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„Technological Change, Corporate Network Concepts  
and Managerial Implications”

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*“We make a living by what we get, but we make a life by what we give.”*

*Sir Winston L. S. Churchill*

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**English abstract**

This study is intended to analyse the relation between the change of technology and managerial behaviour. The starting point of the analysis is the process of change in corporate structure cognition. Implications on managerial behaviour of this specific process of change in cognition are going to be elaborated, identified and verified. The underlying transition process of cognition of the corporate structure is described as a movement from stable corporate structures towards dynamic corporate structures – corporate networks that influence managerial behaviour.

**German abstract**

Die Studie analysiert das Verhältnis von technologischer Veränderung zu Managementverhalten. Der Ausgangspunkt ist der Veränderungsprozess in der Wahrnehmung von Unternehmensstrukturen. Die Auswirkungen der Wahrnehmungsänderung auf Managementverhalten werden erarbeitet, identifiziert und verifiziert. Der zugrundeliegende Änderungsprozess in der Wahrnehmung von Unternehmensstrukturen wird als Übergang von statischen Unternehmensstrukturen hin zu dynamischen Unternehmensnetzwerken beschrieben, die Verhalten von Managern verändern.

## 1. Introduction

What are the implications of network technology and corporate networks on managerial behaviour?

Networks have gained momentum since the last three decades. The term network can be described as a collective term because the variety of definitions is tremendous. In addition, network definitions are not restricted to certain fields like industry or services sector. They are used in a wide range of fields. Based on the collective character of the network term and the purpose of this study it is restricted to networks in the field of the market economy. The evolutionary path of networks in the market economy is based on industrial and especially on technological networks. Industrial networks were rail networks or telegraph networks in its very beginning. Technological networks are based on the innovation of computers and first beginnings of connecting stand-alone computers for information interchange. The momentum of technological networks has affected corporate managers as a whole. According to the objective of this study the affects of technological networks on corporations and management are going to be analysed. The establishment of technological networks reflects a technological change on the corporate level and a structural change on the level of the market economy. Changes that have direct effects on corporate behaviour are email and videoconferences. Formerly managers travelled in order to meet.

The basic understanding of technological change and managerial behavioural change form the framework for this study. The thesis analysis impacts of technological network changes on managerial behaviour through understanding the corporations as corporate networks. It is a fact that technological process takes place in the market economy. The relation between technological process and managerial behaviour is widely researched and not relevant for this study. This study is directed towards the analysis of the effects of technological process on managerial behaviour considering the change in cognition of corporate structures. In this paper the central questions are

1. whether the implementation of network technology impacts the cognition of corporations as network corporations and the market economy as corporate networks from the perspective of organisational theory and practice and
2. whether the change in corporate cognition impacts managerial behaviour.

The basic insights are that the role of information dispersion and communication channels has increased and affected managerial behaviour. Managers are challenged to take decisions quicker because the amount of decisions increased due to technological network changes. The technological change has affected managers understanding of corporate structures as

networks. Open and dynamic corporate network structures influence the manager's attitude to change and his behaviour with regards to decisions.

The methodology is based on literature research and analysis in order to review the existing management literature. The literature for technological change and managerial behaviour, as such, is widespread. The combined consideration of these two issues provides a restricted literature base. Similar insights were found for literature regarding the cognition of corporations and structures.

To meet the objectives the diploma thesis is structured in sections that cover the issue of network corporations, the issue of cognition and the impacts on management behaviour.

The first section, network corporations, is characterised by the notions of a definition for network corporations and corporate structures analysis. The chapter about corporate structures will consider different corporate models and be oriented to the identification of paradigm changes in organisational theory and practice.

The second section, cognition, lays down the basement for the general relation between structures and concepts through the process of cognition. In the following the abstract relation of structures and concepts through cognition is applied to the process of transition of technological change and corporate structure change.

The third section, impacts on management behaviour, delineates the term management behaviour. Based on the definition typical management behavioural actions are going to be identified and analysed. Finally, based on the change of corporate structure cognition, changes in management behaviour will be derived and discussed.

## **2. Technological change and effects**

### **2.1. Technological change**

The relevance of technological development for the costs and problems of corporate collaboration makes it necessary to analyse the changes and innovations in network technology. Based on the leading question about the influence of networks and network concepts a literature review reflecting the mayor milestones of networks from a technical point of view is provided in this chapter.

The term "networks" experienced tremendous popularity during the last two decades and there are no significant signs of saturation or downturn of this term. With the invention of the transistor, the computer and the Internet, technologies were discovered that have significantly impacted the social and the corporate environment.

Therefore I'll provide some historic-technical facts about this specific development in the 20th century to get an overview and understanding for the time horizon.

In 1925, Julius Lilienfeld an Austrian-Hungarian physician submitted the 1st patent for the Field-effect transistor. At this time it was technically impossible to build such a transistor because of technical restrictions. In 1941, Konrad Zuse, a German engineer, built the 1st computer, called Z3. Transistors were not available at this time. He made use of telephone relays. Only in 1945 the German physicians Herbert Mataré and Heinrich Welcher and their American colleagues William Shockley and Walter Brattain built the first transistor at the same time. The term „Transistor“ was introduced a couple of years later. In 1958, Jack Kilby, an American engineer invented the first microprocessor, which is today known as the integrated circuit or abbreviated “IC”. It took another decade until the first computer networks were realised in 1969 in the USA. The first computer networks were realised between US universities and US defence departments in order to exchange information and to coordinate action. In 1989, about twenty years ago, the British researcher Tim Berners-Lee invented the HTML or WWW protocol. In the Swiss research centre CERN there was the need to enable communication between French and Swiss researchers. Both countries based their networks on different systems and hence communication between them was not possible. The solution was developed by Tim Berners-Lee and is nowadays known as HTML. Within one decade the Internet developed all over the world by interlinking autonomous networks. Now the second generation of the Internet was born through the rise of corporate networks, social networks and semantic networks.

In the next chapter network concepts will be analysed from an organisational theoretical and sociological point of view.



## **2.2. Network concepts in organisational theory**

### **2.2.1. Technological change and networks**

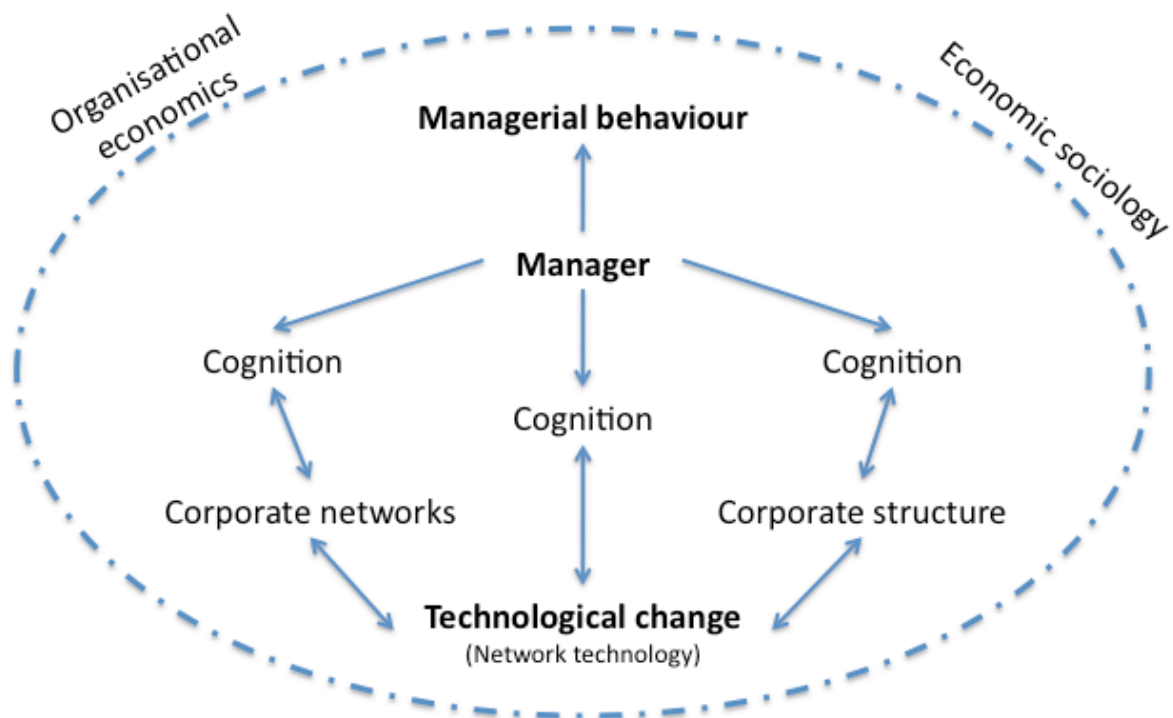
While dealing with the question that was raised at the beginning I realised that distinguishing between technological networks in corporations and corporate networks is crucial. Technological networks establish transparency of corporate structures. Corporate networks are patterns of interactions between none-equity-sharing corporations. The differentiation between external and internal relations is necessary to mention because of its existence but it has the character of a dummy variable. Internal and external network ties do not cause variations of implications to managerial behaviour. In addition, the boundaries of interacting network corporations become blurred and the junction from one corporation to another is fluently.

There are two effects of change. One effect is of technological nature as already mentioned above. It impacts the transparency of corporate structure in terms of interlinking nodes of decision-making, communication and interacting partners. Managers accomplished the transition of corporate structures as corporate networks through the implementation of physical network technology.

The second effect is the transition of network concepts from sociology to organisational theory. The concept of networks is an everyday issue in sociology, where scientists deal with relationships established between persons. They analyse the social role of an individual within the context of relationships, which it maintains with other individuals. These relationships form a social network that consists of these relationships between individuals. The successful implementation of technological networks in corporations and the existent similarities of characteristics of technological and sociological networks made the transition of network concepts from sociology to organisational theory inevitable. The scope of organisational theory is restricted to science and research. Although it is close to economic and managerial practice it cannot cover economic and managerial activity itself. Managers adopted the cognition of corporate structure as a network intuitively. Organisational theory had to follow this transition process of corporate structure but was forced to be compatible with other scientific areas, as sociology. Organisational theorists adopted the concept of networks from sociology and transferred its characteristics to the corporate environment. It is still a process of transition as, though its similarities, the underlying objectives in organisational theory and sociology are different. Hence, characteristics of the network concept are similar but are differently understood. The process of network concept transition is an activity that naturally clarifies and bridges the differences because of diverging ends.

Through the cognition of the corporation as a network, terms like uncertainty, openness, continuous change/development and risk have been introduced into the cognition of corporations. For simplicity let us assume that corporations in the past were seen as steady, static, risk minimizing entities. The cognition of a corporation affects the behaviour of people that are involved in the corporation. This includes owners, managers and employees. I state that under the static view of corporations, technological change exposes a threat to the continuity of the corporation and people will hold oppositional attitudes towards changes. Although they may support technological progress they will oppose changes. But the changes are necessary in order to benefit from the technological progress. In order to establish a corporation that is open towards changes, managers need to aim a corporate cognition that is open to change. The corporate network concept was the response to achieve a corporate wide openness to change. As mentioned above technological networks contributed to the transparency of corporate structure and relations. The structure itself was not affected by the technological change. The effect of the implementation of network technology can be identified in implications of managerial behaviour and in the following on a corporate wide behaviour of employees. The view of corporations as networks, introduces the terms uncertainty, risk, continuous change and openness as systemic and inherent terms. Owners, managers and employees face risk and uncertainty not any longer from an opposing point of view. The characteristics of networks are taken as existent and are considered as the corporation evolves and technological change advances. The following picture summarises the process of implementation of technological networks, the naturally caused process of network concept transition, the change in cognition of corporate structures and the final effects on managerial behaviour. For simplicity the causality chain is restricted to managers. The behavioural impacts on a corporation and market wide level are disregarded here in order to maintain the focus on the management.

## Causality chain of technological change



Organisational economics and economic sociology are part of the transition process. The process of transition including the change of corporate cognition is described in chapter 3 and 4. Beforehand a definition of a network corporation is provided in the next chapter.

### 2.2.2. Definition of a network corporation

At the beginning of this chapter I explain the heterogeneous character of the term 'Network Corporation'. Despite its heterogeneity and diversity I provide a definition for network corporations at the end of this chapter. This definition is valid throughout this work.

