

Towards a Grounded Theory of Information Systems for the International Firm: Critical Variables and Causal Networks

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Abstract -International Information Systems, often of critical importance for the operations of the multinational enterprise, are poorly researched and there is a dearth of theoretical frameworks for analysing them. This paper summarises the evolution of an IIS as it follows its organisation's global business development. Using a Case History method in the Grounded Theory tradition the paper derives a number of key variables and develops their relationship in an effort to establish some theoretical foundations for such systems. The findings support the notion that international information systems should follow the global business strategy of the multi-national enterprise they support. Failure of the IIS to adapt to the organisation's strategy changes sets up a field of antagonistic forces, in which business resistance summarily defeated all attempts to install a standard global information system. The key variables from both the business and information technology domain interact in this force field in a cyclical manner. The notion of causal networks is used to depict the migration through these cycles

INTRODUCTION

Academic research into international information systems (IIS), i.e. information systems for use in multinational enterprises (MNEs), is sparse [10], [3] and little of even the current research is of direct help to systems building practitioners, who have come to regard IIS as difficult and risky [9]. Reference [11] shows that only 8% of some 80 European firms had completed IIS development satisfactorily. This paper, building on research reported earlier [14], investigates further the driving forces for the development of an IIS. Following a summary literature review and a brief discussion of the research method employed the main part of the paper is the description of the further analysis and findings from a case history. Finally, conclusions are drawn and an outline of the further research is presented.

LITERATURE REVIEW

As set out in more detail in literature reviews and position papers elsewhere ([8] covers the early research, [20] gives a very exhaustive overview, and [13] brings it more up-to-date), past research into international information systems is

sporadic and spread over a wide array of topics. Because of the availability of these position papers and also because grounded theory principles discourage the solidification of *a-priori* positions, only an illustrative summary of the literature is given in this paper. TABLE 1 on the next page sets this out - the shading reflects 'light', 'medium' or 'intensive' coverage of the issues. Only in the last few years have researchers begun to direct their attention onto the field of critical factors for the design and development of IIS.

RESEARCH METHODOLOGY

The dearth of IIS research makes qualitative, theory building methods an appropriate choice. Such methods are well established in organisational research and are becoming accepted in information systems research too ([2], [4], [5], [18], [22], [24]). In Sociology, Glaser & Strauss [6] and [7] had already developed a specific inductive method [25] which they termed the 'Grounded Theory' (GT) approach, where theory is left to 'emerge' from the data - in which it is 'grounded'. Turner [21] was one of the first to apply the GT approach to management studies. Orlikowski [17], [19] has pioneered GT in Information System (IS) Research. Yoong [23] and Atkinson [1] are recent studies. Grounded Theory principles applied to case analysis were chosen as the method employed in this research project. The following section gives a - highly abridged - description of the salient facts in mostly tabular format of the case history in question. Reference [14] provides a more detailed description of the case.

CASE HISTORY: AUSTRALASIAN FOOD PRODUCERS' CO-OP

Business background

The Australasian Food Producers' Co-op (later on also referred to as the 'Co-op') with some \$4.5bn¹ revenue is one of the largest marketing authorities for land-based industries in the world.

¹) All names within the enterprise have been changed. All figures are in US Dollars

TABLE 1. RESEARCH COVERAGE OF THE INTERNATIONAL INFORMATION SYSTEMS DOMAIN²:
Indications of LIGHT, MEDIUM OR INTENSIVE coverage of the topic in the literature

Layer	Technology	Applications	Implementation & Social Issues	Management Issues	Governmental Issues
Scope and objectives	MEDIUM		MEDIUM	MEDIUM	MEDIUM
Business processes model			MEDIUM		
Information systems (design) model				LIGHT	
Technology model	INTENSIVE	MEDIUM		LIGHT	INTENSIVE

Structured into 9 regional holding companies, it has a presence in 135 offices in 40 countries.

Prior to the mid-1970s Australasia exported the vast majority of its produce to the United Kingdom, who, under Commonwealth rules, used to accept it all.

Once the UK had joined the European Union, however, they had to give free access to all other EU members, and cut the Co-op's quota severely. Australasia had to develop new markets. A number of subsidiary offices was set up rapidly and agencies were nominated in the US and Canada. This policy of local autonomy was successful. Within a decade the Co-op had built a presence in more than thirty countries and had managed, throughout, to secure a satisfactory return for the all their primary producers.

