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The Rationality Framework for a Critical Study of Information Systems

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Introduction

This paper focuses on the relationship between information systems (IS) and organizational processes from the perspective of the rationality of actors and their actions. The terms rational and rationality that are used in theoretical writings and in everyday life denote a multiplicity of meanings. The idea of reason has been connected with the disposition of actors to give rational grounds for or logical explanations of their beliefs and actions. Similarly, the actions by which actors achieve desired ends are regarded as rational. Furthermore, organizational processes that embody and are governed by rational actions are considered rational. More generally, an increase in the rationality that characterizes modern organizations and society is called rationalization. This paper explores the relationship between IS and organizations within the light of the progressive rationalization of organizational processes.

The relationship between IS and organizations has been a key theoretical issue since the early years of conceptual thinking about the

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organizational use of information technology (IT). In particular, understanding the role and impacts of IS in organizational processes has been the central focus of a wide range of quantitative and, more recently, interpretative and critical empirical studies. As the role of IS evolved from process automation and optimization (e.g. inventory control systems) to supporting decision makers (by decision support systems) and integrated management (by enterprise resource planning and executive IS) and to enabling communication and cooperation across the organization, so too did the criteria for their assessment. The impact of IS on organizational processes was consequently first assessed in terms of the efficacy of control, cost minimization and profit maximization, then in terms of improvements in the efficiency and effectiveness of decision makers and organizations and, more recently, in terms of organizational transformation, which involved the flattening of structure, increasing flexibility, empowering employees, downsizing, etc. In order to make sense of empirical data about organizational use of IS and to improve understanding of the role and impacts of IS, researchers have adopted a variety of theories ranging from organization theory, organizational behaviour and management to sociology, social psychology, anthropology and philosophy (Bjorn-Andersen and Eason, 1980; Attewell and Rule, 1984; Boland, 1985; Orlikowski and Robey, 1991; Ang and Pavry, 1994; DeSanctis and Poole, 1994; Avison and Myers, 1995; Galliers and Baets, 1998; Robey and Bourdeau, 1999; Gopal and Prasad, 2000).

This paper deconstructs the relationship between IS and the rationalization of organizational processes from a critical theory perspective. It explores the rationality potential of IS in a range of organizational processes and the resulting social and organizational consequences. For this purpose the paper proposes a rationality framework founded on the broad-ranging concepts of rationality that were defined primarily by Weber (1978) and later redefined by critical theorists (Adorno and Horkheimer, 1944; Habermas, 1984, 1987). It also draws from contributions by a number of IS researchers who have applied critical social theory to explaining the social and political impacts of IS development in an organizational context (Lyytinen and Klein, 1985; Lyytinen and Hirschheim, 1988; Klein and Hirschheim, 1991; Ngwenyama, 1991; Lyytinen, 1992; Hirschheim *et al.*, 1996; Myers and Young, 1997). Of particularly interest to this study was Klein and Hirschheim's (1991) consideration of IS development as a form of social action and the taxonomy of rationality types they proposed for assessing various IS development methodologies. They assessed a methodology based on the degree to which it adopted a particular rationality type. While this

study draws from similar sources and considers a similar range of rationality concepts, its purpose is different: it aims to develop a taxonomy of rationality types that may help explain the role of IS in the rationalization of organizational processes and the ensuing social consequences.

More specifically, the paper proposes that the social implications of IS could be better assessed (and predicted) if there is an understanding of how the use of IS in organizational processes affects the rationalization of these processes, such as increased efficiency and effectiveness. The assessment of organizational benefits and values becomes relative and will change with the rationality criteria. Systems fully justified under one rationality type could be of dubious value seen from another point of view. Similarly the use to which systems are put could change from one rationality type to another. The failure to understand the actual impact of IS on rationality could lead to surprising social consequences and, ultimately, hurt an organization. Consequently, it is suggested that, if it is possible to determine a type of rationality supported or enabled by an IS, then the expected social and organizational implications of such a system may be better understood and assessed based on the predicted or observed increase of this type of rationality.

The aims of this paper are twofold: first, the paper develops a rationality framework that provides a categorical apparatus for understanding the essential types of rationality affected by the use of IS in organizational processes and, second, by applying this framework to several case examples of IS the paper aims to demonstrate how critical analysis of the role of IS in increasing rationality (of a particular type) provides new insights into their social and organizational consequences. This paper seeks to establish that, so long as more than one rationality exists, the choice between available options will be an important factor in understanding the role and social nature of the use of IS.

In the following section the paper presents a brief historical account of rationality and rationalization in organizations and society. By drawing on different conceptions of reason and rationality it then proposes the rationality framework for examination and critical analysis of IS in organizational processes. The study then interprets three IS cases from a field study and demonstrates how the rationality framework helps explain different IS–organization relationships in the light of increasing levels of rationality that entail both substantial benefits and risks. Finally, in the concluding section the paper briefly outlines lessons learned from its interpretation and puts forward arguments for a rationality theory of IS.