The literature about network corporations as organisational forms is diversified. In order to provide a base for understanding the variety of the term 'Network Corporation' I list some definitions:

#### Definition 1

Johanson, 1987 describes networks as coordination that takes place through interaction between corporations in the network. Relationships are required for corporate interaction. The establishment of corporate relations takes time and is based on exchange relationships of minor risk. Corporations tend to realise transactions within their set of established corporate

relations. Because of the need for corporate adjustment a specific interdependence arises. This definition is referred to as network approach in the literature.<sup>1</sup>

#### Definition 2

Powell, 1990 defines a network as a different structure of exchange. When corporate activities have inter-dependent character and no ownership relation exists between interacting corporations, the common concepts of markets and hierarchies are inadequate means of description. A separate concept with its own framework, a network concept, is required.<sup>2</sup>

#### Definition 3

Shaner, 2011 states that networks are characterised through structure and composition. The network structure is described by certainty, stability and thrust of the institutional environment. The external business network is set up through federations, associations, customer-relationships, competitive relations, and social-legal apparatus, which is the network composition. The network approach of Shaner, 2011 is labelled in the literature as the dependency theory.<sup>3</sup>

According to the three definitions of network corporations it is obvious that the spectrum of network corporation definitions is heterogeneous. In the following I focus on the approach of Powell, 1990 because it plays a significant role in the research area of network corporations.

On the one hand he summarises the heterogeneous literature about network forms and on the other hand he provides a broad definition of network corporations. I would say that he actually did not provide a proper definition of network corporations because Powell, 1990 defines network corporations through “other than markets and firms”. Anyway, many authors (e.g. Mazzarol, 1998, Grandori, 1995, Menard, 2004) seem to understand the scope and take on this notion. Researchers approach from different points of view to the network corporations, nevertheless they have the network approach of Powell, 1990 in common.

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<sup>1</sup> The network approach – as described here – was developed by a Swedish research group. Contributing authors were e.g. Hägg I., Hakansson H, Hammarkvist K. O., and Mattsson L. G.

<sup>2</sup> In conventional economic theory transactions are coordinated between entities either through the market on the basis of price or through firms that integrate exchange activities. The decision for either markets or firms is based on the frequency and specificity of a transaction. The influential literature for markets and firms as economic governance structures is Coase, 1937, Williamson, 1975, Williamson, 1985.

<sup>3</sup> Shaner, 2011 analyses a corporation called ServCo which operates in more than 120 countries and offers services in the inspection and certification industry.

Menard, 2004 states that the market frame consists of demand and supply. The price of a good or service is the guiding determinant. Firms as instruments for internalised transactions have hierarchies for information flow and decision-making. The role of hierarchy is central in firms. But there is a branch where more factors than price guide corporate decisions and where corporate boundaries are blurred. This branch is of diffuse character and can be addressed with many labels: *“clusters, networks, symbiotic arrangements, supply-chain systems, administered channels, nonstandard contracts”* (Menard, 2004:347), etc. He understands that the branch beyond markets and firms is wide. Corporation agreements are diverse and collaboration takes place on *“mutually adjusting with little help through the price system, and sharing or exchanging technologies, capital, products, and services but without shared ownership”* (Menard, 2004:348).

Menard, 2004 and Powell, 1990 understand the heterogeneity of network forms and write:

*“Network is a very general term, now widespread in sociology and management science, that covers about all arrangements involving a set of recurrent contractual ties among autonomous entities. Two subsets have been extensively studied. One is the supply-chain system adopted in many industries (...). The other subset is distribution channels (...). One variety that deserves particular attention is franchising. Because of its rapid development in the provision of final goods and services to consumers in the 1960s and 1970s, it attracted interest quite early (...).”* (Menard, 2004:348)

The network form definition of Menard, 2004 is already more precise but the problem is that he is an economic theoretician and comes from the field of economic theory. For this work organisation theory is required.

Grandori 1995 in contrary is a researcher that better fits the needs of this work because they come from an organisational theory background. In addition Grandori, 1995 provides a general allocation of network corporations within different organisation forms. Grandori, 1995 locates network corporations within the branch of none-equity networks. None-equity networks are widely researched in organisational theory. Network corporations are classified in franchising, joint ventures, sub-contracting, interlocking directorates, etc. Grandori, 1995:184 defines network corporations as follows:

***“The term ‘network’, by itself, is an abstract notion referring to a set of nodes and relationships which connect them (...), and it is used in a variety of sciences, including not only organisational theory but also neuro-sciences, operational***

*research, communication theory and small group theory. We are interested here in networks as modes of organising economic activities through inter-firm coordination and cooperation. In this sense networks lie at the very core of organisational theory.”*

Inter-firm networks are different from inter-firm integration activities and from price coordination on the market. Because of the inter-firm character ambivalent perceptions have risen. The term ‘networks as hybrid organisation forms’ positions inter-firm networks between the market and firm (Williamson, 1991, Thorelli, 1986). The term ‘networks as an autonomous organisation forms’ determines inter-firm networks as a separate organisational concept (Johanson, 1987, Larson, 1993, Powell, 1990).

According to these two perceptions of inter-firm networks, they have the following attributes: First, inter-firm networks manage interdependence and reflect a cooperative game with partner-specific communication. And, second, inter-firm networks take the intensity of inter-firm relations into account.

For the development of inter-firm networks technology, costs and corporate learning challenges are significant determinants. The possibilities of inter-firm collaboration and cooperation were an enhancement to the integrated firm concerning technological innovation. Network forms are applied on different corporate layers. In science these are the economic and sociological layers. The organisational layer of network forms has brought together aspects of economic and sociological approaches and emphasis on the formalisation and stabilisation of networks and issues of information and communication dispersion, according to Grandori, 1995.

The justification of network corporations as organisational forms is its performance advantage according to Mazzarol, 1998.<sup>4</sup>

In the following I am going to analyse the transition process as introduced in chapter 2.2.1. This includes the areas of friction with existing corporate models – Organisational economics and economic sociology – and the process of changing corporate cognition.

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<sup>4</sup> Although Mazzarol, 1998 results are restricted to the SME sector, performance advantages of network corporations are not restricted to SMEs and can be identified in various sectors. Mazzarol, 1984 revealed that partnering of various SMEs positively contributes to the performance of the individual SME. The results of the study rebut the widespread perception of the independent and autonomous acting SME entrepreneur.

### 3. Corporate structures and organisational theories

The underlying definition for a network is broadly formulated. In order to assure a clear understanding of the definition I will provide a foundation that describes the environment of corporate structures and organisational theory<sup>5</sup> in which the transition process is embedded with its effects on managerial behaviour.

Since its foundation at the beginning of the 20th century organisational theory<sup>6</sup> was a discipline dominated by technical engineers, especially in the US. From this technical field of research it, more and more, established links to sociology. In this circumstance it is crucial to mention the accomplishments of Weber, 1972 [1921] in sociology.

The sociologist, economist, politician and philosopher Max Weber (Weber, 1972 [1921], Shenhav, 2003:192) elaborated a model that, for the first time, introduced rationality into sociology. Weber's peculiar capabilities of dualistic thinking enabled him to derive such an ambivalent model. The model he describes in his works analyses sociology from a rational point of view that is endowed with critical comments that compensate for the gap of incompatibility between sociology and rationalism.

Weber's definition of rationality and bureaucracy was chosen to analyse the relation of domination (Herrschaft, Führung) in a market society and perceives bureaucracy as a way of domination. His model provides a comprehensive tool to analyse the level of domination. Therefore the results have mayor influence in the political and social fields of research. In the US Weber's concept of rationalism in sociology was perceived in terms of the engineering discourse. Scientists restricted their understanding of Weber to the mere bureaucratically portion of his concept as they were analysing Weber's theory from an engineering point of view, therefore, the definition of rationality that Weber applied and American scientists applied were not isomorph. Weber intended to provide an analytical tool for the theoretical discussion that took place between Marx and Hegel, capturing the issue of dominance in a market society, whereas the management discourse intended to cope with political issues like separating labour unrest from politics.

The management and/or the engineering discourse, that prevailed in the US (Shenhav, 2003:190), was characterised by the process of generating red tape, unpredictability, lack of control, conflict and instability. However, the approach of its protagonists viewed organisations as rational systems. This cognition of organisation as systems smoothed the way

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<sup>5</sup> To be conform with the existing organisational literature I will use the appropriate term 'organisational theory' in this chapter. The reader shall be aware that the understanding and relevance of the term 'organisational theory' is restricted to economic organisations, corporations, respectively.

<sup>6</sup> See footnote 5 (ibid)

towards more efficient management of organisations. But during the evolvement of corporate theory towards a rational science of organisations it became necessary, due to critics of politicians and protagonists of the market economy, to justify the new concept. Engineers, then, adopted their concepts towards the focus of labour unrest, which was usually perceived as a political issue. Through this new system point of view the issue of labour unrest became technical and was hence isolated from the political issue. The political labour unrest issue more and more rendered itself as central part of the rationality of organisations. As a result engineers were able to justify the existence of the science of organisations as rational systems. Independent of the network definition the organisational environment was characterised by a term of rationality that is aligned towards efficiency and effectiveness because of its technical engineering character. The research on corporations resided in Europe in sociology. Technical engineers in the US started to separate economic organisations from sociology and began to define corporations as rational systems. Based on the background of corporate theory the burning issues for networks within organisational theory are the role of rationality and uncertainty.

### **3.1. Determinants of structures in organisational theories**

#### **3.1.1. Rationality and uncertainty**

Rationality is a widely defined term that becomes narrow within organisation theory. The literature created the term instrumental-technical rationality, where the political, moral and cultural facets are excluded. But this leads inevitably to a misbalance of rationality in decision situations and should be avoided (Shenhav, 2003:198).

The introduction of the term of instrumental rationality has spawned the discussion about uncertainty. The more rational an organisation becomes the more efforts are devoted to the reduction of uncertainty. The purpose – end – of an organisation has changed in order to cope with uncertainty and introduce absolute instrumental rationality into organisations. As a result the research activity in the field of uncertainty increased tremendously, because control, predictability and stability are restricted to a small field, whereas the field of uncertainty is much broader. The infinite number of possible states of the environment and the bounded (restricted) human rationality opens an immense horizon of opportunities for contingencies (Shenhav, 2003:201). Williamson formed the term “bounded rationalism” in terms of limitations of the human mind and postulated that an organisation can cope with the infinity of contingency through internal organisation structures.



Again the scientific process about uncertainty was triggered by the American engineering society, whose intention was to tame uncertainty.

The narrow definition of rationality in organisational studies together with the urge of reducing uncertainty created an immense research field for uncertainty. Critical management studies, which evolved in the UK started to derive alternative management styles going further than the prevailing objectives of efficiency and effectiveness.

Fournier and Grey, 2000 were one of the first authors, who were concerned about this topic. In the UK the issue developed with the introduction of business schools in the 1960s, where mayor sociologists joined in and dedicated their activity to neo-Marxism, critical theory, post-structuralism, feminism, cultural studies, post-colonial theory, and deconstruction. Fournier and Grey 2000 identified some demarcations between critical and non-critical management studies. Critical management studies focus on the role of power, control and inequality, whereas classical management theory, as it was shaped in the US, has objectives as efficiency, effectiveness and profitability at its centre point. Further CMS devotes efforts to identify alternative management practices to the ones that are widely applied and hence foster the rise of them. Finally, critical management theory does cope with the description of power relations and control structures through the application of philosophical and methodological reflection (Shenhav, 2003:203).

Although in classical organisational theory these elements are leaped, their role is of mayor importance because corporations of economic and especially also public and non-profit organisations feature hierarchy, power and domination structures. In addition to general organisational theory, organisational economics evolved in the 1970. Organisational economics breaks with the engineering discourse and describes the firm as an economic entity that is determined to produce output, based on costs, demand patterns and profit orientation. Still, as within the engineering discourse of firms' organisation, the focus is on the individual firm.

### **3.2. Organisational economics**

In organisational economics (Swedberg, 2003b:374) the firm is perceived as a profit maximising entity, a notion founded by Cournot in 1838. The concept makes use of a couple of functions that describe the firm on the base of its production (production function), costs (cost function) and demand (demand function). The general drawback of Cournot's notion is the ignorance of the firm's organisation structure. A point, where critics are rooted and in the 20<sup>th</sup> century scientists like Alfred Marshall or Archibald intended to incorporate the aspect of the firm as an organisation (e.g. organisations as the 4<sup>th</sup> production function) In addition F.

Knight published works about the economic organisation (Knight, 1965<sup>7</sup>) and Jacob Marshak published about teams (Marshak and Radner, 1972).

In the following common economic models are discussed. They represent different corporate cognitions in organisational economics. The different epochs of development indicate a period of change either only in organisational theory or in the economic environment that caused an impact towards organisational theory.

The last chapter Displacement of ends summarises the overall change in organisational theory because of technological changes in the corporate environment.

### **3.2.1. Transaction Cost Analysis**

Coase, 1937 wrote the underlying literature for this theory in 1937 with the title of “The Nature of the Firm” and “The Problem of Social Cost”. After nearly half a century Coase’s work gained momentum, when Williamson, 1975 discovered and spread its work under the nowadays common title of “Transaction Cost Theory”. The concept describes two alternatives of production, which are the firm and the market. The intuition of the concept grounds on the consideration of costs for a transaction in the market. If the costs for a market transaction supersede the costs of the firm then a firm will be set up. Williamson O. transformed the terms into Markets and hierarchies, which are different governance structures. Transactions with specificity, low frequency, uncertainty and special investments tend to be realised through firms On the other hand, transactions with high frequency and of standardised character are usually realised through the market.

