2006

Relationship between Information Systems and Organisational Learning – Lessons from the Field

Dubravka Cecez-Kecmanovic
School of IS, Technology and Management,, dubravka@unsw.edu.au

Marius Janson
One University Boulevard, janson@umsl.edu

Jože Zupancic
University of Maribor, Slovenia, joze.zupancic@fov.uni-mb.si

Relationship between Information Systems and Organisational Learning – Lessons from the Field

Dubravka Cecez-Kecmanovic
UNSW, Faculty of Business, School of IS, Technology and Management
Sydney, New South Wales, 2052, Australia
E-mail: dubravka@unsw.edu.au
Marius Janson
University of Missouri-St. Louis, College of Business Administration
One University Boulevard, St. Louis, MO 63121, USA
Email: janson@umsl.edu
Jože Zupančič
University of Maribor, Faculty of Organisation Studies
Presernova 11, 4000 Kranj, Slovenia
E-mail: joze.zupancic@fov.uni-mb.si

Abstract

The relationship between information systems (IS) and organisational learning has long been claimed but not sufficiently empirically grounded (Robey et al., 2000). This paper examines this relationship by drawing on a longitudinal study of the Slovenian company Sava during its 1995-2004 transition period when it adapted to and prospered in a free market economy. The company is particularly interesting because of the pivotal role information systems (IS) played in supporting organisational learning during its successful transition from a socialist company operating in a protected market to a privatized company operating in a capitalist global market. By providing insights into the role of various IS in organisational learning and in the company's successful transition, the paper contributes to a deeper understanding of the relationship between IS and organisational learning which is relevant and inspiring to other companies, especially those undergoing radical change.

Keywords

Organisational learning; Information systems; IS and single, double and triple loop learning

INTRODUCTION

Organisational learning occurs when members of an organisation change their shared assumptions and beliefs and in turn change the range of their behaviours and enhance their capacity to act. Organisational learning involves complex interactions among individuals in an organisation and between an organisation and its environment, the nature of which is to a large extend determined by organisational structures, culture, information flows and socialization processes (Barlett, 1932; Argyris and Schein, 1978; Fiol and Lyles, 1985; Senge, 1990; Pentland, 1995; Swan, 1995; Huber, 1996; Wijnhoven, 2001). Of particular interest in this paper is the relationship between organisational learning and computer-based information systems (IS) (Pentland, 1995; Robey et al., 2000; Stata, 1989). More specifically this paper investigates what is the role of IS in organisational learning and whether and how IS support specific types of organisational learning.

The literature on organisational learning offers many different perspectives on the nature of learning that is considered organisational. The role information systems play in learning processes is seen differently from the different perspectives. At one end of the spectrum, organisations are conceived as "mental entities capable of thought" (Sanderlands and Stablein, 1987) and learning by sensing their environments and "acting in response to these sensations" (Jones, 1995; Lee et al., 1992). In other words, an organisation is an entity in its own right that learns. This perspective is exemplified by Huber (1991, p. 89) who states that an organisation learns "if through processing of information the range of its potential behaviors is changed." Within this perspective IS which store, analyse, and communicate theoretical and experiential information (Huber, 1996) are seen as "sites of cognition within organisations" and are proposed to constitute the "organisational mind" (Jones, 1995, p. 72).

At the other end of the spectrum, learning is perceived as an attribute of the individual, and organisational learning is understood as an aggregate of individual learning (Schneider and Angelmar, 1993). Within this perspective, IS are viewed as supporting formal and informal learning by individuals (especially managers) and thereby supporting organisational learning (Stata, 1989).

Between these two ends of the spectrum lies a vast number of approaches to organisational learning that attempt to resolve the contradiction between the individual and the collective nature of organisational leaning (e.g.,

Argyris and Schon, 1978; Brown and Duguid, 1991; Lave and Wenger, 1991; Kim, 1993; Jones, 1995; Pentland, 1995; Williamson and Iliopoulos, 2001; Holmqvist, 2003). Argyris and Schon (1978) aptly point to an inherent paradox in the nature of organisational learning:

> "Organisations are not merely collections of individuals, yet there is no organisation without such collections. Similarly, organisational learning is not merely individual learning, yet organisations learn only through the experiences and actions of individuals."

In an attempt to resolve this paradox, Crossan et al. (1999) argue that organisational learning is a process comprising intuiting and interpreting at the individual level, integrating at the group level, and institutionalizing at the organisational level. The critical issue here is to "move beyond the anthropomorphic metaphor of organisations as individual cognizers" and comprehend the social and situated character of learning (Pentland, 1995, p. 2). While it is individuals who make sense of events and learn, they do it inter-subjectively in a social context, through social interaction. In other words, organisational learning is seen as a social affair – "an integral and inseparable aspect of social practice" (Lave and Wenger, 1991, p. 31). Organisational learning can thus be defined as the social production of inter-subjective experiences and organisational rules, structures and relationships that lead to changed organisational behaviour (Holmqvist, 2003; Weick, 1979). This leads us to propose an alternative role and conceptualization of IS as mediators of organisational learning as social practice. To the extend that IS enable and support social interaction, inter-subjective meaning making and reflection, and thereby affect shared mental maps, IS can be seen to impact on organisational learning. Even though it is argued that specific IS can and should be designed to fulfil such roles (Stata, 1989; Williamson and Iliopoulos, 2001), we have yet to see empirical evidence confirming that this actually happens in practice.