On the notion of rationality

In this brief account of rationality the paper will begin with Weber's (1978) analysis of rational action and rationality as an organizing principle in society and organizations. Weber's (1958) analysis of Western rationalism marked the break with 'optimistic faith [of the Enlightenment] in the theoretical and practical rationalisation of reality' (p. 85), that is pre-Weberian thinking of reason and the rationality of actions and society, often naïvely celebrating progress, that has long been regarded as empirically oversimplified and morally overoptimistic (Brubaker, 1987). In contrast, Weber's (1978) empirical and methodological investigations of rationality and the progressive rationalization of social institutions and practices as major determinants of modernity in Western societies were profoundly critical in a way that can be thought of as being relevant for the analysis of IS in contemporary organizations.

More specifically, Weber's (1978) distinction between formal rationality and substantive rationality, which was fundamental to his empirical analysis of modern bureaucratic organizations and society as well as for his moral response to it, can be drawn on. For Weber (1978) formal rationality was 'a matter of fact' and referred primarily to the calculability of means and procedures for achieving predefined given ends. Substantive rationality, on the other hand, was 'a matter of value' and referred to the relationship between an action and some substantive end, belief or value. Bureaucracies and administrative systems, as Weber's (1978) analysis demonstrated, are governed by purely formal rationality. This is a result of processes of rationalization that are characterized by increasing reliance on expert knowledge, in particular technical knowledge, by objectification or depersonalization of power structures and authority and by more efficient control over organizational processes (including material and human components as means of production). Above all, Weber (1978) was concerned with technically enabled rationalization through efficient calculation of means to achieve given ends, without considering the value or significance of these ends, through optimization of the functionality of organizations and industrial production that reduces individuals to material means of production. Formal rationality underpinned by technology thus resulted in organizations operating like 'technically rational machines' (Weber, 1978, p. 811).

Whether these formally rational actions, organizational processes and organizations are substantively rational depends on the ends, beliefs

and values, that is substantive purposes, as standards of rationality. Weber (1964) claimed that, not only are modern bureaucratic organizations governed by formal rationality, but that they are increasingly 'substantially irrational' from the point of view of egalitarian, fraternal and caritative values. Here Weber (1964) not only described the rising tensions between the formal rationality and substantive irrationality of modern organizations and society but also expressed his own position, claiming that their 'institutional foundations are morally and politically problematic' (Brubaker, 1987, p. 38).

According to Weber (1978) rationality, as an organizing principle of social life, has its basic limits. Even if actors are subjectively rational and committed to some beliefs and values and, thus, inclined to substantive rationality, their mutual judgements of rational action differ and conflict to the degree to which their beliefs and values differ and conflict. Weber (1978) maintained that belief and value conflicts cannot be resolved in a rational way. Therefore, because irreconcilable value conflict is endemic in modern organizations, substantive rationality is inherently limited.

Following Weber's (1978) critical analysis of rationality and the processes of rationalization, Adorno and Horkheimer (1944), who were renowned critical thinkers of the first generation of the Frankfurt School, viewed organizational processes and advanced capitalist societies that were governed and shaped by 'instrumental rationality'. Instrumental rationality, which is derived from the concept of formal rationality, refers to the capacity for maximizing efficiency and optimizing control of organizational and societal processes through the application of technical knowledge. (Weber's (1978) concept of *Zweickrationalitat* is translated as instrumental rationality or purposive rationality.) Predominant institutionalization of instrumental rationality and progressive rationalization of processes and society is linked to increased formalization and bureaucratization and increased coherence, calculability and control, with socially disastrous consequences. For Adorno and Horkheimer (1944) it led to 'totally administered society' and 'closed, totalitarian systems'.

In contrast to Weber (1978) and critical theorists of the first generation, Habermas (1984) did not regard rationalization as a process that inevitably leads to instrumentalization, bureaucratization, control and domination, but as an inherently ambivalent process that also entails a potential for human cooperation, emancipation and freedom. The basic thrust of Habermas' (1984, 1987) theoretical approach was his conceptual distinction between instrumental and strategic rationality

(as a derivative of Weber's (1978) formal rationality) on one hand and communicative rationality (as a new conception) on the other. This distinction reflects two fundamentally different orientations of actors: an orientation towards success in the former conception of rationality and an orientation towards understanding in the latter conception of rationality. Actors oriented primarily to success can be either instrumentally or strategically rational. Habermas (1984) considered a purposeful action to be instrumental when it is performed according to technical rules and when it is judged in terms of the effectiveness of its intervention in a physical world. Similarly, an action is strategic when actors achieve their ends by influencing others. Both instrumentally and strategically rational actors intervene in the objective world in order to change its state of affairs and disregard the interests, values and norms of other fellow human beings affected by the intervention. (This paper adopts Habermas' (1984) definition here of the objective world as 'the totality of states of affairs that either obtain or could arise or could be brought about by purposeful intervention' (p. 87).)