According to contemporary literature, authors like Johanson, 1987, Powell, 1990, Shaner, 2011, Mazzarol, 1998, Grandori, 1995, Menard, 2004, Thorelli, 1986, and Larson, 1993, transaction cost theory is advanced and understand more sophisticated. Research and experience has shown that in addition to firms and markets inter-corporate relations or hybrid forms of firms and markets emerged.

### **3.2.2. Agency Theory**

The fathers of the agency theory in economics are Jensen and Meckling, 1976. Their article “Theory of the Firm: Managerial Behaviour, Agency Costs, and ownership Structure (1976/1986) lays down the basis of Jensen’s notion with regards to the principle and the agent. The principle wants to get something done without his presence, by a third person. In economic terms the owner of the firm contracts a manager, who runs the firm on his behalf.

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<sup>7</sup> Original publication dates are 1933 and 1951

The key issue is to align the interests of the owner and the manager on a contractual base and to determine an ownership structure that best aligns the interests of both parties by containing the risk of opportunistic behaviour of the manager.

Jensen and Meckling, 1976 approached to the problem of relatedness from an conflict of interest point of view on a contractual base. How should a contract between the agent and the principle be designed in order to achieve aligned interests of the principle and the agent. Trust and inter-dependency are laterally considered. However, inspired from the technological change in network technology these factors gained momentum in the last two decades. Franchising emerged as a hybrid form of agency theory and trust and inter-dependency based approach (Menard, 2004).

### **3.2.3. Displacement of ends**

McKinley, 2010 analysed that the ends of organisational theory have changed in the last 50 years towards new theory development. In its original constellation it was determined to achieve consensus about the validity of a theory through empirical testing. The displacement of ends of organisational theory was a process that evolved autonomously. The effect of this autonomous dynamic is a proliferated quantity of theories that have not been validated. Over the last half century the activity of researchers became more focused to the evolvement of new theories. As the organisational environment changed continuously and more dynamically research was practically obliged to derive new theories that capture the new environment. The frequency of new theories increased tremendously and even their conceptual character became more understandable for practitioners. However, the complexity on the epistemological level increased exorbitantly. These two factors, innovation frequency and epistemological complexity, impacted severely the validation process. On a steady base the number of none-validated theories increased and the displacement of ends was irreversible. The displacing process advanced and nowadays draws the attention of scientists due to the fact of circulation of untested theories. The lack of contemporary research activity is the bottleneck of timely restricted ability to test theories. Hence researchers begin to join efforts to revive the ends of theory consensus. But a dynamic and quickly changing organisational environment requires, inherently, the generation of new theories, on the one hand and on the other hand it requires validated theories that serve as an anchor in the field of theories.

Based on the historical development of the ends of organisational theory it is obvious that mayor changes in the organisational environment itself occurred. I assume that the organisational environment, which belongs to the sociological environment, changed and is nowadays more dynamic than ever. The assumption just taken I base on the empirical obvious

fact of displacement of ends in organisational theory. The new end of organisational theory of bringing forth of new theories indicates that the organisational environment, as a part of the sociological environment, undergoes changes on a more frequent base.

As the overall environment in economic, sociological and organisational terms became more flexible it is inevitable to trigger a move towards the incorporation of a wider horizon within organisational theory. This means that organisational theory has to rebalance its research focus by putting more weight on inter-organisational relations and on the number of observed organisational entities, namely analysing an individual organisation within an organisational environment, corporate environment, respectively.

### **3.3. Economic sociology and the process of transition**

In organisational economics efforts were taken to incorporate organisational structure in their concepts only in the recent past. Despite the omission of the organisational structure, the firm is perceived as an entity that thrives to maximize profit. This maximizing condition implicated the firm as a rationally guided entity. In classical organisational theory rationality is understood as the consideration about effectiveness, efficiency and predictability. These important columns of rationality in the engineering discourse are inherent to organisational economics, where the economic perspective of profit maximization is in the foreground. Economic sociology goes further than organisational economics as it transcends the economic border and locates the economically operating firm within a sociological context – the corporate environment. This process is labelled transition of the network concept from sociology to organisational theory according to chapter 2.2 Network concepts in organisational theory.

#### **3.3.1. The view of the firm in Economic sociology**

Organisational economics is focused to the firm as an economic entity that thrives to maximise profit. Organisations of other purposes than economic are left out in organisational economics. Other purposes for organisations are of political, religious, cultural or other non-profit nature. The research field of sociology of the organisation bridges the gap between various organisation forms, and analysis the sociological structure of organisations in general. Economic sociology, hence, applies the sociological concept of organisations to economic issues (Swedberg, 2003b:379).

### **3.3.2. The influence of Weber in Organisational Sociology**

Max Weber's (Swedberg, 2003b:380) contribution to organisational sociology was immense. The difficulty was, that economic sociologists tended to misinterpret Weber's ideas as they dealt with Weber's literature on a partial base that was restricted to the role of bureaucracy. Nowadays science has completely understood and adopted his concept. Weber elaborated in his analysis of the firm the following elements: (1) historical development of the firm, (2) cultural-sociological analysis of the firm through analysing the role of spirit for a firm, and (3) creation of the role of the entrepreneur within the capitalistic firm. It is the entrepreneur that transforms the firm into a dynamic entity. As Weber used bureaucracy as a means of domination, his concept of the firm contains this notion too.

According to Quinn and Paquette, 1990, firms restructure themselves in a way that optimizes the relationship between the corporation and the client. To be more precise the corporation structures himself as such that the relationship between the corporation's sales personal and customer are facilitated. On a corporate-wide level this means that a corporation seeks an organisational configuration that favours the social relationships between two corporations' people. The relationship is usually based on a contractual base but a corporation can extent its scope of favouring social relations also on non-contractual relationships. The social relationship, which consists of the personal contact between two people working for different corporations, is in organisational theory transferred into a corporate relationship. The corporate relationship abstracts the relationship to an organisational level.

Changes in technology affect the configuration of bureaucracy in the manner, that with incorporation of technology, processes can be automated and therefore cuts down the workload of coordinators (managers). Bureaucracy becomes flatter and is, now, open to establish interdepartmental links and relationships.

The impact to bureaucracy is, from an organisational point of view, vast since middle management is reduced, and top management gets closer to the operational levels and customers, whereas dominance patterns remain unchanged. Although the hierarchy gets flatter, domination patterns for guiding an organisation remain the same. Nevertheless the functioning of the organisation is supposed to be affected positively as more responsibility and authority is given to the base of the hierarchy. As the base of the hierarchy pyramid is endowed with more responsibility and authority their ability to influence the top of the pyramid increases. The power of domination within the hierarchical setting leveraged to a flatter hierarchy of domination. However, the hierarchical order of domination is re-established through the technological system allowing automation of processes and tightening

middle management, which provides the top management with the ability to control the flow of information directly. With regards to Weber, 1972 [1921]<sup>8</sup> the insight of Quinn and Paquette, 1990 affects hierarchies on the organisational level tremendously but the effect, with regards to domination and control, is unchanged in terms of the final result. What changed is, because of technological change, the quality of domination. The organisation, after the technological change, is dominated through the control of the information torrent instead of a broad middle management layer that blurs domination.

With a broad layer of middle management control errors or even abuse of power are possible and the measurement of middle management is complex due to qualitative measures. The effect of decision errors under the incorporation of technology and elimination of middle management can be directly attributed to top management and are quicker to identify for the top management. The pyramid base is not able to identify the errors with its full spectrum as they have limited information, which is controlled through the top management.

However the new constellation, which is flatter in terms of organisational character and more direct in terms of domination and control character, is more transparent, which should positively influence the level of responsibility of top management and motivate operating units to monitor top management domination more attentive. They should exploit the possibility of establishing communication on a horizontal level to increase their position towards top management.

### **3.3.3. The focus on firms instead of on the firm**

Sociologists usually commit research on a group of firms (Swedberg, 2003b:381). In contrary, economists often focus their research activity on the individual firm. In sociology the organisational field, which consists of various firms that are somehow interlinked, is the focus of scientists. The terms of business groups and organisational fields, soon, created the term of networks in organisational theory. It was the effort of sociological scientists in organisational theory that established the network concept in this area. At the same time, in the 1970, the notion of resource dependence developed. This concept simply states that an organisation has to establish and maintain relations with its environment to be able to exist and survive, on the one hand, and on the other to meet demand requirements.

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<sup>8</sup> Weber 1972 [1921] is not directly quoted in this work but it is recommended to the reader to accompany in depth reading of this paper with selected items of *Wirtschaft und Gesellschaft* like *Macht, Herrschaft, Wirtschaftliche Orientierung des Handelns, Legitimitätsgeltung, Soziologie der Herrschaft, Herrschaft durch Organisationen*;

Granovetter, 1983 and Granovetter, 1992 was the person who popularised the model of business groups in the 1990s. He perceives organisations as groups that are bound together through formal, informal or even other types of relations. He states that business groups can be characterised through ownership structure, finance, relation to the state, authority structure, moral economy, and principles of solidarity.

Based on the concept of Weber, 1972 [1921], the issue of knowledge distribution and resource dependence in the network concept, it is possible to set up and control power structures in a network of corporations (external) and networked corporations (internal).

#### **3.3.4. Decoupled structure in organisational sociology**

Marshall and Radner, 1972 suggested that in the modern organisation there exists the contradiction between to get things done and to adopt the organisational structure to the environment (in Swedberg, 2003b:383). As the organisational structure incorporates elements from the environment, it is more difficult to get things done. Therefore researchers suggest a decoupled structure, where the practices are independent of the formal structure.

The movement of new institutionalism developed as a response to the perception that organisations can be appropriately explained through economic and technological variables.

Fligstein, 2001 sees the modern corporation as an entity, which brings forward a structure that is formed by the role of the state, how managers think about strategy (conceptions of control) and isomorphism (Isomorphism in sociology describes two situations that are similar in structure and form but their development has been different because of varying constraints or starting points) in the diffusion of huge organisations. What often happens in economic organisations is that individuals refer their behaviour and applied practices as rational and objective but often it can be shown that this is not the case and social construction would be a more adequate alternative to describe their behaviour.

In this chapter it becomes clear that researchers have to find a way to decide the question of how to describe a corporation. Sociological and economic approaches have advantages that are worth to be discussed. The key question is whether one of the approaches is superior to the other or if it is possible to elaborate an approach that is able to incorporate sociological and economic aspects.

Swedberg, 2003a opines that the current concepts are not compatible but he identifies a small horizon that bears possibilities to spawn a new corporation description capturing these interests and being able to describe the sociological entrepreneurial character of the firm.

In sociology network analysis is a widely applied instrument (Betts and Stouder, 2004:5), which analyses the relationships between a group of social actors. A social actor depends on the concrete definition within each analysis. In general, social actors are defined as individuals, a group of individuals, social entities or a group of social entities. Entities refer to any form of organisation or institution. Under the light of this paper the social actor is a group of corporations. Due to an extensive literature research it is obvious that the literature on network organisations is restricted but a lot of literature that is based on network analysis is available. Some authors see network forms as governance structures, which adds networks organisation to the canon of hierarchy and markets as a third alternative (Johanson, 1987, Powell, 1990, Shenhav, 2003, Mazzarol, 1998, Grandori, 1995, Menard, 2004, Thorelli, 1986, Larson, 1993). Through understanding a network as governance structure the link to Weber's notion of bureaucracy and domination can be established. This leads to a shift from the discussion about organisational theory towards structure of governance between organisations. This brings a completely different point of view to organisational theory at this stage. The sphere of discussion, so far, took place in the field of organisational theory of the sociological behaviour of one firm and passes to the sphere of governance modes. With governance modes the relationships between organisations are meant. When analysing organisational relations from this point of view the (organisational) structure of a network becomes relevant. The organisational structure of a network is described through the relationships between network members with the instrument of network analysis.

The overview and discussion on organisational theory provides the necessary background for capturing organisations as networks. The key thoughts are decoupling practices and formal structure of an organisation, the scientific origin of networks within sociology and the iterative implementation of sociological aspects in organisational theory.

The aspect of decoupling practices from the formal structure allows that practices can be modified without having mayor impact on the formal structure. The frequent argumentation about the dependence of structure on the local environment is avoided as decoupling allows situating a formal structure in a more dynamic – changing – environment, where practices instead of structure will be adopted. The adoption of practices in an organisation structure is assumed to be more straightforward than adopting the formal structure.

With regards to networks or business groups for the purpose of analysing networks and market economy it is important to mention that a network on the mere organisational base is a dynamic organisational structure that has fluent borders of internal and external structure. Further, networks are - in this context - seen as organisations that are somehow interlinked,



which means that a process of abstraction from the sociological individual to an organisation takes place. This clearly unveils that the practices and structure of an organisation depend definitely on sociological changes. But an organisation is also dependent on other variables causing an organisation to change in the sociological context.

