controlling frameworks for federal organizations. The implementation of controlling in federal organizations should be a combination of central and decentralized controlling. Whereas central IT controlling deals with strategic planning, decentralized controlling is concerned with the implementation of the controlling concept in a particular division. Central strategy development, planning, controlling and regulating allow the longer-term alignment of an IT landscape to the corporate strategy in the subunits of federal organizations. The aim of strategy development is the definition of a nominal condition and to derive options and needs for action. On the basis of options and needs for action, agreements on objectives are made with the subordinated units and the objectives are connected with corresponding indicators (operating figures). An essential part of the IT strategy is the longer-term alignment of IT on decentralized operational processes. The planning of IT intentions and IT projects is, therefore, necessary. Decisions are not usually made at the operational unit level in federal organizations. By analyzing all possible interdependencies, the strategic relevance and effectiveness of the IT portfolio of the complete organization can be guaranteed (Krcmar 2000).

	(Kargl and Kütz 2007)	(Kesten 2007)	(Krcmar 2005)	(Kütz 2005)	(Reichmann 2006)	(Tiemeyer 2006)
Objectives	Strategic objective: Effectivity; Operational objective: Efficiency; Quantitative & qualitative objectives	Alignment of IT support on organizational objectives;	Formal objectives: Efficiency, Effectivity; Real objectives: Quality; Functionality; Compliance of deadlines;	Trade-off between supply and demand of IT performance; Consideration of goods and services and utilization; Utilization of goods and services, divisions; Utilization of goods and services, organization wide; Classification as per objects; Support of divisional IT controlling, optimization of organization wide IT controlling in the foreground;	Strategic information systems planning;	Basis for planning in IT; Means for decision making, cost reduction, performance assurance; Motivation for employees; Profitability;
Functional View	Coordination;	Evaluation;	Coordination; Process orientation; Object orientation;	Coordination; Process orientation; Object orientation;	Task-oriented;	Profit orientation; Product orientation;
Institutional View	Derived from organizational structure/ strategy;	Derived from organizational objectives;	Controlling of IT in the organization;	Controlling of IT in the organization;	Controlling of IT in the organization;	
Objects	Strategy, Projects Operating Applications; IT-Infrastructure; Cost-performance-management; Organization of IT-division;	Strategy/ Projects; Operating Applications;	Portfolio Controlling; Project Controlling; Product Controlling; Infrastructure Controlling;	Project; System; Process; Service;	Acquisition and processing of information; Human resources; Technical infrastructure; Applications;	IT product controlling; Controlling of IT resources; Project controlling;
Functions	Planning; Organization; Service management;	Evaluation of the strategic relevance of IT; Strengths/Weaknesses, Opportunities/Threads (IT degree of maturity) Process oriented planning; Multi-project	Compliance of strategic relevance; Compliance of profitability; Planning; Evaluation & selection of projects; Compliance of	Portfolio controlling; Preparation of and compliance to SLA; Evaluation, selection, initiation & realization of projects; Regulation of resource management;	Strategic task for maintenance and protection of the organization in terms of reactivity and adaptability by use of information technology; Administrative tasks for coordination of planning, regulation and information tasks;	Cost and activity accounting; Allocation of costs;

	(Kargl and Kütz 2007)	(Kesten 2007)	(Krcmar 2005)	(Kütz 2005)	(Reichmann 2006)	(Tiemeyer 2006)
		management; Project controlling; Relationship management/ service provider & service receiver;	quality, functionality; Monitoring of Product lifecycle; Regulation and advancement of infrastructure;		Operative tasks for monitoring the organization and its environment; Counteractive measures in the sense of an early warning system;	
Methods & Instruments	Economic feasibility study; Benefit analysis;	Economic feasibility study; Management ratio; Reporting system; Balanced scorecard; Accounting for services;	Portfolio analysis; Build-up experience database; Realization of profitability analysis; Cost allocation; Ratio system; Benchmarking;	Portfolio analysis; Organization in profit centers; Accounting for services; Make-or-buy-decisions; Appointment of quota of fixed costs and overhead costs;		Portfolio arrangement; Reporting management ratio; Benchmarking ;