In contrast, actors oriented to understanding are communicatively rational. While also aiming to achieve specific ends, they do so by developing inter-subjective interpretation of a situation through social interaction, thereby leading to rationally motivated agreement and coordination of their actions. Habermas (1984) called such actions communicative actions. The very nature of communicative actions implies that, unlike instrumental and strategic actions, they are essentially linguistic in nature. That is to say the actors use language for effectively building mutual understanding and a common interpretation of a situation (White, 1988). Based on this common understanding the actors coordinate their actions, thereby achieving their ends (Koningsveld and Mertens, 1992). According to Habermas (1993)

> 'Rationality' refers in the first instance to the disposition of speaking and acting subjects to acquire and use fallible knowledge. As long as the basic concepts of the philosophy of consciousness lead us to understand knowledge exclusively as knowledge of something in the objective world, rationality is assessed by how the isolated subject orients himself to representational and propositional contents. Subject-centred reason finds its criteria in standards of truth and success that govern the relationships of knowing and purposively acting subjects to the world of possible objects or states of affairs. By contrast, as soon as we conceive of knowledge as communicatively mediated, rationality is assessed in terms of the capacity of responsible

> participants in interaction to orient themselves in relation to validity claims geared to intersubjective recognition. Communicative reason finds its criteria in the argumentative procedures for directly or indirectly redeeming claims to propositional truth, normative rightness, subjective truthfulness, and aesthetic harmony (p. 314).

Of particular importance for the analysis of the roles of IS is how the potential of communicative rationality can be achieved in social interaction. The key assumption here is that participants in communication understand the internal relationship between the raising of inter-subjective validity claims and the commitment to give and be receptive to arguments. Communicative rationality in essence 'signifies a mode of *dealing with* (raising and accepting) validity claims' (emphasis in the original) (Wellmer, 1994, p. 52). Besides, no validity claim is exempt from critical examination. Communicative rationality could thus be said to express a reflexive conception of human speech, which means that all validity claims can only be redeemed in human discourse and can only be justified through argumentation. This further implies that participants should inhabit a pressure-free environment where the constitutive power of the better argument reigns. Habermas (1984) also explained that validity claims are not limited to the objective world of facts (as in instrumental and strategic rationality) but also refer to the social world of values and norms, as well as to the subjective world of individual experiences, desires and feelings. (Habermas (1984) defined the social world as a 'normative context that lays down which interactions belong to legitimate interpersonal relations' (p. 88). The social world embodies moral practical knowledge in the form of norms, rules and values. Complementary to the objective and social worlds, which are external to an actor, Habermas (1984) defined an internal or subjective world 'as the totality of subjective experiences to which the actor has privileged access' (p. 100).)

The rationalization of organizations: a theoretical framework

The paper begins here with two basic conceptualizations of organizations that are distinguished by different ontological assumptions. One is organization as a system, which conceives of organizations as concrete facticities, such as aggregations of actors, physical artefacts (machinery, buildings and technology), processes and structures that are integrated in order to achieve certain goals. Accordingly, management is then

defined as the activity of actors with formal status and legitimate authority intervening into the system (Gephart *et al*., 1996). Systems such as production systems, administrative systems, decision-making processes, financial systems and the like are defined in terms of the objects, processes, states and events about which it is claimed that they exist, have happened or are likely to happen. In other words organization is defined as part of the objective world.

Alternatively, organizations may be conceived as both the system and socio-cultural life world of its members. The socio-cultural life world is the symbolically created, taken-for-granted universe of daily social activities of organizational members, which involves language, social structures and cultural tradition as the background knowledge that members share. While material production refers to the system aspect of an organization, cultural reproduction, social integration and socialization refer to the life world of its members (Habermas, 1987). Whatever happens in an organization and whatever organizational members believe, thematize, contest and talk about refer to the three worlds within the horizon of their life world. The life world 'is constitutive for mutual understanding *as such,* whereas the formal world-concepts constitute a reference system for that *about which* mutual understanding is possible' (emphasis in the original) (Habermas, 1987, p. 126). For actors in social interaction the life world is always intuitively present as the context for inter-subjective understanding of a situation and coordination of their actions. In this process elements of the life world context become explicit and subject to contestation and revision. As a result, actors engaged in social interaction simultaneously draw from and recreate their life world.

Two conceptualizations of organizations that are based on two sets of ontological assumptions determine what is considered to be subject to rationalization: systems in the first conception and both systems and the life world in the second conception. The ontological assumptions (and two concepts of organization) are used as one classification dimension for formulating the basic types of rationality and rationalization of organizations. The second dimension is determined by different approaches to reason and rationality.

As has been seen, there are two fundamentally different and mutually opposing approaches to reason and rationality. One is subject-centred reason, which is concerned with self-assertive individual interests that determine the goodness of goals and means for achieving them. Subject-centred reason is behind the individual perspective of rationality. The other is reason situated in social interaction, which is exemplified by

the inter-subjectivity of mutual understanding of the participants that denotes the collective perspective of rationality. The individual and collective perspectives of rationality coupled with two views of organization (as a system or as both a system and life world) form a framework that distinguishes four basic types of rationality (Table 5.1).