The third thought that is taken from the above overview, is the role of sociology in organisational theory. Sociology alone is too general to cope with the sociological concept of market economy and network organisations. The research area of this work would be set out too broad to be able to cope with the scientific question on a reasonable base. Anyway the incorporation of more sociological aspects than in common organisational theory is necessary as the market economy is penetrated by sociological elements more than ever. The open structure of networks and the deeper penetration oblige to incorporate a broader range of organisations, which nowadays also includes non-profit organisations and organisations with close ties to governments or even governmental organisations.

### **3.3.5. Organisational theory**

Organisational theory is challenged. Challenged to provide models that bridge the prevailing corporate perception and corporate structure. In the second half of the 20th century organisational theory developed so many theories in order to describe a new structure. There is no need for new organisational theories that describe new structures. Corporate structures do not change, however their quality changes. Quality refers to technology, distance, time and corporate velocity. Technology is about the application of research and development results in corporations. The technological change affects the cognition of the environment and the environment itself. The corporate environmental structure often remains unaffected by technological change. Let us take the invention of the automobile as an example. Before the automobile, horse carriages were the common media to travel. The invention of the automobile was based on a new technology. However, the general goal of an automobile was the same as of the horse carriage, namely to travel from one place to another. From this point of view nothing changed because one can travel with a horse carriage or with an automobile in order to reach another geographic location. The mayor difference between horse carriages and automobiles is the speed and price. Some explanation to speed and price is necessary. If one considers the speed in absolute terms, the conclusion will be that an automobile is faster than a horse carriage. A relative consideration provides the result that both transport media are equally fast. Why? The social structure around the era of horse carriages is adapted to its characteristics, which is especially speed but also comfort of travel, environmental effects, etc. The same conclusion is valid for the automobile. Comparing the relative characteristics of

speed of horse carriages and automobiles suggests that horse carriages and automobiles embedded in its social structures are equally fast. Whenever one compares both transport media within the same social structure the effect of speed will be different, namely that horse carriages are much slower than automobiles. At the point of innovation the relation of automobile and social structure does not exist yet. The new technology has to penetrate the society and create the new structure, which takes some time. The penetration intensity depends on the price and quality of the new media. The price of an automobile was compared to a horse carriage very high and only a few – very rich – people could afford to buy a car. A new innovation is prone to failures and errors because of the lack of enough testing and experience in the new field, which hampers the process of social penetration at the beginning. When the process of penetration is completed a relative comparison between the different transportation modes is possible and comes to the above conclusion that horse carriages and cars are equally fast. The relative comparison is at the beginning not possible because of missing experience and data. The only comparison that is possible is comparing the transportation modes absolutely in the same social environment. In this case the automobile has clear advantages and disadvantages, like speed and comfort, though comfort in the first automobile prototypes was not much considered.

### **3.3.6. Ends of organisational theory**

I see two mayor ends of organisational theory: (1) Developing models that incorporate actual perception of corporate structure and (2) developing scenarios of qualitative change.

Developing models that incorporate actual perception means that organisational researchers should focus towards describing and explaining the underlying corporate structure with elements that represent the current perception of practitioners. An example would be networks and network concepts. As described in the chapter about networks and concepts organisational theory intends to describe corporate structure from a network point of view. We have also seen the implications of new theories in organisational theory with regards to verifiability.

Developing scenarios of qualitative change would be a process of forecasting impacts on perception because of qualitative change within the organisational and social environment. Therefore it is necessary that qualitative determinants are identified and then are modelled on different level of change. Assume that technology is supposed to be such a determinant. For analysing the change in perception the level of technological change has to be defined as well, e.g. transportation time of physical goods is reduced by 50% because of a new transportation technology that is available at competitive prices to all market participants. The organisational

and social environment has to be described as well. A starting point for forecasting perception change in a market economy might be Homo oeconomicus. For specific scenario purposes the stereotype of the Homo oeconomicus may be adapted.

The effect on organisational theory by enhancing or replacing its ends with these two would be that organisational theory would become backward and forward looking.

### **3.4. Trends in organisational theory**

Within this organisational-sociological setting the defined corporate networks are situated. The majority of the network members are led through an entrepreneurial thrust but also taking other strategic elements into consideration.

The relationship in networks varies in its quality. Tight relations are usually based on contracts. A contractual base is not sufficient to ascribe tightness to an inter-organisational relation. Furthermore, the level of incorporation of the contract partners allows spawning a tight relation. There may exist loose organisational relationships that are based on a contract. Such relationships may arise due to the character of the contractual item, which in general will be a standard good or service, which requires little incorporation of contract partners. Loose relationships may also arise on the base of former contracts or simply because of informal relationships that are set up on the base of information and lobbying purposes.

The internal structure of an organisation is set up, based on the purpose of the organisation. Over time the internal structure changes but is more static than its environmental structure. In relative terms the internal structure is static and in absolute terms the internal structure is dynamic because it continuously adapts to the sociologic-organisational needs of the people and the entrepreneur. The internal structure is of formal character, which is decoupled of organisational practices. The practices applied in an organisation reflect the organisation's underlying network ties and environmental perception by the people and the entrepreneur. Practices adopt nearly on an immediate base to changes in the network or the environment, whereas the role of network changes is more influential than environmental change.

If the organisational network changes on a continuous base the organisation will finally be seen as a network as external changes directly effect internal organisational practices. The direct bridge from external to internal changes makes the frontier between an organisation and its environment a mere theoretical and conceptual frontier.

The majority of the network members, organisations, follow an entrepreneurial thrust that captures the fact of an economic organisation, being more than merely economically guided. Economic organisations are seen as entities that are part of the society and try also to achieve political, environmental, social and other goals.

#### **4. Cognition, corporate structures, and concepts**

The causality of technological network change to impacts on managerial behaviour takes place over cognition of technological change and cognition of corporate structures. Corporate structures are constant.<sup>9</sup> Technological change impacts the quality of relationships between corporate entities.

The statement about corporate structures reflects the decoupling effect of practices and formal structure. Corporate entities exist independent of its relations. A decoupled corporate structure is possible for internal and external corporate structures. Internal corporate entities are departments like marketing, controlling, production and personal. This corporate entity structure exists independent of practices. Practices are the relational structure of corporate entities based on mutually required cooperation. Cooperation is characterised by exchange of information and existing communication between entities. External corporate entities are autonomous corporations that provide goods and services. Practices on the external level are based contracts. They contain the objectives for mutual cooperation and communication.

In both cases the existence of the corporate entity is independent of the practice. If the objective for mutual cooperation vanishes, the existence of the entity is not threatened. The existence of an entity is questioned if the frequency of relations to other entities is fades out. As a result of lacking relations external entities face bankruptcy and internal entities face restructuring of own objectives.

Technological change in the network technology modifies the mode of exchange of information and communication. Hence the relationships between corporate entities are affected and the entities itself remain.

Corporate structures constitute themselves through relations between entities. Mere corporate entities are constant. The establishment and termination of relations between corporations make corporate structures dynamic.

Uncertainty and rationality (see chapters 3.1.1) address the relationships in between entities. Technological changes take effect when they impact the mode of relationships. The technological change does not impact the objective of a relationship or practice. The objective to buy a book from a bookstore remains. Because of network technology books can be bought either in a bookshop or through an online bookstore. The mode of a relation is referred to the qualitative character of a relation. Qualities of a relation are technology, time, relative distance.

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<sup>9</sup> see 3.3.5 Organisational theory on page 25

In order to affect behaviour qualitative changes have to be perceived. In the case of this work qualitative changes have to be perceived by managers.

The cognition of a manager is his own description of the corporate environment on which the manager bases his reasoning and action. In order to facilitate cognition managers make use of concepts, which are description templates for certain fields of the corporate environment. The corporate environment is constituted of technological, political, legal, sociological, and other fields. The analysis of managerial impact is based on the technological field of the corporate environment. If the environment changes because of technology, valid concepts become outdated. The former concepts do not become obsolete. They simply do not apply any more in this field. Other concepts describe the new situation better than the former ones. Each corporation has a certain structure, which continuously adapts to changes. According to the decoupled structure in corporations technological change only affects the quality of relations. Corporate entities are not affected.

The change of managerial cognition is the replacement of one concept by another. The new concept may be elaborated from scratch or adopted from another field. In the case of network technology the concept transfer takes place from sociology to organisational theory.

An organisation can only adapt its practices to the new environment if it is able to perceive the changes in its environment. A corporation has to monitor on a regular base its environment in order to identify changes and has to decide upon whether to adapt or not. Managers have to be aware of changes in the environment in order to take prudent decisions. In order to transform a corporate structure to a structure that is more efficient in interacting with the environment a new structural concept has to be elaborated and communicated throughout the corporation. The communication process is exactly the change in cognition where one concept is replaced with another concept. This step is the mayor part of a transition process of a corporate structure.

In the following paragraphs the terms cognition, concept and structure will be elaborated in more detail.

#### 4.1. Cognition

*„[Cognition] as a process that takes place every second, that are doing things you do not even think about“, (Goldstein, 2010:4).*

In general one thinks that through cognition one is in direct contact with the environment. However what a human being perceives is the result of human senses that replicate the environment. The result of the cognition process is a replicate of the reality that is the aggregated sum of the different human senses.

The general cognition process is divided into stimulus, electricity, experience and action and knowledge. The first three phases take place sequentially, whereas the forth phase, knowledge, is anything that adds to the overall cognition result at any point of time. The physical process of cognition is not the focal point of the underlying research and will not be elaborated in more detail. For further information on physical perception see Goldstein, 2010, Kieser and Ebers, 2006, Abrahamson, 1990, Merleau-Ponty, 1974, Gibson, 1982, Berne, 1979, Gibson, 1968, and Allport, 1955.

In order to understand the process of cognition and its environmental influences the rat-man example from Goldstein, 2010:11 is used. The example of the rat-man shows that knowledge can have a mayor influence in what we perceive. In the case of the rat-man picture the reader has seen first a more rat like picture and was then presented a rat-man picture. The results of the test revealed that under the influence of knowledge the majority has perceived a rat.

The example indicates the significance of knowledge during the cognition process and how many factors affect the result of cognition. The insights of this example indicate the complexity of the observation process of the organisational environment and identification of changes in the environment.

Corporate entities are enabled to set action through their managers, decision makers and employees. The same is true for the cognition and observation process. Corporate members perceive the environment in duty of the corporation. Employees execute this activity in a corporation and provide the results to managers. On the one hand a corporation observes the environment in general and on the other the corporate environment in specific. The corporate environment in specific refers to other corporations. Greenberg, 2007:88 describes the process of asking himself, what are others like as the process of social cognition. The process of social cognition does always compare the observed individual or group with the observer or other groups.

The issue that copes directly with the individual – the observer – himself is characterized by the term of social identity and responses to the question of who am I. An identity is the merge of social and personal identifying elements.

The process of social cognition is motivated through the observer in order to obtain a picture of the social environment he is able to overview and understand. Therefore, social cognition is inevitably a process of simplifying the corporate environment. The analysis of the corporate environment, performed by an individual person, can be directed towards himself as a person or on the level of the corporation. The later is at centre stage in this work.

To obtain an appropriate result of the environmental cognition process it is absolutely essentially that the analysing process is performed on an ongoing basis and that the results have to be disassembled in order to reveal the motivations and causes for changes in the environment. Greenberg, 2007:92 describes this step as follows: Based on the action, one infers certain attributes, which can be accurate. In order to stem inferring errors one has to observe over a longer time period under different situations.

Causes of behaviour can be motivated internally and externally. Internal causes for behaviour can be personal traits of an individual, whereas external causes are related to the environment. For determining the cause of behaviour the theory of Kelly<sup>10</sup> is applied.

During the scanning process of the environment one has to try to achieve objective results, which means that a person has to organise the process of cognition as such that objectivity is guaranteed. However, there are inherent errors and biases that can hardly be circumvented. Greenberg, 2007:96 identified and labelled common cognition errors. These common cognition errors are the Halo effect, the similar-to-me-effect, the first impression error, and self-fulfilling prophecies<sup>11</sup>. Cognition errors are caused through inaccurate judgement about others.

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<sup>10</sup> According to Kelly's theory the fundamental attribution error is about the judgement of others. It is based on interior characteristics. Certain people tend to base the judgement of people on personal traits, which is finally quicker and easier than considering the comprehensive situational environment. Kelly's theory observes three types of information: consensus, consistency and distinctiveness. Consensus refers to the fact if a person behaves similar to other persons. Consistency copes with the issue if the person behaves similar at other points of time. Distinctiveness analysis if a person behaves the same way in different situations (Greenberg, 2007:96).

<sup>11</sup> The Halo effect describes a cognition bias that generalises a capability of a person. If a person is good at finance one would imply that the same person is also good in other occupational fields, like marketing or logistics.