Table 3: Survey of introduced IT controlling concepts

There as a complete controlling concept comprises a holistic view on controlling, the core of a controlling concept is its applied methods. One of the widely-used methods is the Balanced Scorecard (BSC) which was first introduced by Kaplan/Norton (Kaplan and Norton 1992) and. represents the central method of IT controlling (Rehäuser 1999, Rehäuser and Krcmar 1995). The BSC is the ideal controlling method for federal organizations because it is not limited to the presentation of the entire organization but can be used for the controlling of particular organizational domains, divisions or projects (Heilmann 2001). In the range of federal organizations, ratio systems are best used for organization-wide controlling that reflects the objectives of particular subunits. Such a controlling ratio system can be derived from the BSC. Its adaption does not occur with regard to its content, but rather its structure. Activity and cost data of IT have to be represented in management ratios in a way that using benchmarking, comparisons between the subunits of federal organizations can be made to increase transparency. Process oriented cost accounting offers the possibility to measure costs where they emerge (Aurenz 1990). A prerequisite for the strategic use of results of IT controlling in federal organizations is an established reporting system of the decentralized units among each other as well as between the subunit and headquarters. Because recipients of the reports make decisions in different areas and vary in their need for information, it is appropriate to consider, recipient, form, and date of the report when creating reports or planning the reporting system (Tiemeyer 2005).

Table 4 compares the requirements of IT controlling in federal organizations to possible approaches of existing IT controlling concepts structured by methods and instruments. Both columns result from a comparison of the literature reviews on IT controlling and federal organizations depicted above, conducted by the authors.

Characteristics	Requirements regarding IT controlling	Possible IT controlling solutions
Organizational structure	Provision of decentralized information for management; Centralization of controlling or decentralization with central administration;	Methods and instruments: Profitability analysis, benefit evaluation, ratio system, reporting systems, BSC, cost accounting, portfolio analysis, build-up experience database, Benchmarking, determination of fixed costs and overhead costs quota
Governance principles	Knowledge of decentralized processes for solving complex problems; Provision of decentralized information for management; Documentation of compliance with strategic objectives by decentralized units; Provision of criterion for performance measurement; Controlling spin-off as a service task;	Methods and instruments: Profitability analysis, benefit evaluation, ratio systems, reporting systems, BSC, cost accounting, portfolio analysis, build-up experience-database, benchmarking, organization profit centre, make-or-buy-decision, determination of fixed costs and overhead costs quota
Principles of cooperation	Definition of objectives for units; Definition of intervention time by headquarters; Assignment of responsibilities for operational processes;	Methods and instruments: Profitability analysis, benefit evaluation, ratio systems, reporting systems, BSC, cost accounting, portfolio analysis, build-up experience-database, benchmarking, organization profit centre, make-or-buy-decision
Attributes	Provision of decentralized information for management; Monitoring of compliance with operational objectives in decentralized units; Documentation of compliance with operational objectives by decentralized units;	Methods and instruments: Profitability analysis, benefit evaluation, ratio systems, Reporting systems, BSC, cost accounting, Portfolio analysis, Build-up Experience-DB, Benchmarking,

	Enabling of objectives correction; Enabling of incentive and sanction scheme; Centralization of controlling or decentralization with central administration; Differentiation of controlling systems depending on needs of decentralized units; Provision of a reporting system; Assignment of responsibilities for operational processes;	Organization Profit centre, Make-or-buy-decision, determination of fixed costs and overhead costs quota
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Table 4: Requirements of federal organizations and possible solutions

3 CONCLUSION

In summary, the major challenges for IT controlling in federal organizations lie in the provision of information about the decentralized, operational units for the centralized, strategic management. In addition, the decentralized units have to document their compliance with strategic objectives and their performance must be measurable. The literature review shows that existing controlling concepts use different methods and instruments to meet the IT controlling requirements of federal and modular organizations. The unique characteristics of decentralized units in federal and modular organizations make it difficult to implement one particular concept. This literature review focuses on German publications. Future reviews should include international literature. Research in this area should explore the application of existing instruments and methods of IT controlling in federal organizations in order to enable the transfer of information by controlling. Different theories, such as principal-agent theory or contingency theory, might provide an explanation as to how to improve the relationship between centralized and decentralized units in federal organizations. The resulting explanations could be further investigated in practice, for example by conducting case studies in a real world federal organization.

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