Our research study is motivated by the need to develop a better understanding of the relationship between organisational learning and IS in real-life organisational contexts. While much of literature draws from experiences of companies in western, market driven economies, this relationship between organisational learning and IS is believed to be even more critical to companies in transition economies. Our longitudinal study of the Sava Company, which endured a radical change both internally (privatization and change of management system) and externally (loss of market and the transition to an open, market driven economy), provided a particularly pertinent setting to investigate this relationship. Firstly, we examined how and to what extent Sava managers and employees used various information systems to support organisational learning. We were interested in uncovering explicit attempts to develop or acquire particular information system that enabled gathering, storing, analysing, and communicating information for the purpose of organisational learning. Secondly, we searched for evidence of information systems that specifically supported different types of learning, as well as the nature of 'support' for each type. By providing insights into Sava's organisational learning practices and its use of IS to enable and advance learning, we aim to advance understanding of the link between IS and organisational learning and derive lessons that are relevant and inspiring to other companies and especially those in transition economies.

In the following section we first present an approach to organisational learning adopted in this study. We then describe the research site and methodology. Based on empirical evidence from Sava, in the next section we describe processes and practices of organisational learning and the ways organisational actors used IS in enacting these processes and practices. This is followed by the discussion of the empirical findings and interpretation of the relationships between specific types of organisational learning and various IS.

THE NATURE AND TYPES OF ORGANISATIONAL LEARNING

In this paper we draw from a tradition in organisation and management studies that examined the social and situated nature of organisational learning (Argyris and Schon, 1978; Hawkins, 1994; Torbert, 1994; Snell and Chak, 1998; and many others). Following these works we adopted the model of organisational learning consisting of single loop, double loop and triple loop learning (most comprehensibly defined by Snell and Chak, 1998), presented in Figure 1. These types relate to the nature and degree of change of organisational behaviour. Single loop learning involves adaptive responses to changing conditions and environment: when organisational actors fail to achieve their desired outcomes (predefined goals) they learn to take corrective actions. Single loop learning contributes to an organisation's knowledge and competency base without, however, altering its goals, strategies, or mental maps. For example, single loop learning comprises adjusting a production process to ensure that the product meets (predefined) quality standards. Double loop learning involves evaluating and changing organisational goals, organisational strategies, and mental maps. Double loop learning is typically initiated when established mental maps and ways of understanding the business become inadequate. For example, when a product's market-share drops significantly, a company is forced to re-think its understanding of market needs and competitors' advantages and develop new mental maps that enable the company to change its marketing strategy.

Triple loop or deutero learning (Figure 1) occurs in response to a realization that existing mental models and ways of organisational learning no longer suffice. Snell and Chak (1998) state that the essence of triple loop learning consists of inventing new processes, methods or strategies for reframing and generating new mental maps. Mental maps play a vital role in organisational learning (Senge, 1990, 1992). By becoming an organisational member, an individual not only learns about operating procedures and organisational structures, norms and rules, but also gradually acquires shared beliefs, perceptions and mental maps or models of understanding the world. These shared beliefs and mental maps enable learned responses and consistent actions by actors across an organisation (Senge, 1992; Spicer, 1998; Chermack, 2003). However, as Argyris and Schon (1978) caution, there is a danger of their institutionalization that may lead to protecting the status quo and in effect preventing the search for new understanding and new mental maps or, in other words, preventing double loop learning (Kim, 1993). Our interest in the Sava Company arose in part because of its potential to shed light on how radical changes in social and economic environments can trigger changes in organisational and managerial mental models.

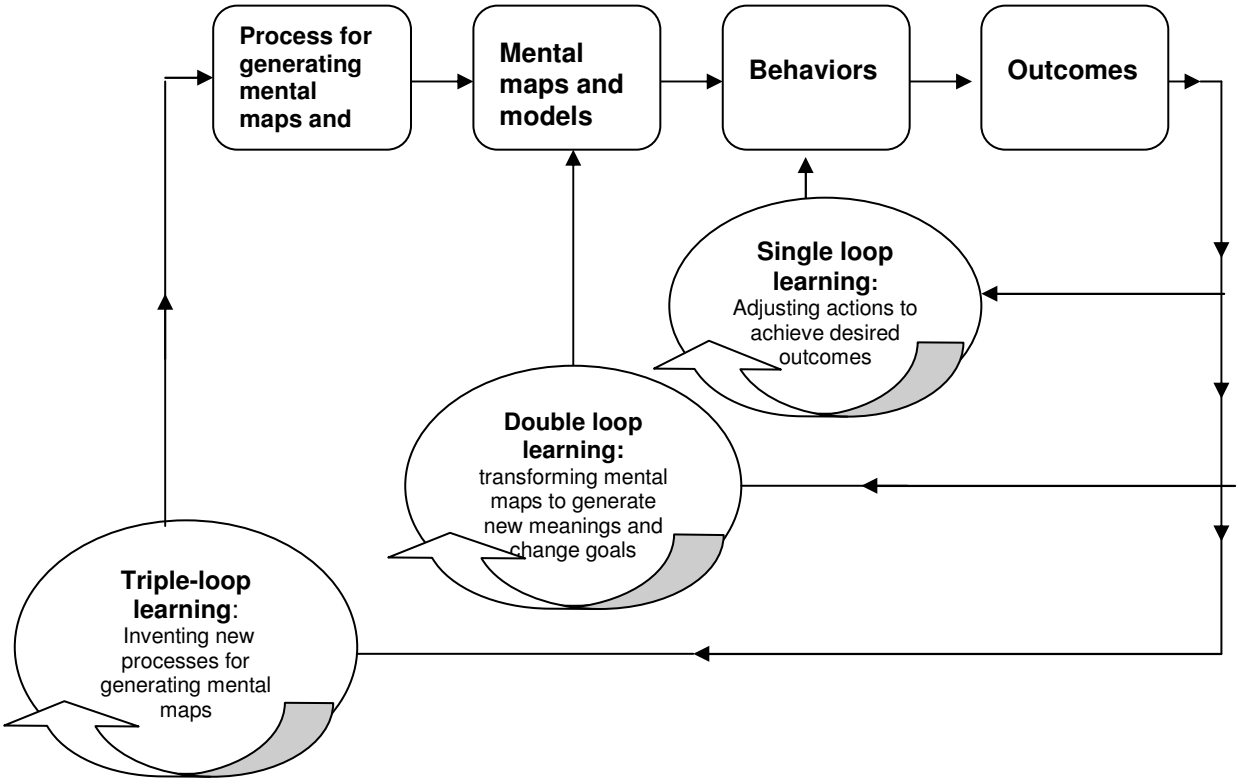

Figure 1. The model of organisational learning: single, double and triple loop learning (adapted from Snell and Chak, 1998)