People who are prone to the similar-to-me effect tend to perceive people that exhibit similar characteristics to them as more positive than people that do not. The degree of similarity is not only restricted to the attitude towards work, it ranges from personal values or beliefs over personal interests to the notion of organisational

Errors and biases<sup>12</sup> during the cognition process have to be considered in the design phase to prevent them or, if not possible, to treat them specifically to assure good quality of the cognition process. The significance of influencing factors on the overall cognition process was already mentioned above, when the example of the rat-man picture was introduced.

In the following section organisation culture is going to be discussed under the light of cognition.

### **Cognition and organisational culture**

Organisational culture and corporate structure are independent from each other. Organisational culture does not influence the objectives of corporate entities and practices. The culture of a corporation is more than its corporate structure. The corporate structure does not contain the organisational culture but it reflects the culture. Organisational culture impacts the mode of practices and not its objectives. An example for the mode of a practice would be the openness to change and flexibility of practices.

The environmental picture a corporation has is the sum of individual cognition results of each corporate member. A key role plays the cognition of the management and decision-makers of the corporation for corporate wide action. However, the working environment and the way activities are organised in the corporations depend on individual cognition of each member. The organisational culture represents the self-understanding of a corporation in terms of social corporate identity. Greenberg, 2007:544 defines Organisational culture as a “*cognitive framework consisting of attitudes, values, behavioural norms, and expectations shared by [corporate] members.*”

An organisation culture is based on core characteristics that describe the sensitivity to others, the interest in new ideas, the willingness to take risks, the value placed on people, the openness of available communication options and friendliness and congeniality. Each of these

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behaviour.

Another well-known bias is the first-impression error. The nature of this error is the dominance of the first impression of a person, which determines the quality of up-coming impressions and experiences of a person. This becomes a serious issue if managers have to evaluate the performance of their subordinates. In the case of first-impression error the evaluation is based on the initial impression and disregards the actual – posterior – impression.

The last bias that is listed here are self-fulfilling prophecies. In general this bias refers to the attitude or perception of a manager about another person, which finally affects the outcome of this person. The positive branch of this error is known as the Pygmalion effect, where positive perception influences employees in a positive manner. The negative branch is known as the Golem effect, where contrary results are achieved (Greenberg, 2007:96).



characteristics form part of an organisation culture and have to be well balanced in order to achieve a healthy organisational culture. An organisational culture positively influences the commitment of employees to their job and corporate mission, strategy, respectively. As people with different beliefs and values work together corporate wide beliefs and values are established and communicated. This encourages employees to identify themselves with the corporation.

Decision-makers usually delegate the environmental scanning process because of scarcity of time resources. Specialised departments dedicate themselves to the analysis of the internal and external corporate environment and make concrete propositions to decision-makers of how to communicate the observed change in the corporate environment and which segments of the corporation require adaption in order to align the prevailing corporation structure with the new environment. The organisational culture predetermines the mode of communication of environmental changes in the corporation. The organisational culture is important because of its determining mode character for adapting the corporate structure.

There are various possibilities to identify and analyse forms of organisation cultures. Greenberg, 2007:549 applies the approach of competing values framework. There are two scales, of which one polarises internal versus external focus and the other flexibility and discretion versus stability and control.<sup>13</sup>

A network corporation can be found at any position on the external-internal orientation, however on the flexibility-stability scale it would be clearly located on the flexibility side. As I analyse network corporations an additional dimension regarding this point of view is required. From a corporate level a network can be characterised by any form of internal and external orientation. On the network level the assumption does not have to hold, whereby it can. On the network level the corporation is part of a comprehensive constellation of corporations that committed themselves to the network concept. The orientation of each network member differs from the other and hence results in a heterogeneous corporation network environment. Despite the heterogeneous organisational culture the organisational

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<sup>13</sup> Internal orientation considers processes that take place within a corporation, whereas the environmental influence is considered laterally. With regards to external orientation it is vice-versa. The environment in which a corporation is situated determines the orientation in terms of organisation culture. The flexibility and stability scale is about change of organisation culture. Flexible cultures are characterized through continuous or radical patterns of change, which is perceived as integral part of the organisational culture. Stable organisation cultures are interested in sustainable enduring culture, where the culture as a whole develops further. Changes are perceived critical in such cultures (Greenberg, 2007:549).

network does usually share common goals that are based on a common business strategy. On the network level a corporation can be either internally or externally oriented.

I criticise the description of Greenberg, 2007 organisation culture from a completeness point of view. His description and definition of organisation culture is restricted to the internal cognition of the corporation, which means that the cognition results do not incorporate elements of external observation. To derive a complete and representative social organisation culture and identity the corporation's environment has to be analysed as well. Despite the lack in Greenberg, 2007 approach it is useful for the purpose of corporate networks. Before cognitive change in terms of organisational culture is continued I state again that the cognition process has to be a result of a comprehensive scanning process that does not restrict itself to certain corporate areas.

## **4.2. Corporate structures and the environment**

In order to describe the corporate environment the subject – object model is used. For the description of the corporate structure Luhmann's system theory is taken (Luhmann, 1998, Luhmann, 2000, Martens, 2006). The framework of Burrell and Morgan, 1994 is used to indicate the transition of dichotomous organisational theories and that the transition process is not restricted to adoption from sociology to organisational theory.

### **4.2.1. Subject – object model**

The subject – object model in sociology copes in specific with the relationship between the researcher and the object (Burrell and Morgan, 1994, Scherer, 2006:24). The researcher is the perceiving subject who copes with the object of cognition. The foundation of the model consists of elements of natural science and elements of the philosophical dispute of rationalism and empirism. Popper, 1989 [1935] was a mayor protagonist of the synthesis of empirism and rationalism, which resulted in the development of the subject-object-model.

Both positions, empirism and rationalism, are not capable to explain what knowledge is because the former bases knowledge on experience (a posteriori) and the latter bases knowledge on logical consideration. In order to provide an answer to this issue Karl Popper and Hans Albert described the object of cognition as part of the corporate environment, which is independent of the perceiving subject in its structure. The structure of the object of cognition is defined through its entities and the relations between them. Through the logical empirism (Viennese Circle) Popper, 1989 [1935] elaborates the logical rationalism, which acknowledges the general validity of empirical insights. However, Popper offers criticism on

the subjective verifiability of empirical assumptions and argues that the result of cognition is verified through a social process. He does not accept the inductive method as scientifically and, hence, relies on the deductive method. In the case of deduction there is always the difficulty of the validation of starting propositions. To respond to the starting proposition problem Popper proposes that the starting conditions have to be verified on a continuous basis. False propositions will be rejected and still valid propositions will be steadily adjusted and become more accurate. The cognition of the reality and its structural patterns is possible, which is a process of ongoing adaption. Popper's concept is labelled critical rationalism and creates theoretical knowledge. In its essence the knowledge base that is formed through critical rationalism is only verifiable on a logical base. The propositions itself cannot be subjected to real verification. This is the point, where Luhmann (Luhmann, 1998, 2000) and also Habermas, 1970 exert criticism on Popper, 1989 [1935] critical rationalism. Habermas argues that the social structure with regards to power relations and the basement of the actual social structure is not considered in Popper's critical rationalism. In his explanations Popper responded that theoretical knowledge could be examined exclusively on a logical base. About the validity of norms and values the critical rationalism does not provide means for its review. Habermas describes this characteristic of the critical rationalism as technical interest of recognition.

Luhmann, 1998, 2000, Burrell and Morgan, 1994 describe social systems and conditions that have to be met for their existence. They argue that social systems<sup>14</sup> have to perform certain functions and there are equivalent social structures that can fulfil this function.

Criticism on the subject-object-model discusses the lack of consideration of power relations in the critical rationalism (Scherer, 2006:30). In the light of sociological science, social and power relations should be explained and elaborated.

Another point of critique is the fact that the subject-object model has its roots in natural science, where the object of cognition has continuous characteristics. In natural science experiments can be repeated, since the environment in which the experiment was undertaken formerly can be replicated. In sociology, the object of cognition features subjectivity. Sociological objects are actually not objects but rather subjects. Because of the subjective character of sociological objects of cognition a corporate environment under which an experiment or assumption was taken cannot be replicated. As a result, in sociology more frequently dialectical, hermeneutical – in general interpretive methods are applied.

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<sup>14</sup> For this work social system as corporate systems are relevant. Social systems usually comprises society as a whole.

The integration of interpretive methods in sociology affected also the methods and concepts in organisational science, where in the first half of the 20<sup>th</sup> century the contingency theory was the guiding theory. The contingency theory assumes that a corporation and its environment are static, which is in line with the subject-object-model. It is assumed that the corporation can be described with certain structural parameters as technology, environment, corporate size, etc. However, since the second half of the 20<sup>th</sup> century, authors like Silverman, 1970, Schryögg, 1978, and Clegg and Dunkerly, 1980 are searching for alternatives to the subject-object model in order to cope with cultural and political interests of corporations. They state that the behaviour of corporations depends on the subjective cognition of corporate actors. As a consequence of individual cognition more than one corporate environment exists and this is a situation that the subject-object-model cannot explain. Out of a sudden, as a result of individual subjective cognition, various corporate environments exist. The question is no more about how a corporate system survives but rather which of the various corporate environments is legitimated in the corporation and why. To handle the new requirements and conceptual change in the corporate environment, organisational science began to apply also interpretive methods. This process is called transition process of the network concept from sociology to organisational theory.

#### **4.2.2. Burrell and Morgan**

Burrell and Morgan, 1994 and Scherer, 2006:34 argue that organisational theories are based on two columns. They are based on a theory of philosophy and a theory of society. Theory of philosophy represents the methodological assumptions on which organisational theories are based and the theory of society provides the framework in which the organisational theory is embedded, hence the researcher's interest of recognition.

With their framework, Burrell and Morgan intend to capture organisational theories on a two-dimensional field through the merge of the two scales of theory of philosophy and theory of society. The scale of the theory of philosophy represents methodological assumptions ranging from subjective to objective. The second scale, which is derived from the sociological theory, ranges from regulation to radical change. The two scales are of dichotomous character, which means that there are separate fields of organisational theories. The theory of philosophy is in general about the ontological and epistemological assumption, where ontology refers to objectivity and epistemological to subjectivity. Regulation in the sociological theory means the description of sociological systems and radical change describes the changes of sociological systems.

In terms of Habermas (Scherer, 2006:34) sociology of regulation intends to describe the structure of societies on a technical and practical base. It merely describes the behaviour of sociological actors. In contrary, the change of sociological systems intends to change and criticize the current sociological situation and reflect an emancipatory approach to recognition.

Based on a two dimensional grid of Burrell and Morgan there are four different sectors of organisational theories. First, there is the paradigm of functionality. It is a concept that describes the social order from an objective point of view. This means that researchers assume that an organisation is determined through external determinants like environment that can be analysed.

The paradigm of interpretation is based on the assumption of soft facts that are gathered through an inductive process of the researcher. The researcher performs interviews on which he derives the order of a social system.

Protagonists of the radical humanism criticize the existing social situation. They perceive the social situation as a subjective construction of powerful actors. It is their intention to change the subjective social construction in a way that it becomes more balanced for all members.

Finally, there is the radical structuralism, which is located in the field of sociological change and objectivity. The distinguishing element towards radical humanism is that they identify deficiencies of the social construction not within the subjective social construction but rather in the area of the structure. They see deficiencies in the market economy or relations of production itself.

Corporate structures change over time. The change is due to factors of the prevailing organisational theory. Any organisational theory suggests corporate changes because of the change of certain factors. The difference between the theories is the time and cause of corporate change as organisational theories are differently set up. The concept of Burrell and Morgan provides an instrument to characterize different organisational theories based on descriptive-normative character and subjective-objective character. For the underlying purpose of the work all four fields of organisational theories are appropriate to describe corporate structure change. This is clear because all, independent of the sector, are finally organisational theories, that describe corporate structure or proposes structural change. However for this work the field of sociological change is chosen to be the most appropriate because of its subjective character of cognition of structure and social construction, which is determined through social legitimisation. In addition I agree with Luhmann, 1998, 2000, Habermas, 1970 , Schreyögg, 1978, etc. who are protagonists of corporations as social systems that are guided through political and cultural processes.

The future development of social science is dependent on its researching actors and not on its researchers or observers (Scherer, 2006:55).

Morgan 1983 (Scherer, 2006:55) proposes that sociological research is rather a process of interaction between researchers and the object of research. He suggests a paradigm change, where the prevailing subject-object-model is disregarded in order to move to paradigm of research interaction.

Incommensurability is an appearance that arises when different organisational theories are compared with each other. The different assumptions about cognition and objectives of a theory do not allow comparison in between organisational theories. The problem of comparison of theories with different fundamental assumption is known as incommensurability.

Morgan proposes that researchers change their cognition in order to cope with incommensurability. Researchers usually observe the object of research from the meta level. According to Morgan researchers should move from an outside observing position towards a participating position, where they discuss methodological issues of their theories. The aim of the discussion approach or the perspective change is to create a broader common understanding of the theory of cognition or rationality.