From an individual perspective, assuming the view of organizations as systems (that is cell 1 in Table 5.1), rational actors pursue their interests and make decisions so as to intervene in a system and achieve predefined ends. This type of rationality, following Weber (1978), will be called formal rationality. Using Habermas' (1984) categorization, it is further differentiated as instrumental rationality and strategic rationality. Instrumentally rational actors calculate means based on technical knowledge in order to achieve given ends and disregard other human beings involved. Strategically rational actors follow rules of rational choice and achieve given ends by influencing other actors, who are perceived as rational opponents. The more an actor's knowledge of the target system is accurate, the more effective his/her intervention in the system and, therefore, the more instrumentally rational the actor. Similarly, the better an actor's knowledge of other actors (opponents) and their likely counteractions, the more effective his/her influence on these actors and, therefore, the more strategically rational the actor.

When the ontological assumptions are changed and all three worlds are included, while still looking from an individual perspective, the nature of rationality changes as actors are oriented to achieving ends that are not only related to systems (e.g. increased performance and efficiency of material production, which are defined within the objective world) but also those referring to their life world: norms and values,

Table 5.1 The rationality framework

	Ontological assumptions	
	Organizations as systems (part of the objective world)	**Organizations as both the systems and life world of their members (involving the objective, social and subjective worlds)**
Individual perspective (subject-centred reason)	Cell 1: formal rationality Instrumental rationality Strategic rationality	Cell 2: substantive rationality
Collective perspective (reason situated in inter-subjectivity)	Cell 4: quasi-communicative rationality or distorted communicative rationality	Cell 3: communicative rationality

justice and fairness, political or ideological affiliations, etc. (which are related to their shared social world and their inner subjective worlds). Following Weber (1978) this cell is called substantive rationality (cell 2 in Table 5.1). The issue here is that different actors pursuing their (different) interests and driven by their (different) substantive ends and values will usually disagree in their judgement of rational action. Klein and Hirschheim (1991) outlined the key assumptions behind effective application of substantive rationality, i.e. that individual actors can and do share a common set of values. Each is 'held accountable for the degree to which his actions are consistent with an ultimate value ideal' (Klein and Hirschheim, 1991, p. 160). Clearly the potential for conflict arises when actors hold differing values about either or both of their shared objective and social worlds. Conflict of this nature is particularly difficult to handle in situations where the lack of agreement over values is hidden and there is no mechanism for identifying it.

An alternative, collective perspective of rationality that becomes of great significance when viewing the organization as both a system and life world is communicative rationality, which is the third type in the framework (cell 3 in Table 5.1). As has been seen, instead of rationality defined from the position of a success-oriented, self-interested individual, Habermas (1984, 1987) defined communicative rationality from the perspective of social actors oriented to mutual understanding. Communicatively rational actors use language for developing inter-subjective understanding of a situation as a basis for a rationally motivated agreement and coordination of their action plans (aimed at achieving their, in principle, different ends). It is via communicative rationality that the hidden disagreements of substantive rationality can be identified and possibly resolved.

It has to be noted here that this study adopted what is believed to be an original idea of Habermas (1984) of communicative rationality. This paper does not see justification for distinguishing between communicative rationality and emancipatory rationality as proposed in the earlier mentioned paper by Klein and Hirschheim (1991). When communication works to create an effective shared understanding of all significant elements of a situation, it may emerge that differences of opinion among the actors are extreme enough to prevent 'consensually orientated action'. Emancipatory rationality is proposed as a way of dealing with such conflict so as to improve conditions for rational discourse. This is a departure from Habermas' (1971) original idea that emancipatory interest and emancipatory potential are implied by communicative rationality. Namely, the essence of communicative

rationality is unconstrained communication, free from any force that inherently involves emancipatory potential. While 'recognizing the barriers to rational communication' and 'finding remedies on how to overcome distorting tendencies in communication' (Klein and Hirschheim, 1991, p. 171) is a relevant aspect of emancipation in social interaction, more than communicative rationality cannot be expected when dealing with it. It is communicative rationality that enables the achievement of emancipatory potential. As this study accepted Habermas' (1984) original comprehensive definition of communicative rationality that inherently involves an emancipatory potential, no need is seen for formulating a distinct emancipatory rationality.

In addition, a number of authors have criticized the concept of communicative rationality as idealistic and claimed that conditions for the realization of emacipatory potential could not be met in any practical organizational situation (Wilson, 1997). As a response to such criticism Habermas (1990) noted that a degree of communicative rationality is necessarily assumed in any practical discourse up to the point where communication breaks down. Similarly, for participants in social interaction it is meaningful to strive to realize the emancipatory potential to a satisfactory degree while understanding that the ideal of emancipation could never be fully achieved.

The conditions for communicative rationality in practice may be restricted in many ways. First, the processes of reaching understanding and communicatively achieved agreement might be limited by competing interests, underlying power asymmetry, different levels of communicative competence among actors and unequal access to knowledge and resources. For instance, actors in power positions or with privileged access to knowledge may unintentionally exert influence on others while believing to be oriented to understanding. In another scenario, they may pretend to be oriented to understanding while in fact being oriented to success, thus intentionally deceiving others. In both cases communicative rationality is distorted: unconsciously in the former and consciously in the latter. Distorted communicative rationality (paradoxically) assumes a collective perspective in order to preserve the appearance of communicative rationality and, thus, enable covert strategic acting. However, the practice of distorted communicative rationality does not genuinely take into account or refer to the life world of participants but rather remains concerned only with systems aspects (cell 4 in Table 5.1). The above distinction between the distorted and genuine communicative rationality types is conceptually very clear but may be somewhat blurry in practical situations (as will be discussed later in this paper).