THE RESEARCH SITE AND METHODOLOGY

We chose to study the Slovenian company Sava, a diversified manufacturer of automobile and other tires and specialty rubber products, due to the company's reputation as a learning organisation and the use of IS to support and enable innovation, restructuring and learning as part of its successful transition to a market economy. Moreover, Sava's top management agreed to grant the authors access to large numbers of employees at all managerial levels, and to acquire important information such as annual reports, company documents and manuals, and newspaper articles. Our empirical investigations during the 1997—2005 period included two sets of on-site audio taped interviews with Sava's top and middle managers (in October 1997 and June 2003, totalling 13); company annual reports for the years 1995 through 2004 and the 2005 half-yearly report, internal company documents and documents on Sava affairs published by newspapers and trade press, Slovenian Governmental Agency reports, industry reports, and other public documents. The interviews were semi-structured, with an interview guideline ensuring that all topics were discussed without preventing interviewees from telling their story in their own way.

Sava was a successful automobile tires company that enjoyed a protected position in the domestic market of the former Yugoslavia. The loss of its home market after Slovenia's seceding from the former Yugoslavia in 1991

led to a crisis that company management tried to resolve by attempting to penetrate markets in Western Europe and Central and Eastern Europe. However, Sava's top management quickly realized that the free market economy and global competition necessitated an entirely new corporate strategy and management style, and much more attention to efficiency, productivity, and product quality (Sava 1995 Annual Report). To understand the changes they embarked on, we needed to understand the political, economic, social, and legal circumstances under which the transition started that led us to also explore Sava's history and past experiences.

Our case study was interpretivist in nature focusing on the organizing processes rather than on the organisation (Weick, 1979). This view of organisational learning opened up an understanding of ways IS were adopted and used in support of organisational learning. Analysis of our data started early on as we collected historical documents and conducted the first set of interviews. After studying interview transcripts, annual reports and various internal documents, we tried to grasp how actors perceived and affected changes in their environment (i.e., market, political, social, and legal) as well as changes due to Sava's privatization. Next we focused on deliberate managerial actions to develop a learning organisation, as well as the emerging practices of organisational learning and the implementation and use of various IS. Our understanding of the subjects' interpretations was based on and validated against the historical background of the broader social, economic, and political changes. Due to the iterative nature of these processes, we went through several hermeneutic circles (Klein and Myers, 1999) before arriving at a satisfactory understanding.

Understanding subjects' interpretations was, as often happens, intertwined with our theoretical interpretations. That is, we viewed the findings within the theoretical lens of the single loop, double loop and triple loop learning model (Argyris and Schon, 1978; Snell and Chak, 1998). This effort made organisational learning phenomena appear in sharp focus, enabling their bracketing (Denzin, 2002) – inspecting, dissecting, uncovering, defining, and analyzing their characteristics and structures and relationships with IS. Building on bracketing processes, we then extended the organisational learning model so as to be able to differentiate between learning processes at the individual, group (or department), and organisational levels and to investigate the specifics of IS support. The theoretical interpretation of organisational learning and the role of IS thus constructed were contextualized in Sava's social milieu and the informants' experiences of transition. This contextualization "brings the phenomenon alive in the worlds of interacting individuals" (Denzin, 2002, p. 359). Through contextualization we aimed to demonstrate how lived experiences shape the specific nature of particular organisational learning processes (within a single, double, and triple loop learning model and at the individual, group and organisational level), which in turn determine the type of IS support, and the meaning of IS use in these learning processes. Theoretical interpretation emerged while going through yet another series of hermeneutic circles – back and forth between empirical findings (i.e., informants' interpretations) and our own provisional theoretical interpretations.

ORGANISATIONAL LEARNING AND INFORMATION SYSTEMS IN SAVA

Members of Sava's management team were acutely aware that privatization and free market conditions necessitated a fundamental reorientation of the company's business strategy. Early on, during the first years of transition, the company's top management promoted a "goal to become a permanently learning company" as essential to achieving success (Interview with Company President, October 1997). Each annual report from 1996 through 2004 reveales progressive growth of a learning culture and provides many instances of organisational learning. Particularly revealing is the twofold attention on excellence and learning as illustrated by the following extract from Sava's 2001 Annual Report:

> "The culture of excellence and the culture of a learning company in Sava are being combined. In 2001 as well, the range of acquiring new knowledge increased and forms of education in various domains … aimed at instigating and directing change."

Sava's successful development as a learning organisation was supported and enabled by various information systems. Our interviews and company annual reports include numerous references to IS and IT, and their role in supporting organisational learning and coordinating work processes, as illustrated by the following quotes:

> "To the greatest possible extent we are seeking to exploit the advantages provided by advanced information technology in producing information, rationalizing business and introducing commercial activities. Considerable attention is therefore being devoted to the process of employing IT in all spheres. Its development is being supported by extensive investments, the most prominent being the SAP business information system." (Sava 2001 Annual Report)

> "[Ten years ago there was much] resistance to introducing electronic administration … people were used to communicating with their secretary who wrote things down. IT changed our work and our daily lives. We use Lotus Notes to effect organisational change and create operational change." (Interview, Research Director, 2003)

> "Manufacturing a high tech product [entails] many raw materials and it is difficult to keep track of everything … to manage all this information. It was difficult … everything was on paper. So we demanded information systems, we tried alternative systems but [finally] Sava settled on SAP which proved to be a good decision." (Interview, Factory Manager, 2003)

Management at all levels perceived IS as an integral component of business that was essential to supporting the company's goals and business strategy, and enabling organisational learning. In our study we specifically examined how Sava employed IS to support single loop, double loop, or triple loop learning and what was the nature of 'support' in each of these types of learning.