It is clear, that not all competing questions of the different organisational theories can be aligned. As Morgan's proposal is directed towards scientists it is all right, if competing questions are left as they are. This results in the outcome of unsolved scientific issues, which is acceptable in science. In organisational practice such an outcome is not acceptable, for action is required.

Critique on the perspective change is executed in the field of practical relevance. This approach lacks obviously practical relevance because in corporations people have to decide in order to act and fulfil their objectives. It is not possible to have an undecided situation because such a situation would create an obstacle to action. Nevertheless, such situations arise whenever political interest is involved. In political decision processes it is often the case that the parties cannot agree and the issue will fade out. In this case the undecided situation will be left for a while, which maybe a couple of years, and then brought forward again. Closely related with political influence are state-run corporations or corporations with governmental influence. Undecided situations form part of the daily business activity. In such environments it is crucial to have a response algorithm for undecided situations, which maybe alternative issues/projects or to put things consciously on hold. The consequences of undecided situations are losses of employee's motivation. In corporations that participate in the market economy

this can lead to bankruptcy because reduced motivation also affects productivity, profitability and competitiveness.

Nevertheless Morgan's efforts are worth to receive appreciation because the perspective change of the researcher initiates a process of harmonisation. It is more correct to say approximation and mutual understanding of different theoreticians and hence organisational theories. It was Morgan's intention to get a handle on the problem of incommensurability. With this approach he realised the first step towards the approximation of theories. There is no need to harmonise organisational theories because this would be contra-productive in terms of diversity and plural realities but the contribution to comparability of organisational theories is remarkable.

The framework of Burrell and Morgan consists of four dichotomous sectors. These sectors will remain dichotomous in spite of the perspective change. What Morgan is able to achieve with the perspective change is the creation of bridges between the dichotomous sectors. This characteristic makes his approach valuable for future organisational research.

Once the dichotomous sectors become intertwined one can better translate insights from one theory into another organisational theory. Although the incommensurability problem still exists, the former barriers of different underlying assumptions become bridges that allow conversation from one theory to another. This will be useful for this work too because I focus on Luhmann's system theory for corporations (Luhmann, 1998, 2000). The insights from the system theory will become transferable to other organisational theories, e.g. insights from system theory to insights in the contingency theory.

In order to understand Niklas Luhmann's theory of organisations it helps to have a look on his cognition and analytical behaviour (Luhmann, 1998, 2000, Martens, 2006:427). His publications are characterised by the question of what is the analysed object good for and what alternatives do exist. Luhmann was a person who was looking for the functionality of things. In addition he perceives the excess of possibilities as a result of existing complexity and contingency. He seeks for the significance of contribution of social entities to the reduction of complexity and contingency.

The contingency term of Luhmann is significant different from the contingency understanding in organisational theory. Authors of the contingency theory prescribe the contingency term a clear deterministic element, whereas contingency in Luhmann's contingency theory is of undetermined character. The contingency term opens the horizon for other alternatives of a problem. What other possibilities are adequate for a problem. According to Luhmann contingency seeks for what else would have been possible.

The term complexity, according to Luhmann describes a structure of something that is hard to understand. There are so many elements included that an overlook is not possible. In addition various combinations of the involved individual elements result in the same structure but bear different levels of risk and uncertainty. This structural characteristic is influential to Luhmann's understanding of complexity.

Based on the principle of redundant contingency Luhmann constitutes that the purpose of corporations has to be to cope with the uncertainty of the future. The success of a corporation is a measure of how well it is able to reduce the complexity. Corporations as social systems offer a framework of formal and informal rules to respond to the problem of redundant contingency, where, two social entities confront each other. Due to contingency both of them can choose different options of action. Hence it is possible that each of them bases his action on the action of the other, which creates the dilemma of action. Dependent on the ability of social entities to react to the surrounding uncertainty they will be more or less successful.

In addition to reduction of uncertainty organisations have the purpose to reformulate general goals and hence further reduce complexity, according to Luhmann (in Martens, 2006:427, see also Luhmann, 1998, 2000).

Luhmann's contingency approach opens a variety of "what else would be possible", which confronts a decision-maker with the situation to trade off between contingent alternatives. Although contingent alternatives increase the difficulty of decision, Luhmann's contingency term fits modern time. Modernity is characterized through variety and diversity. All facets of life became more diverse and diversified – a process that has advanced so far that the original order and regularity of possibilities (very restricted contingency) has transformed into a contingency pool. The number of alternatives in the contingency pool has no structure and is hard to trade off. This calls for means that are capable to either organize the infinite feature of the contingency pool or to convert the broad contingency term to a finite contingency term.

Corporations are somehow enabled to solve certain problems, such as scarcity of goods, the production of goods or the development of capabilities (in Martens, 2006:430, see also Luhmann, 1998, 2000). It is surprising that corporations are able to offer solutions to these problems over the long run, independent of the people. However, corporations are not able to cope well with social intimate relations. Luhmann argues that corporations are able to meet these challenges independent of time because they have the special capability of adapting to the environment.

Luhmann categorises different social systems, which are interaction, corporation and society. Social systems itself, according to Luhmann, belong, as machines, organisms and psychic



systems, to the superior category of systems (in Martens, 2006:431, see also Luhmann, 1998, 2000).

Corporations create an area where employees can communicate with employees they are not in direct contact. An example would be a law office, where various lawyers are employed. They meet and communicate with each other because they work in the same office. Without the law office they would not communicate with each other, except they meet by coincidence. The case of coincidence is disregarded here because it is not a prosperous option of corporate success.

Therefore corporations exist of decisions, which make other decisions possible and foster the capability of decisions within a corporation. In order to effectively confront complexity corporations elaborate formal rules and decide about membership of people. People that are willing to respect the corporate rules and are willing to learn to behave according the corporation's rules will be issued corporate membership.

For the understanding of Luhmann's concept it is crucial to mention that he determines decisions within a corporation as communication processes. The central role of decisions and communication in a corporation endows Luhmann with the capability to state that the elements, of which a corporation is set up, are decisions.

Decisions are able to transform contingency. This means that a decision realises a selection of one alternative out of a pool of alternatives. For example, the management board of a corporation decides to launch product A instead of product B and product C. The decision for product A is communicated throughout the corporation. With the transformation of contingency the contingent elements are also communicated with the decision. This has a direct effect on the motivation and commitment of the employees. It is important that the manner of communicating the decision is chosen as such that motivation and commitment is fostered, especially for corporate members supporting contingent alternatives (in Martens, 2006:430, see also Luhmann, 1998, 2000).

The existence of contingency in Luhmann's corporate system exposes the threat that the communicational process can be easily interrupted. The structure of a corporation pours contingent alternatives into a frame, that assures continuation of communication (in Martens, 2006:438, see also Luhmann, 1998, 2000).

A corporation with several R&D departments decides on the future research fields, which requires confirmation from the management board. Without an existing structure the communication of a decision is very likely to break, since the management board is confronted with contingency. In the case of an established corporate structure that restricts contingency it is possible to assure the communication and decision process. A

communication structure, where decisions and proposals from subordinated departments have to be discussed and decided in the management board, guarantees the continuation of decision communication within the corporation.

As contingency brings freedom and diversity a structure within the corporation is able to guarantee the functional orientation of a corporation and to guarantee the continuation of a decision process till its final realisation. The corporate structure is a connecting element that brings together people from different departments and levels of hierarchy. This element is crucial for the communication of decisions and to enable actors to repeat them in the future.

Although the conversation is about corporate structure, stability and repeatability it is important to remember that structure is something dynamic. It is not static like the framework of a glass palace. Hence corporate communication remains dynamic and contingent within a corporate structure (in Martens, 2006:438, see also Luhmann, 1998, 2000).

To conclude this chapter, structure, restricts contingency and provides a frame that is directed towards the achievement of the organisational objectives, where connectivity between communication elements is given.

Corporations know that they face complexity and variety and they are aware of the alternative decision possibilities (contingency of decisions, in Martens, 2006:441, see also Luhmann, 1998, 2000). In spite of this specific environment they have to act and respond quickly and precisely. The challenge of is to set up a structure that efficiently coordinates the activities of the corporate entities in order to meet the objectives of the corporation. The corporate structure evolves on the base of decision premises, which restricts the number of decisions without influencing a decision itself.

For the description of decision premises Luhmann makes use of the various rules and distinctions that produce modern corporation structures. He does not describe the forms and structures of corporations. His descriptions of decision premises are always directed towards an answer of the question, what function or utility does a certain rule and/or distinction have. Luhmann's focus identifies the relatively small number of premises that are responsible for the infinite number of corporate structures. He states that decision premises are formed through the combination of distinctions. Such distinctions, according to Luhmann, are objective/mean, centralised/decentralised, competent/not competent, position/career, etc. (in Martens, 2006:442, see also Luhmann, 1998, 2000)

In order to better understand Luhmann, the levels of observation are considered. When Luhmann talks about social things, at the same time he is talking about observation. The observation process at different layers is crucial for Luhmann. There are three observation

layers that reveal different insights for the observer on each layer. The first observation layer identifies the individual observations of a person as he perceives the environment and, accordingly, chooses an action, which is appropriate from his point of view. The second layer, which is from the social scientists point of view, observes the subjects and events on the first layer. Because of his outside position role he is able to see things that the subject on the first layer is not able to observe as it is occupied with the actual situation. The social scientist is able to observe contingent possibilities due to his meta point of view. This concept applied to a corporation looks like as follows. The first layer describes the behaviour and observation that is responsible for the action on the employee level. The second layer is about the observation of corporate processes or, in more general, about the observation of corporate behaviour and the corporate environment. In corporations there is a third layer, which analyses the decision premises that are responsible for the corporate structure.

The third layer copes with questions about communication, cognition, action and function. Questions like what information to communicate to whom, how do people act, what difference in cognition arise if an other decision premise is chosen or in other words, which function does a specific distinction serve for?

Luhmann identified decision programs, ways of communication and personal placement as mayor decision premises. The coordination and interrelatedness of single premises is realised through self-descriptions, which are significant for a collective identity. Reforms are applied to adapt decision premises or self-descriptions.

In addition to these formal communication premises, Luhmann, does not hesitate to incorporate informal communication in his organisational theory structure (in Martens, 2006:441, see also Luhmann, 1998, 2000).

According to Luhmann's understanding corporations consist of the communication of decisions. Employees are merely members of a corporation that form the social system. The emphasis on decision premises requires raising the assertion that Luhmann's system theory lacks humanity. Organisational theorists agree on the necessity and significance of human beings in and for corporations. Luhmann encounters this point of critique with a sophisticated but somehow ambivalent description of the premise about personal decisions. He argues that the relevance of personal in corporations is obvious in his concept because the significance of personal decisions. Through personal decisions common decision premises and communication corridors are set and extended because people provide contacts, mind, intellect, reputation and ordinary decision events to the corporation (in Martens, 2006:445, see also Luhmann, 1998, 2000).

People have certain characteristics and programs provide a framework, which is changeable. The exchangeability of people underlines the relevance of personal decisions as they form the structure of the corporation. In spite of the relevance of personal, Luhmann ascribes personal to the corporate environment. In order to mitigate the critique Luhmann uses Parson's concept of interpenetration of structural linkage (Parson, 1978). He reinforces that personal, people, respectively are part of the corporate environment and not of the corporation itself. With Parson's structural linkage he achieves an affiliation in between corporations and its environment. Parson's concept describes the structural linkage of psychological and social systems. Each system is the environment for each other and provides mutual selectivity. Parson says, that systems depend on each other. Luhmann incorporates this thought and argues, that corporations are dependent on employees that have selective capabilities and employees require corporations that provide diversity and/or organisational restriction of alternatives.

Luhmann's argumentation is in line with the traditional organisational theory. Behaviour in corporations is controlled through intensive systems, membership conditions, subordination and commitment. In depth analyses of corporate objectives and the motivation of members reveal that they are separated. The corporations' purposes are analysed with the concept of purpose and system rationality. The results show that the purpose of corporations is to provide blindage and motivation. Blindage refers to values and moral impertinences and motivation refers to employees. This phenomenon untwines the motivation of employees from the objects of the corporation. The change in paradigm endows corporations with liberty about the objectives and corporations align employee motivation through salary, incentive systems, etc.

In the discussion about corporate objectives and employee motivation Luhmann again raises the question for the functionality of the separation and identifies that corporations become highly flexible and adoptable. Corporations can adapt to changes in the environment through the change of practices (job descriptions) but also by changing the corporate objectives, without interfering with the personal motivation of employees.

Critics state that Luhmann's commitment to the functionality is his blind spot. Functionality as the point of view conceals other points of views like humanity and this is why Luhmann ascribes the human being to the corporate environment (in Martens, 2006:445, see also Luhmann, 1998, 2000). At this point I suggest that communication and decisions of managers are going to be affected by technological change.