Second, actors that do not belong to the same life world may engage in a cooperative activity (e.g. employees from different, geographically dislocated organizations coordinate their electronic commerce activities). They may honestly seek mutual understanding of a situation, but their ability to achieve it is limited due to the lack of their shared background knowledge. In such circumstances (cell 4 in Table 5.1) there are partial conditions for communicative rationality. Therefore, it is proposed to name it quasi-communicative rationality. While the criteria for distinguishing genuine from quasi-communicative rationality are unambiguous, in real life situations any collective (a group or organization) oriented to mutual understanding would find itself on a spectrum between the two pure types.

Table 5.1 presents a rationality taxonomy that defines three fundamental types of rationality: (1) formal rationality (instrumental and strategic), (2) substantive rationality and (3) communicative rationality. In addition, it defines a fourth type of rationality, quasi-communicative rationality and distorted communicative rationality, as derivatives of the third type of rationality.

The rationality framework presented here suggests several lines of IS inquiry. First, it indicates the rationality potential of IS–organization relationships in relation to the four (or more precisely three plus one) types of rationality. Second, it helps in understanding the meaning of rationalization (to be potentially) achieved by an IS for each type of rationality and the resulting consequences. It helps in understanding how the actual rationality (not necessarily the intended one) affected by the use of an IS determines the nature of social and organizational consequences. Third, it also provides a conceptual foundation for analysis and classification of different types of IS and the development of standards for their evaluation. The authors think that confusion as to rationality type is a significant factor in the continuing high level of dissatisfaction with IS and their failures. Next this paper briefly presents the field study and then gives examples of IS in order to illustrate these lines of inquiry.

Research methodology

This paper draws from a field study conducted in the Colruyt Company, which is a discount food chain and Belgium's third largest food retail company. The Colruyt Company evolved from a one-store enterprise in the 1960s to a highly profitable food retail chain, currently comprising some 120 stores located throughout Belgium. The company's success is

attributed among other things to its innovative use of IT and its integration with the company's management philosophy regarding workers empowerment and their participation in decision making. Namely, as the late Jo Colruyt, the founder and former company board chairman, explained in a 1993 interview, from its very beginning the company used IT for exploring new innovative organization structures and enabling and supporting open and inclusive management practices that stimulated employees' initiative, responsibility and risk taking.

The field study started in 1992 and continues to this day. Initially it was an interpretive field study conducted by non-participant observers (two of the authors were among them) (Janson *et al.*, 1997a,b). Gradually, as the observers became concerned with the assumptions behind the application of IT and with the ways in which IS are used for achieving improvements in work processes and decision making, this added a critical dimension to the study. Namely, on one hand, the observers experienced the company's attempts to build genuine participative decision making and empower employees, in which the use of IS played an important role. On the other hand, the observers noted unions' accusations that company management had hidden agendas and had used IS for masking their pure commercial interests and objectives. As a result, the study adopted a critical orientation, with the aim of not only interpreting and explaining but also informing and changing practice (Cecez-Kecmanovic and Janson, 1999). Consequently, informed by critical social theory, the authors' interpretation and analysis turned the study into a critical field inquiry (Klein, 1999; Cecez-Kecmanovic, 2001).

Document analysis, in-depth interviews and non-participant observation research techniques that were developed for interpretive field studies were used in the empirical study (Walsham, 1993, 1995). However, by setting a particular research agenda (the rationalization of organizational processes) focusing on specific explanatory substantive problems (such as the assumed rationality of actors, the intended and achieved rationalization due to the use of IS and the manipulation and control of employees versus emancipation and participation) and adopting a historic perspective, the study became a critical inquiry (Cecez-Kecmanovic, 2001).

Over 30 company and union documents (both hard copies and electronic ones) were collected and analysed. Eighteen in-depth semi-structured interviews (five with the company's founder and high level managers, three with shop managers and clerks and three with union members) were conducted and analysed (e.g. interview transcripts by

M. Lengeler in 1992, 1993, 1994, 2000, 2001 and an interview with J. Colruyt in 1993) and several meetings were observed. The authors reconstructed stories from these sources about the company's IS, including the purpose and history of their development, assumptions about the context in which they were developed and implemented, the types of rationality addressed and the rationalization aimed and achieved, as well as other intended and experienced effects, risks and dangers. For the purpose of this paper, three cases of IS were selected for illustrating how the rationality framework assists understanding their roles and long-term social effects.

Interpretation of information systems from the field study within the rationality framework

Information systems for fresh food shipments

Fresh food products are shipped from the company's warehouse to individual stores in carts that have hollow outer walls. During transportation the fresh products are kept at a low temperature that is maintained by injecting a coolant into a cart's walls. Delays in unloading carts after they arrive at the store and before the fresh food products are placed in the stores' freezers are frequent. Government regulations require that fresh foods be kept below a certain maximum temperature at all times. Rejecting a fresh food shipment because its temperature exceeded the government-established temperature is expensive. In order to keep records of rejected fresh food shipments the company decided it needed to store each cart's inside temperature in a database.