The use of **IS to support single loop learning** can be illustrated by Sava's use of SAP to introduce and implement product quality standards as part of its strategy to expand to global markets. Quality control was enforced by well defined quality standards (embedded in SAP) and assisted by a variety of training courses:

> "The training goal is to instruct managers and factory workers concerning the use of technology in work processes. Courses include identifying product quality problems visually and by x-ray, and categorizing product quality problems as arising from manufacturing processes, from working procedures, or from production tools and equipment. The teaching methods comprise lectures and demonstrations." (Sava Course Catalogue, 1997)

Quality control processes and standards as well as training courses exemplify single loop learning as they assist employees in their individual learning aimed at achieving product quality goals. These processes, standards and courses improve managers' and workers' understanding of the company goals and quality assurance strategies (without questioning or altering them) and also increase their competency in achieving them.

As part of Sava's strategy to achieve globally competitive quality products, SAP adoption specifically targeted single loop learning in production processes. Besides providing more accurate, timely and comprehensive information, SAP advanced quality assurance processes, making them more effective and efficient. For example, before each production run a production worker at Sava receives product specifications from SAP. The worker then checks whether the parameters of the item produced are within range and, in case they are not, the worker checks whether corrections can be made. If corrections prove to be impossible, the item is set aside for a supervisory inspection (Factory Manager, Interview, June 2003).

Double loop learning and the use of IS can be illustrated by a campaign "A thousand ideas for a better tomorrow" Sava's top management initiated in 1996 as a way of engaging all employees in generating new ideas and innovations in-house (Company President, Interview, October, 1997). One year into the program employees throughout the company contributed some 350 usable proposals, majority from production shop floor. When the campaign was introduced, it relied on IT in a very limited way. Individuals entrusted their innovative ideas to company-provided forms that were then forwarded to a central location, where they were entered into a computerized database. A committee consisting of the factory manager, a technical expert, and additional individuals when necessary, evaluated the proposals on their ability to contribute to the quality of the work place, simplify work, increase product quality, or reduce production cost. After four years, this successful campaign transformed into a systematic practice of work groups to stimulate and progress innovative ideas and proposals for company improvements:

> "Two years ago we started with sixty-one work groups that meet weekly for sixty minutes to discuss proposals for improving work. Proposals are [still] in paper form. It is [desirable] to enter proposals directly into a computer database and we are looking for software packages to process [proposals] electronically." (Director of Research and Development, Interview, June 2003)

Company management collaborated with the working groups on a regular basis. Through regular meetings they systematically examined performance and achievement of goals, and discussed and defined future developments and goals. The emphasis was on sharing knowledge both horizontally among the working groups and vertically between the working groups and management. Such knowledge sharing was supported by different IT applications – "information boards" for information dissemination, an IS that maintained employees' proposals, as well as records of discussions, evaluation and implementation of proposals. These IS and IT applications were expected to be replaced by a "knowledge management database" which in 2003 was at the very early stage of development (IT Manager, 2003 interview).

Another process named Sava Dialogue involved annual "systematically run interviews between executives and each employee" (Sava 2002 Annual Report). Sava Dialogue was seen as a management tool complementing work group processes:

> "The principal aim of *Sava Dialogue* is to provide coordination of corporate goals (business plans) and daily activities of individuals (goals, activities and personal development). This helps individuals to more easily understand the long-term goals of the Company …" (Sava 2002 Annual Report)

Through Sava Dialogue employees assessed (by self and peer-evaluation) their competencies and skills vis-à-vis the goals and tasks to achieve them, within the broader context of company strategic goals. This in turn was the basis for preparing personal development plans. In such a way employees were engaged in a learning process which helped them change their views of the business and of the business environment and also reframe their roles and tasks in line with their deeper insight into the company's changing vision and strategic goals. The work groups extended the "A thousand ideas for a better tomorrow" campaign when they shared in the process of analysing and reframing problems, leading to changing mental maps and setting new corporate goals. These were double loop learning processes simultaneously operating at the group and the organisation level. In this example we saw Sava management actively searching for and building IS and other IT applications to support these specific learning processes.

To understand Sava's **triple loop learning and the use of IS** we need to understand its history and especially self-management practices in the former Yugoslavia[1]. While single loop and double loop learning processes are shown to be essential for Sava's transition to a market economy, they initially operated within a mental model reflecting Yugoslavia's brand of socialism. However, Sava's privatization changed ownership from employees to shareholders. As a result the Board of Management made major business decisions instead of the Workers Council in the socialist system. Privatizing required abandoning the socialist self-management mental model in favour of an altogether different capitalist mental model (Bogdan and Andreja, 1992). A transition of this kind required triple loop learning (see Figure 1).

The President's position in the 1996 Annual Report, while indicating clear market orientation, reflects some ambiguity in terms of the underlying mental model:

> "It is because of [our] customers that Sava is oriented towards the development, manufacture and marketing of high quality products, which in turn, calls upon us to instil, encourage and motivate knowledge, creativity and productivity in all our employees. In turn, because of the customers, our shareholders can expect good business results. Customer satisfaction is the only guarantee of a yield on the company's investment and job security for its employees." (Sava 1996 Annual Report)

The President is addressing profit expectations of the shareholders but he is also concerned with employee job security. The new company structure and roles of top management, especially in terms of their responsibilities to the shareholders, gradually led to a new mindset more attuned to the contemporary socio-economic conditions in Slovenia and the company's new identity.