#### **4.3. Corporate structure concepts**

The description of the cognition process was necessary to perceive the corporate structure. The structure of a corporation I described in the previous chapter. Based on the specific and unique structure of each corporation it is possible to analyse individual corporate structures and derive a corporate concept. Significant conceptual pillars I will discuss in this chapter.

In order to distinguish between science and none-science one should focus on objectives, which are an adequate means of differentiation (Abrahamson, 1990:208 about Weber). A mayor intention of sciences is to predict things and therefore direct observation of behaviour, events, and phenomena is necessary. Direct observation or concluded results of other observations reveal patterns.

For example, the Austrian railway network is unique. It is different from the Indian, American and Russian railway network. In order to predict how future railway networks may look like, common characteristics of the various existing railway networks need to be identified. The common characteristics form a pattern and create the base for a railway concept.

The identification process of patterns requires specific circumstances like events, behaviours or things that are able to create an abstract form, which is adequate for the formulation of general patterns and concepts.

In sociology there are many examples of patterns. For example, take a prison as a unique organisation. If a prison is compared to a mental hospital or military base, similarities can be identified. Weber's concepts of bureaucracy or total institution are founded on these similarities (Abrahamson, 1990:208). Hence, concepts assist in making similarities apparent. The identification of patterns and formulation of concepts change concrete cases. Through the deductive process of observation a change of the phenomenon and its cognition takes place. The identification of differences becomes more difficult as the concrete case (e.g. the prison) is seen on an abstract level. In contrary, by highlighting similarities certain characteristics are clearly identified and cannot be overseen. Weber concludes the application of concepts by stating that specific things become general. Anyway one has to consider that general things bias the view towards the specific case (Abrahamson, 1990:209).

For corporations Weber's methodology in Abrahamson, 1990 is applicable. Each corporation is unique. For example Deutsche Bank. The corporation is different in corporate structure, investors, stakeholders, product portfolio, markets, etc. from other banking corporations, like Raiffeisen (Austria), Sperbank (Russia), Bank of England or Banco de Santander (Spain). Nevertheless they have things in common like the customers, offering of deposit accounts, trading with money, currencies, or hosting ATM networks. Of course it is possible to identify distinguishing factors of corporations too but the significant element for patterns and concepts

is the similarity. The result of the above observation of bank corporations would be a bank corporation concept.

International acting corporations tend to concentrate on their core business activity and hence outsource the bulk of general business activities. They become organised as boundary-less, modular or virtual corporations. Modern corporate structures offer the possibility to adapt and incorporate changes of the environment on a continuous base (Greenberg, 2007:608).

Decision makers have adapted their cognition of the environment towards a dynamic environment. At the same time decision makers restructured corporations and endowed it with the ability to cope with a dynamic environment. There are two changes that took place. The first change took place within the decision-makers cognition of the corporation structure as a dynamic form, for which nowadays one commonly uses the term of a network. The second change that took place was the real change in corporation structure, which aligned the structure according to the ability to allow and facilitate the establishment of network relation with other players. The structural change was finally of minor relevance because corporations have always been organised in units, departments, segments, regions, excellence centres, etc. The mayor change took place at the level of the decision-maker's cognition. He developed its cognition and strategic thinking towards a network corporation. Decision-makers make use of network concepts in order to create a picture of the corporate structure and corporate network that enables them to act accordingly and exploit opportunities effectively and be competitive in the long term.

## **5. Corporate networks and managerial behaviour in the market economy**

Contemporary managerial behaviour is embedded in the market economy. The market economy is the social-corporate environment where the impacts of technological change and the cognition of corporate networks take effect through changes in managerial behaviour.

### **5.1. The modern market-oriented society**

What are the sociological-psychological characteristics of the society that behaves economically? This question will be at centre stage in this chapter. The society determines the sociological frame for individual thinking, behaviour and acting. Hence sociological characteristics have an effect on organisations, their functioning and interaction.<sup>15</sup>

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<sup>15</sup> This chapter mainly analyses Schumpeter's work Capitalism, Democracy and Socialism. Other sources that are used in this chapter are Smith, 2010 and Kugler, 2010.

Schumpeter, 1947 [1942] examines types of man with the characteristics of market-oriented society. The rational attitude is inherent to the individual because of economic necessity. The economic model is the hotbed of logic and rational thinking. An example: A prehistoric individual that uses a stick in his daily life. Assume the stick breaks in two pieces. The prehistoric man can either state a magic spell or worship the broken stick and hope that the damage becomes repaired. Another method would be that the man thinks of effective possibilities to repair the stick or get a new stick. Both methods are possible! The first behaviour refers to the affective nature of the prehistoric man and the latter to the rational behaviour of the modern capitalist. The modern primitive would have behaved himself like the prehistoric man and stated a magic spell.

Both variants bring a solution to the broken stick, though, experience has shown that the rational behaviour is more efficient to satisfy personal needs. The endless chain of economic needs is better served with economic behaviour and smoothes the way for rational behaviour over prehistoric behaviour. This appearance is independent of any economic model as it is inherently inscribed in the existence of human beings. The market-oriented individual has further developed rational behaviour and endowed it with new drive.

### **Change frame of innovation**

Innovations are crucial for the functioning of corporations and the market economy. However, it is not sufficient to be innovative. In order to function properly, corporations require that an innovation be followed by intervention and implementation. Intervention describes the action of appointing an innovation with a specific usage and application. Only when an innovation is applied (implemented) it revealed its advantages over the former technology. Under these circumstances corporations and the market economy can function.

Although there are many indicators about innovativeness, research and development activities, they fail to measure the functioning of the market economy. The growth rate of an economy is able to capture the functioning of the market economy as it compares the economic output of a certain economy between two sequent periods. The economic structure undergoes continuous change, which consists of innovation, intervention and implementation (Kugler, 2010).

Schumpeter, 1947, [1942] makes use of an historical observation in order to describe the primary market-oriented impetus. He describes the historical qualitative change on the example of agricultural production. It underwent revolutionary development from the 17th to the 20th century with crop rotation, ploughing techniques, process of mechanisation, grain silos and railway usage for storage and transportation. Another example is from the energy

sector, which in ancient years was restricted to the waterwheel, later on to the steam engine and in the last two centuries characterised by electricity and nuclear energy. Nowadays, new energy resources are exploited and wind energy or solar energy is used too.

In terms of corporate structures become outdated and new structures were introduced. In the past craft enterprises and factories were common corporate structures. Nowadays multinational corporations and corporate networks evolved as a result of a globalising economy and increased economic velocity. The economic structure renews infinitely endogenously. The process of change takes place in phases or stages, whereas phases perform relatively stable. The initiation and closure of phases are intense and discontinuous and the process of change takes place continuously. Revolutionary results are either absorbed or revolutionised. This fact is known as the economic cycle. Schumpeter, 1947 [1942] labels the endogenous process of change that destroys the old structure and creates a new structure as the process of creative destruction. This process is the core of every market economy, according to Schumpeter, 1947 [1942].

Common analysis of the market economy emphasis on how it copes with existing structures. But in order to understand the market economy an analysis of structural change in the market economy is more promising. The modus operandi of competition used to be price. As qualitative competition raised the hegemonic role of price decreased. Although the competitive pattern changed, the market economy remained to perform stable, since the overall conditions were not affected. Such conditions are methods of production or industrial organisation forms. Market-driven competition takes place when these conditions are effected, such as new products are launched, new production techniques are discovered, new resources are found or made exploitable or new organisational forms arose. If the market-driven competition is able to leverage costs and benefits quality, the corporate structure of the market economy will be changed. It is the most effective form of competition that could be achieved. The impact of effective competition is strong and mighty and the existence of knowledge about effective competition causes organisations to perceive effective competition. In reality, structure, does not host competitive elements itself. Competition is attained through behaviour, which as a result leads to perfect competition.

The market economy serves as the frame for technological change. Each new technology sets up a new frame within economic activity takes places. According to the set up of the frame the internal economic structure is redesigned. The characteristics of the frame are specific and depend on the technological change. In the case of network technology the frame exhibits for example global communication, control of information, reduction of hierarchies and real-time



communication. The internal economic structure of the market economy aligns according to the present characterising elements of the frame.

## **5.2. Corporate networks and cognition of the market economy**

In the previous paragraph the characteristics of corporate network concepts and the market economy were discussed. In this chapter the two fields are bundled together in order to finally conclude the raised question of the role of corporate network concepts in the market economy.

I have described corporate network concepts in the sense of corporate networks, where relations between people (managers, employees, etc.) are considered, rather than relations between organisations. In classical organisation theory organisations are described as objects that can be captured by certain determinants like size, legal form, market power, etc. In the last two decades organisational theory was confronted with dynamic change of its research field. It became nearly impossible for researchers to respond and bring forward reliable models as they faced an environment that suddenly began to change more frequently.

One sensible response would be to increase the number of researchers in order to fulfil scientific requirements. Because of the lack of means and due to utility considerations this response was not possible, neglected, respectively. Utility considerations would contain cost-effect arguments about new verified theories in contrast to their utility in a dynamically changing environment.

Theoreticians in organisational theory still face a situation they cannot cope with and hence rely on the traditional verified models. However, these models are not constructed to cope with a dynamically changing environment that becomes with each change more diversified.

In my paper I respond to this issue by using a corporate network concept definition that has also roots in sociology. Elements of organisational theory and sociology are considered. The human being as manager and employee with its social corporate relations is at centre stage of the corporate network concept. Their cognition of the corporate environment is the mayor constant that shapes the corporate environment.

Then I considered the influence of technology on the structure and cognition. The technical component is about the development of network technologies in the past three decades, which is characterised by the development of the computer, computer networks, the Internet and social networks. The effect of this technological development thrust radically amended the corporate social environment. The relative distance between two places became less as a new channel of network technologies extended the means of information transportation. The physical distance remained unchanged but the time required communicating a message

between two communication partners decreased. Communication, nowadays, takes place on a real time base. The technological change (progress) affected the peculiarity of the corporate social environment.

In addition the relation of real economy and communication behaviour development has reached a new status by a radical change of technology. The relative delay between information transmission and real economy progress became basically obsolete, for information is communicated on a real time basis. A similar effect is recognisable in the relation between the real economy and financial sector, where the volume of real economy is much below the volume of the financial sector. This is due to the real time information character and the now available technology that allows acting globally on a real time basis.

Technological change has direct affects on managers and employees. Their sociological perception changed towards perceiving the corporate environment as a network.

In the market economy the time scale of information and communication changed, which increased the speed of action radically. The former pattern of action was completely overcome. Hence the structure of action, the perceived corporate environment and perceived corporate structure changed. The corporate environment describes the social relationships between acting people within and between corporations. The corporate structure refers to the actual constitution of corporations and corporation networks. The structure of corporations was not affected by the technological change, whereas the structure of corporate social structure was radically changed. In turn the perception of acting people was completely renewed.

Above I stated that the corporate environment changes more frequently. At this point I revise this argument because what changed was the perception of the corporate structure. The corporate structure itself remained unchanged. One could say, the corporate structures became physically networked with communication technology; in other words, it became enhanced by making it transparent.<sup>16</sup>

Organisational theorists are challenged in the sense that they face corporations that are no longer perceived as autonomous entities but rather as members of boundary less corporate conglomerates. This is a reality that has always existed. The difference is that the awareness of this fact was of minor interest. As the term network was more and more introduced in the corporate reality and organisation theory it became unavoidable to continue neglecting this cognition. A reason for the former minor consideration of corporate network concept in reality and organisational theory might be the relation between information transmission

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<sup>16</sup> see 3.3.5 Organisational theory on page 25

speed before the technological change and information transmission speed after the technological change.

For the market economy this means that the source of competitiveness has resettled. Before the technological change the flow of information transmission speed could have been taken as a crucial component of competitiveness. After the technological change this component was neutralised as communication speed occurs at real-time and is available to everyone nowadays. The component of information and communication quality remained during the transformation process of perception. The quality component was a competitive element especially during the transformation process because it was difficult to verify the reliability of information quality because all participants had the problem of lacking experience. The key question is now, how the competitive component set became reshaped? The amount of information and communication activity increased and corporations had to efficiently distribute information and efficiently organise communication activity, which became the competitive supplement.

The technological and perceptual changes are necessary elements for the functioning of market economy because both of them lead to the renewal of the economic structure. The network component within the competitiveness set is more influencing than ever, hence the functioning of economy by the current development is effected as such that the composition of competitiveness is changing.

Managers and employees understand the corporation and the wider corporate environment as a network. They perceive economy as a whole, where corporate actors are interlinked. Changes of one actor cause impacts on the other actors and hence reconfigure economy. A paradigm change in the managerial cognition of the market economy and its corporate composition has changed from static to dynamic.

Through the hype of networks the social patterns were affected. People become more open to changes and uncertain situations as the technological advances in communication technology brought the need to adapt continuously to altering corporate social environment cognition.