Dockworkers behave in a rather robust manner when unloading delivery trucks and rough handling would result in frequent computer damage if one were located on the loading dock. Yet the loading dock is the location where the carts' temperatures need to be recorded and entered into the systems database. In short, the company needed a system that enabled measuring a cart's temperature and entering the measurement into the IS database without using a standard keyboard.

The company formed a functional group comprising a work simplification expert, an expert familiar with various instruments that measure temperature and an IS analyst. During the functional group's meeting it became clear that an exact recording of the carts' temperatures was not needed. The essential nature of any temperature measurement was binary, that is to say a cart's interior is either below or above the critical temperature. This realization led to the following solution: (1) a thermometer was used for reading a cart's inside temperature and (2) a two-colour

plastic strip was glued to the loading dock's wall. One colour indicated a temperature below the critical point while the second colour meant a temperature that was above the critical point. All the dockworker had to do was to read the thermometer and point a laser gun at the appropriate colour which then resulted in entering the carts' temperature condition into the IS database. The laser gun was attached to a personal computer that was mounted out of harm's way high up the loading dock's wall. The IS was a resounding success.

When reflecting on the system's success it seems that the key issue was the correct assumption concerning the rationality of the actors involved in the process. The IS was based on the functional group's view that the reordering process was inherently instrumental. That is to say, the designers assumed that the system served an optimal distribution of fresh food products based on a temperature criterion. The real issue here is that the system designers modelled the process as involving inanimate elements of the 'objective world'. However, the computer being one of these inanimate objects that could be easily damaged by human action was the reason that the computer had to be placed out of harm's way. In short, the solution to the problem accorded with instrumental rationality and, hence, fell into the first cell of the framework used here (the organizational process of fresh food distribution as a system individual perspective). However, it could be argued that the IS used dockworkers for feeding data into the system and, thus, treated human beings as objects. The push to increase speed in the fresh food manipulation and temperature reading (that is to increase rationality) may have exerted high pressure on the dockworkers that remained hidden in the initial assessment of the IS impacts.

By viewing the IS within the rationality framework it is possible to judge the appropriateness of the rationality type chosen (in this case instrumental rationality, i.e. cell 1 in the rationality framework) and assess (1) the value of the IS based on increased instrumental rationality and (2) the potential risks involved in it (see the summary in Table 5.2).

Information systems assisting in the decrease of customer waiting times

After completing serving a customer the checkout clerk enters the number of waiting customers into the IS. This enables the calculation of customer waiting times. At the end of the shift the clerk receives the waiting times of those three customers who experienced the longest waiting time. Company documents revealed that the information is provided to nobody but the clerk. Summarized figures are made

Table 5.2 Impacts of the Colruyt Company IS on rationality

	Intended IS use and expected benefits	**Observed IS use and its effects**	**Risks and challenges**
IS for product distribution	Increase in instrumental rationality – optimization of the fresh food shipping process	IS succeeded due to focus on the instrumental rationality that governed the fresh food shipping process	Dockworkers measure temperature and feed data into the IS and are thus treated as objects; increased rationality of food shipping would imply pressure on dockworkers to speed up feeding the data
IS for decreasing customer waiting times	Increase in substantive rationality – achievement of congruent goals related to improved customer service	Increased efficiency and improved customer service Selection of checkout clerks for additional training Clerks' self-evaluation and improvement	There is a risk that managers and supervisors misuse the IS in order to obtain detailed customer waiting times and spy on individual clerks Introduction of clear policies preventing IS misuse and nurturing shared values and norms regarding employees' rights (through training) was considered key to achieving intended goals
ISID	Increase in communicative rationality – increase in mutual understanding of issues, thereby enabling cooperative interpretation of problems and assisting members in reaching agreement and consensus in decision making	Generally improved communication: open, public and efficient company-wide communication Raised awareness of company problems and increased workers' participation in problem solving	An actor can deceive others by pretending to act communicatively while in fact acting strategically The challenge is to train company members to be communicatively competent and capable of detecting the misuse of ISID and potential deception A further challenge is to ensure access to as wide a range of information as possible

available to the store and district managers and to members of upper management. An interview with a store manager confirmed that confidentiality of customer waiting time data was indeed a fact. The manager further indicated that, while it was technically possible for him to access individual clerk data, it would violate company policy.

Checkout clerks receive regular training that provides them with the necessary skills and motivation for this important task. It is the company's philosophy that employees should be supplied with information that makes self-evaluation possible. According to Colruyt (1984)

> Enabling the employee to measure his own performance furthers self-appreciation [for a job well done] and being able to monitor his own performance makes the employee more independent in relation to his surroundings (p. 54).