Evidence of a new mindset appeared in 1996, when the "A thousand ideas for a better tomorrow" campaign was introduced. As top managers were concerned with Sava's ability to radically transform its products and processes, they became aware of the limitation of organisational innovation and learning processes. They felt the need to change the approach to company learning. So they introduced a new structure for generating and sharing innovative ideas and for arriving at new collective mental maps. This new structure was supported by a particular IS: as ideas and proposals for innovation were uploaded into the system they could be accessed and assessed by all other employees; they were also processed and evaluated by work groups. This organisational structure relied on the participation of all employees and therefore had a potential to change collective mindfulness.

Throughout the period of transition while triple loop learning was under way, members of top management became increasingly aware of IS contribution to developing and supporting the market-oriented mental model.

Furthermore, a subsequent annual report cited important reasons for upgrading IT hardware and software:

> "We tackled the complete innovation of the information system based on SAP software. [Thus] new solutions from January 2002 are ensuring quality supervision of a considerable number of business operations." (Sava 2001 Annual Report)

Further analysis of interview data demonstrates that IS and other IT applications were successfully implemented throughout Sava during the period from 1995 to 2002. These applications were implemented in response to information processing needs that arose from ever increasing demands for organisational learning. In short, the increasing complexity of organisational learning processes was the driver for implementing IS.

---

[1] The former Yugoslavia was the first socialist country to reform its economic system and introduce some forms of a market economy, workers' ownership of companies and the so-called self-management system in 1965 (Roland, 2000). Workers rights in participating in decision-making were guaranteed by the Yugoslav Constitution, and the self-management system was regulated by law. Workers participated in various forms of decision-making, such as electing members of the Workers Council. While a company executive played typical management roles – being responsible for operations and management of functional areas (e.g. production, finance, marketing or personnel) as well as for the company as a whole – it was the Workers Council who made strategic, investment and other key decisions.

DISCUSSION

In its transition to a private company operating in global market conditions Sava demonstrated considerable capacity for re-conceiving not only its environment but also its own identity. Our study reveals an exemplary case of radical organisational change enacted through organisational learning variously supported by IS. Importantly, specific processes of organisational learning – underpinning radical change – involved innovations of communicative practices and informating processes through IS applications. Most of the top managers we interviewed believe that organisational learning enabled by IS was the key to the company's successful transition.

The importance accorded to IT and IS increased significantly during the 1997 to 2004 period. To illustrate, in 1997 Sava used IT to enhance corporate communication using email. In 2002, however, the company's IT centre had implemented Lotus Notes that enabled interpersonal communication, online discussion, and conducting meetings. Lotus Notes enabled information sharing up and down the corporate hierarchy as well as horizontally within and among individuals and working groups. Next, in 2000 Sava purchased and implemented the SAP software package: first modules for managing production operations, quality control, and production machinery maintenance, and then modules for managing purchasing, sales, marketing, and logistics operations. A key research question in our study is, how did IS enable and support specific types of organisational learning processes, and what is the nature of support for each type?

Table 1 summarizes examples of IS-enabled learning classified according to a) the type of learning: single loop, double loop, or triple loop; and b) the level at which learning takes place: individual, group/department, or organisation. This is an extension of Snell and Chak's (1998) framework. While any learning is essentially individual learning, we distinguish among different levels based on the focus of a learning process (where learning is manifested and implications felt):

- Organisation-level learning is manifested as a change in organisational knowledge and competency base and has organisation-wide implications;
- Group/department-level learning is relevant to the organisation but is manifested in the change of group/department understanding and actions; the focus of learning is limited to a group/department, and consequences of learning or lack of learning are primarily felt at that level;
- Individual-level learning is relevant to an organisation but is enacted by an individual action, with consequences immediately felt by an individual.

Learning at each level can take the form of single loop, double loop and triple loop learning, as presented in Table 1. From our analysis of empirical data, summarized in Table 1, we can see a wide range of learning processes, each with distinctive management problems, information needs, IS support, and determinants of success.

For instance, Sava's implementation of SAP for production management helped production workers to check the quality of parts, machine operations and products and take corrective actions. Here first loop learning leads to individuals' adaptive actions for quality standards. The goal is predefined and mediated by SAP. Individual learning involves mastering the use of SAP. The success of such learning depends on the IS (SAP) – its comprehensiveness, friendliness, adaptability, timeliness, accuracy, etc.

An example of double loop learning at group and organisational levels occurred when Sava implemented the "A thousand ideas for a better future" campaign. The focus of learning was on work groups across the organisation, including management (Table 1). Group learning and inter-group learning required an open dialogue, non-defensive reasoning, free and open inquiry, and effective communication tools. Learning involved questioning assumptions and beliefs, reframing problems, and developing a new shared understanding and new mental maps within groups, among groups, and between groups and management. Sava's approach reflects Brown and Duguid's (1991) view that knowledge and innovative capacity are distributed throughout all communities that make up an organisation:

> "For it is the organisation's communities, at all levels, who are in contact with the environment and involved in interpretive sense making, congruence finding, and adapting. It is from any site of such interactions that new insights can be coproduced" (p. 52).

Sava's management realized that the success of double loop learning depends on opportunities for social interaction (61 work groups met weekly), capacity for inter-subjective sense-making and shared understanding, and negotiation skills as well as organisational culture. While SAP provided useful reports, double loop learning also required highly specific IS support that was emergent and situated in local conditions. This is why Sava's management actively searched for adequate IS. The nature of double loop learning is such that IS support

("Information Boards" and IS that supported collaboration and processing of proposals) increases effectiveness of these processes, but does not alter them substantially.