### **5.3. Corporate networks and effects on managerial behaviour**

Managerial behaviour is challenged considering the underlying change towards corporate networks and its effects on organisational theory.

#### **5.3.1. The significance of knowledge**

„Knowledge is power“ – Francis Bacon 1597 (in Kylhäeiko, 2011) is still valid and has today even more relevance. Technological strategy has a higher weight for achieving the corporate strategy. Managers need to have a comprehensive knowledge about technology as technological change affects all corporations.<sup>17</sup>

External sources of knowledge and information are more relevant (Yam, 2011). Corporate activities have become modularised in general. This affects also R&D and innovation activities, where knowledge becomes available externally. Management and internal R&D departments are prompted to access external sources of knowledge, which enhances competitiveness.<sup>18</sup>

Knowledge management is now even more important for the corporation. The management has to take decisions about knowledge management (dissemination) in the corporation and with cooperation partners (Eerola, 2011). Because of the rise of knowledge accessibility knowledge management has become an influential part of management activity. International corporations elaborate knowledge management policies in order to cope with information bulks, asymmetries and competitiveness aspects. Changes in technology, especially in network technology, affect corporate strategies. Corporations apply future oriented technology analysis<sup>19</sup> to foster responsiveness to changes in technology and the role of knowledge.

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<sup>17</sup> Extended research is available for High-tech corporations. But they produce about 10 – 15 percent of output. Kylhäeiko, 2011 therefore dedicated their focus to analyse the affects of technological change on low and medium-technology corporations. Although all corporations are affected the affects are different for corporations with different technology level.

<sup>18</sup> Also Kylhäeiko, 2011:274 mentions the relevance of external knowledge by bringing light to the significance of sharing specialised knowledge between corporation partners.

<sup>19</sup> TKM is concerned with information that is managed in databases, libraries, websites. TKM has usually a clear structure and efficiently handles large amounts of information. PKM has a diffuse character. It includes interaction of people. Other factors are of relevance, when managing participative knowledge. Subjective opinions, cultural specificities, personal versus impersonal interaction, the communication channel, etc influence PKM. PKM is less hierarchical and requires more social leadership skills of management. TKM needs a strcutured and rational approach (Eerola, 2011)

### **5.3.2. Information management**

The rise of corporate network technologies and the process of workflow digitalisation confront the manager with questions about information management and dynamic information/communication flows. At the beginning the user interfaces and database searches were bound to the technological concepts. User oriented approaches for categories and database hierarchies were not considered at all. The user interfaces in information management systems did not consider usability and user friendliness. The appearance of software was technically predetermined. Modern information management systems are designed comprehensively. User orientation and intuitivism are at centre stage at every point of the development process (Brynko, 2011:16, Lewis, 2011:17). General information management characteristics have to be respected by management. They have to consider compatibility, coherence and accessibility of corporate wide information management systems. These factors are prerequisites for information management functioning. Brynko, 2011 states in addition that information management systems have become dynamic like the Internet. Managers have to be aware that the difference of location of information and location of information access is crucial. Information resides on one specific place but can be accessed from everywhere through a network access terminal. Managers have to assure the access to information despite a dynamic corporate network environment. Corporate information is spread over the corporate network. Changes in the corporate network constellation can make information unavailable, which can cause information bottlenecks internally and externally. Internal difficulties could be of communicative character and external bottlenecks could affect customer satisfaction.

### **5.3.3. Communication and cognition of corporate structure**

The change in technology has made smooth and efficient communication in the international business environment possible. The effort to exchange information is nearly negligible (Bird, 2011 and Lewis, 2011). Network technology has removed the hurdle to communication between global acting corporations. The workload for mere communication set up is less, which has a direct effect on overall communication activity. Managers can communicate more and hence are confronted with more tasks and decisions. During the process of change managers and employees face a higher level of stress because of the ongoing change in technology and communication. The change in network technology is causally linked with communication. Hence, the change in communication triggers a change in perception of the

corporate environment and structures. Corporate structures are perceived as networks with a dynamic character.

The technological change has modified actual corporate structures. The bulk of management structure, comprising operative, middle and strategic management is reduced. This is due to the fact of change in the network technology. The challenge for management is that they have to cope with increased amounts of information and decisions. Their leadership responsibility over employees is enlarged due to the fact of a leaner management structure. The technological network change finally increases the workload and leadership responsibility of managers. In addition the speed of communication but also activities has accelerated too (Lewis, 2011:17).

On the other hand, corporate hierarchies have reduced and corporate structures become more transparent.

#### **5.3.4. Attitude towards change**

The managements' behaviour and perception can influence the employee's attitude towards technological innovations.<sup>20</sup> Skilled employees with a high level of self-esteem use to take on innovations autonomously, whereas lower skilled employees with a low level of self-esteem use to take on innovations because of managerial support or urge. The decisive measure for employee's behaviour is how they perceive themselves in relation to their superiors and how they perceive their superiors managerial behaviour (Leonard-Barton, 1988:1252).

The influence of management support to the innovative behaviour of employees is characterised by perception. Employees behave or adopt their behaviour according to the perceived management support. The process of managerial influence exhibits its bottleneck in the measurement in perception<sup>21</sup>.

*“In complex organizational environments, characterized by highly decentralized decision processes, increased professionalization of subordinates, freer communication, and looser structure (...), persuasive messages issued by a competent person (...) or*

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<sup>20</sup> Leonard-Barton, 1988 underlying innovation sample can be grouped in administrative and technological innovations, whereby there was only one technological innovation.

<sup>21</sup> The bottleneck can be partly dissolved by considering perceived managerial messages. The method is described in Leonard-Barton, 1988:1254. The managerial influence on innovation does not originate from the intrinsic added-value of the innovation. The role of employees' self-perception of their own capabilities determines the openness to management messages about innovation and openness towards innovation in general.

*members of the social system (...) could be more effective and less costly (...) than formal authority's attempts to influence subordinates' attitude and behaviour."*  
Leonard-Barton, 1988:1254

Leonard-Barton, 1988 brings the impact of change in network technology to the point. The severe impact on the corporate environment reshuffles the significance of formal and informal information. Soft communication skills and controlled information management plays nowadays a significant role for successful management. Still, the difficulty of measuring perception<sup>22</sup> remains but the significance of perception has become obvious during the last two decades. This endows Leonard-Barton, 1988 implicitly with visionary characteristics because he recognised the extend of technological change in the corporate environment already two decades ago.

In order to express sustainability and credibility of informal communication (Grapevine) the management of corporations is challenged to provide physical accessibility to innovations for employees. Grapevine is sufficient for motivated and engaged employees in order to adopt corporate innovations. Their perception of accessibility of innovation will be of positive character.<sup>23</sup>

Powell, 1978<sup>24</sup> states that change is inherent to the work of leaders in institutions and corporations. Corporations change has two dimensions. One dimension is the initiator of the change, which often is the management. The second dimension is the employee affected by the change. In the management literature too little attention was paid to capabilities of employees that support change. A managerial attitude<sup>25</sup> that is characterised by a critical perception of employees towards change leads finally to resistance to change among

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<sup>22</sup> see footnote 21; In the organisational theory literature management support is considered to be crucial. However employees self-perception and perception of superiors competences varies widely between organisational fields of innovation, which is another hurdle to measurement of perception.

<sup>23</sup> Still, the perceptive drawback of perception variation remains. At least half of the corporations employee stock does not perceive grapevines and requires direct management communication to adopt behaviour to corporate innovations. (Leonard-Barton, 1988)

<sup>24</sup> Powell, 1978 applies the attitude towards change concept from Dunham, Gruber, Gardner, Cummings, and Pierce 1989. Literature reference: Dunham, R. B., Grube, J. A., Gardner, D. G., Cummings, L. L., & Pierce, J. L., 1989, The development of an attitude toward change instrument. Paper presented at Academy of Management Annual Meeting, Washington, DC; The model introduces a general and specific attitude towards change.

<sup>25</sup> Managerial assumptions are restricted to positive and negative attitude of employees towards change. (Powell, 1978:33)

employees. Managers that dedicate their attention to employees communicate appreciation and foster thereby employees' readiness to change. The corporate network concept in organisational theory relies on the readiness to change attitude. It has to because change is a substantial element in corporate networks.

Another implication for managerial behaviour is the rising need for predicting employees' reaction to change. The underlying assumption and in the literature verified is the prevailing readiness for change. The following quotes provide an overview of the significance of technological change in the last two decades:

*„Few people need to be reminded, that change is a way of life for those responsible for managing organisations, institutions and families.“ – Powell, 1978:29*

*„Change is a major issue, affecting all individuals, groups and organisations“ - Staniforth 1996 in Mahbuhul, 2008:1*

*„It is time to expand our understanding of resistance to change, including its sources and potential contribution to effective change management.“ - Angelo D'Amelio 2008 in Ford, 2008:362<sup>26</sup>*

It is obvious that the management of change, which is attributable to technological innovations, has been an issue over decades. Since the frequency of technological innovations has increased, the impacts to management are severe. Managers have to behave more sensitive and prudent in a corporate environment that is characterised by ongoing changes in technology. Therefore, managers have to elaborate capabilities to cope with change as such and not only with resistance to change (Ford, 2008).

## **6. Conclusion**

There is a causal chain between technological change, corporate networks and managerial behaviour. Technological change influences the cognition of the corporate environment and the corporation as a whole interdependent system – corporate network, and corporate networks influence managerial behaviour.

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<sup>26</sup> The perspective on resistance is focused on the change agent, the person desiring the change. There is a group of authors (Dent and Goldberg, 1988, Meston and King, 1996) that revealed the same results.



The causality between technological change corporate networks is influenced by management decisions about implementation of technological changes, in the case of corporate networks, the application of network technologies. The causality of the two causal chains originates from the first causal change (technological change and managerial behaviour). The affects of the changes in network technology have impacted the behaviour of management and employees. The impacts on the physical corporate structure are marginal but the visibility of the corporate structure increased due to the physical integration of network technology. In addition the corporate social structure and the corporate social environment were renewed as communication and information distribution changed. As network and communication technology penetrated corporations the understanding of corporate and market structures were altered towards networks.

The evolvement of corporate networks affected organisational theory and practice. Organisational theories were challenged to respond to the cognitive paradigm changes in corporate structures. Organisational models were too static to cope with the dynamic changes of the last three decades. Researchers are still challenged to review the changes of this dynamic period. Their work is restricted by the scarcity of resources and biased by the ongoing dynamics. Impacts on practice imply changes in managerial behaviour by the rise of corporate networks as corporate structures and concepts. Impacts on managerial behaviour are the relevance of knowledge, the ability to control the transmission of information, the exponential rise of decision frequency, the communication mode, and an open attitude towards change.

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## **A. Attachments**

### **A.1. Eidesstattliche Erklärung**

Ich erkläre eidesstattlich, dass ich die Arbeit selbständig angefertigt, keine anderen als die angegebenen Hilfsmittel benutzt und alle aus ungedruckten Quellen, gedruckter Literatur oder aus dem Internet im Wortlaut oder im wesentlichen Inhalt übernommenen Formulierungen und Konzepte gemäß den Richtlinien wissenschaftlicher Arbeiten zitiert, durch Fußnoten gekennzeichnet bzw. mit genauer Quellenangabe kenntlich gemacht habe.

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Stephan Richter

Wien, am 01. August 2011

## A.2. CV

### Curriculum Vitae STEPHAN RICHTER

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#### Education

|             |                                                                                                                                   |
|-------------|-----------------------------------------------------------------------------------------------------------------------------------|
| 2005 – 2011 | University of Vienna, International Business Administration with specialisation of Corporate Finance and International Management |
| 2010        | Complutense University of Madrid, Spain, International Business Administration, Erasmus Program, 1 semester                       |
| since 2009  | University of Vienna, Slavonic Studies, Russian (Baccalaureate)                                                                   |
| 2007 – 2008 | Financeacademy Moscow, Russia, International Business Administration, EU Joint Study Program, 1 semester                          |
| 1998 – 2003 | Secondary College for Technical and Economic training                                                                             |

#### Occupational activity and Internships

|             |                                                                               |
|-------------|-------------------------------------------------------------------------------|
| 2010        | BIG, Vienna, Real estate corporation, Controlling, 5 months                   |
| 2005 – 2009 | Deloitte Vienna, Corporate Finance and Financial Advisory Services, part time |
| 2008        | HTL Horwath Zagreb, Tourismmasterplaning, 1 month                             |
| 2005 – 2008 | Manz, Vienna, Tourism school book reissue, part time                          |
| 2002        | Cronite Castings Ltd., UK, Steel production, Internship, 1 month              |

#### Additional activity

|             |                                                        |
|-------------|--------------------------------------------------------|
| 2003 – 2004 | Jugend eine Welt, Social service in Ecuador, 14 months |
| 2003        | Aupair in Barcelona, Spain, 3 months                   |

#### Languages

German (Mother tongue), English, Spanish, Russian;

#### Hobbies

Saxophone, Volleyball, Dancing;