The system has a threefold purpose: to support top managers in increasing efficiency and improving customer service, to assist selection of checkout clerks for additional training and to help clerks' self-evaluation and improvement. This is clearly an IS that assumes and impacts on all three worlds (staff are perceived not as objects, but as individuals with their experiences and desires). Moreover, rationalization is seen from the individual perspectives of clerks and managers. Consequently, the system falls into cell 2 of the framework used here (organization as a system and life world individual perspective). The Colruyt Company is a company with a carefully nurtured and articulated value system that all stakeholders share to a large degree. Central to the company's philosophy is the importance of employee work satisfaction, self-realization and social relationships. Staff members are expected to be committed to the company's goals and participate fully in the company's activities. In return the company commits to designing an environment for 'meaningful' work. In this case the clerks, the company management and the union subscribe to the same value position, namely that the clerks are independent self-directing individuals and not 'parts of the customer-serving system'. Because there is a congruency of goals between top management, store manager and clerks, founded on shared values and norms, the IS successfully serves substantive rationality.

Many retail organizations use point-of-sale systems for employee control purposes by collecting data on worker productivity, worker accurateness and worker honesty (Klein and Alvarez, 1987). Such systems can develop from an (erroneous) assumption that instrumental rationality applies (as for the previous system). Since we are clearly in the

social world, a multitude of counterproductive patterns of behaviour on the part of the clerks can and has been observed to occur. Alternatively, systems like these could be considered to be based on substantive rationality but often with an implicit value system as that, for example, embodied in the 'Taylorist' work role design. Counterproductive behaviour will occur if staff do not share the value system.

So prevalent was this approach that the Colruyt Company's union members were critical of the stated system goals and declared a contribution to substantive rationality. The union suspected the use of IS for decreasing customer time in fact enabled management to exercise control and direct monitoring and constant surveillance of clerks in order to influence their behaviour (in a covert way) and, thus, achieve better performance. A union document stated that 'We do not dare think of the working conditions [of the checkout clerks] when customers are promised to be checked out within some pre-specified time period' (Adele *et al.*, 1984, p. 77). If this claim is interpreted within the rationality framework, it implies that the IS is not in fact used for increasing substantive rationality-based shared values (cell 2), but is instead used for supporting covert strategic action by management and increasing their strategic rationality (cell 1). In other words, the union pointed to the risk of misuse of the IS, which compromises its intended purpose and benefits. As a result, clear policies regarding the use of the system were introduced, thereby ensuring its contribution to substantive rationality. Understanding the impact of IS on a rationality type (in this case substantive rationality) and conditions of sustaining that impact, that is remaining committed to substantial rationality and not slipping into strategic rationality, is an important contributor to systems' success (Table 5.2).

Groupware: an interactive system for information dissemination

In keeping with the idea that information should be available to anyone, the Colruyt Company developed an interactive system for information dissemination (ISID). The system was designed for meeting the company's objectives for open, public and efficient company-wide communication. Company policy ensured that information about decisions, actions and events, as well as inter-office correspondence, outbound and inbound communication and minutes of meetings, were captured by the ISID. An important system feature was its wide accessibility (80% of information is accessible to all company members

and union stewards and 20% is confidential with access limited to authorized individuals).

The key role of the ISID is to assist all employees in engaging in problem identification and problem resolution and becoming genuine actors in the decision-making process. Any employee can raise a problem via the ISID and initiate its resolution. Other employees may respond (via the ISID) with relevant information or, perhaps, a ready-made solution. If no immediate solution exists a team of self-nominated individuals is created in order to explore the problem further and to propose possible courses of action. The team chooses a moderator, based on self-nominations or nominations by others. Next, the team members establish a common understanding of the problem situation and develop one or more potential solutions to the problem at hand. This is then communicated via the ISID so that other company employees with an interest in the problem or its solution get promptly informed and participate in the problem solving. Once publicly announced on the ISID, the problem definition and its proposed solutions are open to questioning, criticism and counter-proposals. New inputs to the problem definition and its solution may trigger reassessment by team members and this process continues until, ideally, an agreement is reached. However, this is not always feasible due to time limitations (usually a period of 3 weeks) or deep-seated personal differences. In this case, the team moderator weighs all arguments, comments and counter-proposals and makes a final decision and communicates it to all employees via the ISID. The decision, for which the moderator carries ultimate responsibility, is then implemented. While the whole decision-making process is lengthy, the democratically assigned rights of the moderator ensure that the process stays within time limits that are tolerable for the retail industry.

The company has an extensive range of in-house courses available to all employees in order to assist in their personal development, i.e. improving their self-knowledge, assertiveness, job skills, inter-personal skills and communication skills, thereby encouraging free discourse regarding employees emancipation and company values, policies and practices. Employees attend these courses at their own discretion and during their regular working hours. Employees so trained share a common perspective and participate in company affairs significantly less constrained than would normally be the case. The ISID creates the technologically enabled environment that makes communicative action a reality, i.e. access to knowledge and an ability to raise and contest validity claims and provide arguments in an unconstrained discourse,

thereby leading to co-created inter-subjective meanings and shared understanding of a situation. Such an understanding provides the basis for consensually motivated agreement.

This IS falls into cell 3 (organization as a systems and life world collective perspective). The history of the ISID's company-wide use demonstrates how communicative rationality can be achieved in practice and how it affects all forms of life. The company has been remarkably successful in a very competitive retail industry. At the same time, it has experienced the lowest staff turnover as compared to other retail companies, the decision making has been devolved with broad-ranging employee participation and the company culture is characterized by highly valued work ethics, a cooperative spirit, self-realization and emancipation through work and collaboration.