Sava's top management did not assume that there is a "right" answer or a universal approach to be discovered for its transformation. Rather, they drew from the company's experiences and relied on their employees as key resources in exploring innovative ways for learning, asking new questions, developing new ideas and becoming a new organisation. Through triple loop learning top management opened new channels for stakeholders' participation so that different questions can be asked, different perspectives explored and different sorts of explanations offered (Snell and Chak, 1998).

The introduction of the "A thousand ideas for a better tomorrow" campaign and its subsequent extension with work groups established a new structure for organisational learning. The new structure facilitated changing the organisation's values, beliefs and rewards, and arriving at new collective mental maps and goals. Interestingly the success of this campaign (hundreds of ideas generated each year and a high employee participation rate) has been largely attributed to Sava's past experiences with self-management. In hindsight it may sound paradoxical that with triple loop learning Sava's top management relied on socialist experiences when they initiated the change of the collective mindset from a socialist to a capitalist one. However, a more subtle analysis reveals that it may not have been all that paradoxical.

Sava's top management approach to a learning company was consistent with Pedler's et al. (1991) definition of a learning company as one "which facilitates learning of all its members and continuously transforms itself" (p. 2). Most characteristics of a learning company – the learning approach to strategy, participative policy-making, informating, enabling organisation structures, self-development opportunities for all, etc. – were present at Sava to a large degree. Company experience with workplace democracy and self-management from the socialist period provided a fruitful soil for implementing organisational learning. Before the dissolution of the former Yugoslavia, workers in Slovenian factories engaged in participative decision-making concerning business strategy, organisational structure, production plans, and other issues. Corporate programs were undertaken to educate employees and enable them to respond effectively. While transforming itself Sava drew from its past and, in Truex et al's (1999) words, "used its own identity as the primary point of reference when it reconstructs itself" (p. 118). In such a process

> "the socially constructed realities of an organisation form the basis for the next version of the organisation. As an organisation adjusts and changes it does so with reference to its former self in a more or less constant mode of self-reproduction. That is, in continuously reproducing itself the organisation must do so with constant reference to itself, its past practices, its values, decisions, contracts, and commitments." (Truex et al., 1999, p. 118)

But self-reproduction and reconstruction as part of organisational learning leave nothing quite the same. For instance, the introduction and implementation of "A thousand ideas for a better tomorrow" processes clearly established the power of top management. They made a decision to involve employees. The practice of triple loop organisational learning in this case – while drawing from employees' past experiences – enforced the new power structure and the new capitalist mindset. Top management enacted organisational learning based on their prerogatives as representatives of investors' and shareholders' interests rather than employees' interests.

When participating in the "A thousand ideas for a better tomorrow" initiative and in double loop learning, employees risked being conned "into believing that they have more rather than less power" (Snell and Chak, 1998, p. 338; Coopey, 1995). While we were not able to establish this, we certainly witnessed top management obtaining control over resources, information, company policies and strategies, as well as learning structures and processes. Statements by Sava's President in an interview with a newspaper reporter confirmed that by 2003 top management operated according to this new mental model emphasizing the necessity for further radical changes with profitability increase as a major driver.

Such a radical change in mental models and company identity was possible due to top management's commitment to a learning organisation and their initiative in enacting and persistence in practicing triple loop and double loop learning. The change in mindset and mental maps happened at the top management level. But thanks to new learning structures, processes and IS, "grass-root" members engaged in double loop learning: they participated in inter-subjective sensemaking concerning the new environment and the new company vision (e.g. through workgroups' interaction with management) as opposed to a passive response to the initiatives of top management. It is important to emphasize that top management demonstrated sensitivity to issues of workplace democracy and workers' participation: they respected former (socialist) values while promoting new values and developing a new company identity and directions attuned to a radically changed environment and private ownership.

CONCLUSION

Broadly speaking Sava's case can be interpreted as a confirmation of Robey's et al. (2000) optimistic scenario that "information technology may increase the capacity of organisations to learn and [that], simultaneously, learning capacity may affect the degree to which new technologies are adopted and used effectively" (p. 147). As we have shown, the adoption and use of various IS and IT (such as SAP and Lotus Notes) did indeed increase Sava's capacity to learn; conversely, Sava's orientation to learning, integration of working and learning, and ongoing innovation of products and work processes created new needs for IS support and motivated the search for and adoption of new systems. However, the major contribution of this study is a deeper understanding of the intricacies of the relationship between organisational learning and IS support, including specific roles of IS.

By investigating organisational learning in the context of changing work processes and on-going transformation of organisational practices, we suggest that the role of IS varies depending on the nature of the learning. The range of relationships between organisational learning and IS in our case company are systematized in Table 1. In this Table we extended Snell and Chak's (1998) framework that combines, on one dimension, types of learning (single, double and triple loop learning) and, on another dimension, the level or focus of learning (individual, group/department, and organisation level learning). The use of this framework to analyse and systematize organisational learning and its relationship with IS at Sava illustrates how it may be useful in other cases and contexts.

In single loop learning, where learning processes are typically well structured, the role and tasks of IS can be defined in advance and often realized with off-the-shelf software products (e.g. ERP system, Lotus Notes, document management system). The use of such systems, however, becomes so embedded in work processes that they become an integral and indispensable part of the learning loop, so much so that the breakdown of the IS interrupts both working and learning. Sava's experience also shows that the success of single loop learning depends on workers' skills and there IS training.

Double loop learning is, as we have seen, less structured and a much more complex learning process. While we saw that double loop learning is also embedded in the working processes, the cycle of learning is much longer and more diffused than in single loop learning. Consequently we saw more variety in the roles and tasks that IS played. We saw the generic need for organisational members to be well informed, to communicate and share their assumptions, views and mental maps. Such needs can be fulfilled by traditional management and executive IS and enterprise systems (such as SAP) and electronic communication systems (emails, electronic discussion, electronic bulletin boards). In double loop learning the needs of actors may also be idiosyncratic, dependent on the nature of the business, organisational culture, the specific nature of the learning, and the expectations and skills of participants. This was the case with the "A thousand ideas for a better tomorrow" campaign, which required an IS to support submitting, managing, evaluating and implementing proposals for innovation and change. With both types of IS support for double loop learning – generic and specific – the role of the IS is a supporting one. IS may improve learning and make it more efficient and effective, as was the case at Sava. But the essence of learning remains in social practice – in the ways organisational members socially interact, cooperate, share and co-create knowledge, and engage in inter-subjective meaning-making. Based on our interpretation of empirical evidence from Sava we would agree with Jones (1995) that IS's contribution to learning "comes not from their retention of specific organisational descriptions" as the viewpoint of Argyris and Schon (1978) suggests, but from their effect on the general ongoing process of interpretation through which individuals construct and reconstruct their interpersonal milieu (Walsham, 1993, p. 73).

The role of IS in triple loop learning is even more complex and subtle. Visionary, risk-taking, responsible, and reflective leaders were required for successfully identifying obstacles to learning in the past, promoting the culture of learning, and inventing new structures, modes and strategies of learning. Evidence from Sava's successful transformation confirms what many authors emphasized: that company leaders play the key role in both double and triple loop learning (Coopey, 1995; Torbert, 1994; Snell and Chak, 1998). Sava leaders critically appraised old values, business assumptions and the company's (in)ability to deal with global markets and develop and promote new values, assumptions and a corporate vision (which in fact testifies to double loop learning). But more importantly, Sava's leaders opened new channels for collective knowledge sharing and co-creation, established new structures (e.g. workgroups) and implemented new IS for organisational learning (e.g., SAP, Lotus Notes). The link between triple loop leaning and IS in Sava can be seen from two perspectives:

- IS broadly support triple loop learning: Sava's top management is generally informed by various IS systems that contribute to their awareness and understanding of organisational problems and increase their sensitivity to specific learning issues;
- IS are envisaged as part of new channels and structures for organisational learning. For instance, when the "A thousand ideas for a better tomorrow" campaign was introduced it opened a new channel for

double loop learning that required a new IS to support it. When implemented the system also assisted top managers in comprehending the emergence of learning processes, in appreciating the nature of engagement and the extent of employees' participation. It also helped them understand the emergence and proliferation of new mental maps throughout the company.

Finally an unexpected implication of our study concerns the controversial issue of workplace democracy, participative policy-making and egalitarian power structure that is intrinsic to the notion of a learning organisation (Pedler et al., 1991; Coopey, 1995; Snell and Chak, 1998). Such a Utopian view is contrasted with "Foucaultian gloom" where only the powerful "learn and win" (Snell and Chak, 1998, pp. 338-339) while others are no more than instruments in their hands. First, we found that some form of workplace democracy, participative policy-making and egalitarian power structure that remained from Sava's socialist past was conducive to and provided a fertile soil for the development of a learning organisation. Second, we found that the development of organisational learning, and especially the practice of double and triple loop learning, established and strengthened top management's power position while relying on employees' participation. Therefore, Sava's case seems to support neither view - Utopian or Foucaultian. Rather, one might argue, Sava found its own way in balancing the contradicting demands of an IS supported learning organisation and profit maximization.

REFERENCES

Argyris C. and Schon D.A. (1978) *Organisational Learning*, Addison-Wesley, Reading, MA.

Barlett, F.C. (1932) *Remembering*, Cambridge University Press, Cambridge, UK.

Bogdan K. and Andreja C. (1992) Strike Action in a Self-Managed Enterprise: The Ravne Iron Works – A Case Study, *Employee Relations*, 14, 48-64.

Brown J. and Duguid P. (1991) Organisational Learning and Communities of Practice: Toward a Unified View of Working, Learning and Innovation, *Organisation Science*, 2, 40-57.

Chermack, T.J. (2003) Mental Models in Decision Making and Implications for Human Resource Development, *Advances in Developing Human Resources*, 5, 408-422.

Coopey, J. (1995) The Learning Organisation, Power, Politics and Ideology, *Management Learning*, 26,193-214.

Crossan M., Lane H. and White R. (1999) An Organisational Learning Framework: From Intuition to Institution, *Academy of Management Review*, 24, 522-537.

Denzin, N.K. (2002) "The Interpretive Process" in A.M. Huberman and M.B. Miles (eds.), *The Qualitative Researcher's Companion*, Sage Publications, Thousand Oaks, CA, 349-366.

Fiol C. and Lyles M. (1985) Organisation Learning, *Academy of Management Review*, 10, 803-813.

Hawkins, P. (1994) Organisational Learning: Taking Stock and Facing the Challenge, *Management Learning*, 25, 71-82.

Holmqvist, M. (2003) A Dynamic Model of Intra- and Interorganisational Learning. *Organisation Studies*, 24, 95-123.

Huber, G. (1991) Organisational Learning: The Contributing Processes and the Literatures, *Organisation Science*, 2, 88-115.

Huber, G. (1996) Organisational Learning: A Guide for Executives in Technology-Critical Organisations, *International Journal on Technology Management*, 11, 821-832.

Jones, M. (1995) Organisational Learning: Collective Mind or Cognitivist Metaphor? *Accounting, Management and Information Technologies*, 5, 61-77.

Kim, D. H. (1993) The Link Between Individual and Organisational Learning, *Sloan Management Review*, 35, 37-50.