However, the ISID carries with it the danger of being misused. Several instances of use of the ISID in which employees made an appearance of communicative rationality while in fact acting strategically have been discovered. On one occasion an employee searched and collected all submissions by another employee and used this evidence for mounting accusations against that employee. Moreover, some members of the company were worried that restricted access to confidential documents and information stored in the ISID may systematically distort communication and, thus, compromise the whole purpose of the ISID. Misuse of the ISID leads to distorted communicative rationality and the system in these instances would be classified in cell 4 rather then cell 3. In order to identify and prevent potential misuse of the ISID, the Colruyt Company introduced the practice of critical reflection and public debate about such incidents, which in some cases led to the introduction of new norms and rules.

The evidence from the Colruyt Company indicates that the application and use of a system such as an ISID for supporting communicative rationality in a social group involves the risks of dishonest use and deterioration of conditions for genuine communicative rationality. It is notable that, as for the previous IS, the use to which the ISID is put and the social conditions in which it operates are as important as the system design in establishing its communicative potential.

Conclusion

This paper proposes use of the rationality framework for critical examination of the use of IS in organizations. The types of rationality proposed are rooted in the social theories of Weber (1959, 1978),

Adorno and Horkheimer (1944) and Habermas (1984, 1987) and draw on the work of IS researchers such as Lyytinen (1992) and Klein and Hirschheim (1991). The taxonomy of rationality types is based on two dimensions: (1) organization ontology (organization as a system versus organization as both a system and life world) and (2) the orientation of actors and location of reason (an individual versus collective perspective). As a result three fundamental types of rationality are identified: (1) formal rationality (instrumental and strategic), (2) substantive rationality and (3) communicative rationality. In addition, the taxonomy identifies a fourth type, quasi-communicative rationality and distorted communicative rationality as derivatives of the third type of rationality.

This framework extends the dominant decision theoretic approach in two ways. It adds the socio-cultural life world perception of the organization to the traditional 'hard' facts and measures description that the system view of an organization takes. It differentiates between our perspectives as (self-interested) individuals and as members of a social group (a collective). Three of the rationality types (cells 1, 2 and 3) offer positive potential for an IS. An appropriate choice between the cells and effective application of the designated rationality (instrumental, strategic and substantive and communicative) will go a long way to supporting the development of IS that add business value to an organization. From the analysis here of the fourth cell, it is suggested that one factor that may be contributing to the poor value delivered by some IS supporting a social group (a team or an organization) may be perception of its needs predominantly in system terms, thereby ignoring the life world (social integration, cultural reproduction and socialization) of its members.

The IS case examples provide powerful support for the proposed framework. The first example of an IS in supporting fresh food shipments established the continuing value of the decision theoretic approach where physical factors dominate. It also shows inherent risks of increasing instrumental rationality. The second IS, which was for customer waiting times, was of particular interest. Because the case company, i.e. the Colruyt Company, had such an unusual culture and set of values this IS demonstrated how differing values produce differing results for similar IS. Substantive rationality allows this issue to be identified. The last case exemplifies the company-wide use of IS in increasing communicative rationality that achieves significant benefits for both the company and its employees. It demonstrated the way in which an IS can support and enhance the collective perspective. These examples demonstrate how, by focusing on the nature and meaning of the

rationality achieved or supported by the use of an IS, the critical analysis led to improved understanding of the system's actual and potential roles in increasing the rationality of organizational processes and, thus, enabled new insights into its social and organizational consequences.

The major claim of this paper is that basic types of rationality, i.e. formal (instrumental and strategic), substantive and communicative rationality (with two derivatives, quasi- and distorted communicative rationality), with their well-established theoretical foundations (presented here only briefly) are useful constructs for examining both the potential benefits and risks of increased rationalization of organizations that are enabled and supported by IS.

Based on this study, it is suggested that the rationality framework provides a starting point for the development of a rationality theory of IS. Such a theory should further advance our understanding of the nature of the rationalization of organizations and society that is achieved by the use of IS and should help in identifying and exploring their less obvious social consequences. The rationality theory of IS would, for instance, be concerned with the contribution of IS to increasing formal rationality and the associated issues of bureaucratization and subordination, increased formalization and depersonalization of workplace relations and increased control and alienation. It would also assist researchers and practitioners in exposing (a disregard for) substantive ends and values in the design and implementation of IS and revealing attempts at using IS for concealing real objectives or illegitimate and dishonest purposes. The primary task of the rationality theory of IS would be to contribute to the critical analysis of social and organizational use of systems by drawing attention to and exposing the hidden social consequences of increased rationalization enabled and supported by IS. Conversely, the rationality theory of IS should indicate the ways in which IS can be used for meeting the communicative needs of a social group and assisting actors in increasing their communicative rationality. It is also noted here that such a theory is not intended to replace but rather to complement many other theories and perspectives that inform our understanding of IS phenomena in contemporary society and organizations.

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