Lave J. and Wenger E. (1991) *Situated Learning. Legitimate Peripheral Participation,* Cambridge University Press, Cambridge, MA.

Pedler M., Burgoyne J. and Boydell T. (1991) *The Learning Company, A Strategy for Sustainable Development*, McGraw-Hill, New York.

Pentland, B.T. (1995) Information Systems and Organisational Learning: The Social Epistemology of Organisational Knowledge Systems, *Accounting, Management and Information Technologies,* 5, 1-21.

Robey D., Boudreau M-C and Rose M.G. (2000) Information Technology and Organisational Learning: A Review and Assessment of Research, *Accounting, Management and Information Technologies*, 10, 125-155.

Sanderlands L.E., and Stablein R.E. (1987) "The Concept of Organisational Mind" in S. Bachrach and N. DiTomaso (eds.), *Research in the Sociology of Organisations*, 5, 135-162.

Schneider S.C. and Angelmar R. (1993) Cognition in Organisational Analysis: Who's Minding the Store? *Organisation Studies*, 14, 347-374.

Senge, P. (1990) *The Fifth Discipline: The Art and Practice of the Learning Organisation*, Doubleday, New York.

Senge, P. (1992) Mental Models, *Planning Review*, 20, 4-44.

Snell R. and Chak A. (1998) The Learning Organisation: Learning and Empowerment for Whom? *Journal of Management Learning*, 29, 337-364.

Spicer, D.P. (1998) Linking Mental Models and Cognitive Maps as an Aid to Organisational Learning, *Career Development International*, 3, 125-132.

Stata, R. (1989) Organisational Learning - The Key to Management Innovation, *Sloan Management Review*, 30, 63-74.

Swan, J.A. (1995) Exploring Knowledge and Cognitions in Decisions about Technological Innovation: Mapping Managerial Cognitions, *Human Relations*, 48, 1241-1253.

Torbert, W.R. (1994) Managerial Learning, Organisational Learning: A Potentially Powerful Redundancy, *Management Learning*, 25, 57-70.

Truex D.P., Baskerville R. and Klein H.K. (1999) Growing Systems in Emergent Organisations, *Communications of the ACM,* 42, 117-123.

Walsham, G. (1993) *Interpreting Information Systems in Organisations,* John Wiley and Sons, Chichester.

Weick, K.E. (1979) *The Social Psychology of Organizing*, Addison-Wesley, Reading, MA.

Wijnhoven, F. (2001) Acquiring Organisational Learning Norms: A Contingency Approach for Understanding Deutero Learning, *Management Learning*, 32, 181-200.

Williamson A. and Iliopoulos C. (2001) The Learning Organisation Information System (LOIS): Looking for the Next Generation, *Information Systems Journal*, 11, 23-41.

COPYRIGHT

Appendix: Table 1. IS supported and enabled organisational learning (based on an extension of the Snell and Chak's, 1998, framework)

Levels of learning / Types of learning	**Individual learning**	**Group/department learning**	**Organisational level learning**
Single loop learning	Sava's goal: produce globally competitive, quality products. Quality insurance processes and practices, implemented via *SAP,* assisted production workers in checking both parts (in and out of machines) and the operations of machines according to pre-defined standards; in case of faulty parts or malfunctions *SAP* provides instructions for corrective action.	Sava's goal: develop globally competitive, quality products. *Computerized* document *system* changed information processing practices in the Research and Development Department; the system enables knowledge sharing and supports inter-subjective learning processes in the Department and thereby increases engineers' capacity to design, innovate and improve products.	Sava's goal: improve and apply a unique policy to customer relationships management By providing a *unique* source of customer information and effective support for addressing customer requests, *Lotus Notes* enables a unified policy in managing customers across the whole Company. Due to *Lotus Notes* the Company is improving its response to customers' requests and is building a knowledge and competency base, thus enabling consistent policy implementation and goal achievement without altering them.
Double loop learning	The purpose: advance employees' skills and competencies and change individual mental maps Through Sava Dialogue employees assess their competencies and skills vis-à-vis their goals and tasks within the broader context of Company strategic goals; this in turn is the basis for preparing personal development plans. In such a way employees are engaged in a learning process in which they change their views of business and also reframe their roles and tasks in line with deeper insights into the Company's changing vision and strategic goals.	The purpose: change the Company's knowledge and competency base by involving all employees in an ongoing process of rethinking and changing their products, processes and their environment. "A thousand ideas for a better tomorrow" campaign started in 1996 and by 2000 became a well established program that generates about 300 ideas per year; in 2001 this program involved sixty-one working groups discussing future developments and goals with management. Knowledge sharing and collaboration among the working groups and with management were supported by "Information Boards" and an IS for managing proposals, discussions and proposal implementation. "A thousand ideas for a better tomorrow" campaign and working groups involve double loop learning as they mobilize the organisation's workforce in the process of sharing understanding and reframing problems within working groups and between working groups and management, leading to changing organisational mental maps and setting of new Company goals.	

Levels of learning / Types of learning	**Individual learning**	**Group/department learning**	**Organisational level learning**
Triple loop learning			The goal of top managers was to develop Sava's ability to radically transform itself (its products and processes); thus, they needed to eliminate obstacles to organizational learning and change the approach to company learning. The introduction of the "A thousand ideas for a better tomorrow" campaign and its establishment as a regular practice of work groups can be seen as a new structure and strategy for arriving at new collective mental maps. Empirical evidence indicates that the mental model from the period prior to Sava's privatization, which was informed by socialist ideals, was replaced by a free market oriented mental model informed by capitalist ideals. Inventing these new processes and structures for company learning was a case of triple loop learning that led to Sava's radical transformation; throughout the transition period, while triple loop learning was under way, IS often played a critical enabling role.