At the onset of the 90s, however, competition for the Cop-op had become increasingly global. With the emergence of global brands (such as Coca Cola, McDonalds, etc.); the Co-op needed to develop global brands themselves and had to have sufficient command (and control) to mount synchronised international marketing and logistics operations. With the arrival of a new Chief Executive Officer in 1992 the Co-op began a concerted campaign to shift authority and control back to head-office, within a vision of balanced central control and local flexibility. Part of this new policy was a critical look at the role of information systems throughout the Co-op's operations.

The IS Landscape in 1992

During the 'global' phase, the Co-op had built up a sizeable IS department with a mainframe operation at the head-office, linking up with all the main subsidiary offices and ProdCos throughout the country. Foreign activities were few and hardly needed computer support. The forced expansion drive

in the 80's, however, lead to an increased need by local operations to be supported with information systems. By 1992 a number of regional offices had bought computers and software to suit their own, individual requirements. *IBM (3090, S/36 and AS/400), Digital, Data General, Hewlett-Packard, Sun* were the main hardware platforms, supporting regional networks between 80 terminals (Japan) and 500 (at HQ), multiple central machines (UK/Europe) and sophisticated regional networks (South America). Where there was no central mainframe/minicomputer, local-area PC networks had sprung up in more than a dozen countries around the globe.

The Global Information Systems Project

Against this background of a proliferation of uncoordinated local systems on the one hand and a declared policy of more control from the Co-op's centre on the other, the Co-op's IS Department, in April 1992 took the initiative to establish a global 'Framework for Information Systems', binding for all of the Co-op's 135 offices in 35 countries. Subsequently, late in 1992, the 'Food Information Systems Technology' (**FIST**) project was created by the IS Department to implement this 'Framework's' in three stages:

- Firstly, to develop a 'prototype' system with a representative site;
- Second, implementation of the prototype in a small number of 'pilot' sites; and finally,

Following successful completion of this, a synchronised 'roll-out' of the 'global system' into all the regions and offices would form the last stage. Estimated completion dates for the three stages were late 1993, early 1995 and mid 1996 respectively.

TABLE 2 below sets out an overview of the project.

²) After Lehmann (1997), from a framework suggested by Zachmann (1987)

TABLE 2.:
PROJECT TIMELINE: CO-OP'S FIST PROJECT

<i>Time</i>	<i>Project Activity</i>
Late-1992	North America Region (NAR) reviews its ageing IBM S/34. NA chosen as 'prototype' site. South East Asia Region (SEAR) needs to upgrade their fragmented PC-based installation to cope with rapid regional growth. Both sites chosen as pilot sites for FIST; FIST Budget (for full global implementation) is set at US\$ 35m
Early-1993	'Benchmark' (concept prototype) for NAR developed by the FIST team at the Co-op's HQ.
Mid-1993	'Benchmark' comparison between NAR and SEAR finds a 90-95% match. SEAR points out it is in different markets with different products; refuses to accept 'Benchmark' and opts out of the pilot.
Late-1993	FIST issues a global Request for Proposal (RFP) based on NAR 'Benchmark'. Selection of global technology to be completed by early-1994, full pilot implemented by mid-1994.
Early-1994	RFP's evaluated and global standard technology selected, based on ORACLE on an HP platform. Applications software to come from ORACLE and DATALOGIX (a small North America software house and ORACLE partner). No communications vendors or support organisations were selected; NAR pilot deadline extended to late-1994.
Late-1994	NAR pilot deadline extended to mid-1995; 'Benchmark' comparison extended to European Region (ER) finds another 90-95% match; ER rejects the finding, citing divergence in markets, products as well as large intra-regional diversity; ER refuses to accept FIST; ORACLE insists to support the NAR pilot from its Australasian office (not from its North America base).
Early 1995	FIST team enlist support of the Co-op's CEO, who issues a strong directive to all regions to accept FIST; FIST Project Costs at US\$ 5m
Mid 1995	ORACLE begin to negotiate with DATLOGIX to acquire their software; all modification work in FIST stops; NAR pilot deadline extended to early-1996;
Late 1995	Co-op opens new office in Dubai; NAR opts out of the pilot project and pursues interim solution before it will decide to implement FIST; FIST team select Dubai as the new representative pilot site for the global standard information system; FIST begin to develop a new 'global prototype' for Dubai at HQ (there are insufficient IS resources in Dubai); Dubai 'global prototype' deadline is early-1996;
Early 1996	Dubai pilot/prototype deadline is extended to late-1996;
Mid 1996	Co-op CEO commissions an international consulting firm to carry out a management audit of the FIST project.
Late 1996	Dubai pilot/prototype deadline is extended to early-1996; Consultants report to CEO: "FIST overly ambitious, unachievable within timeframe, benefits doubtful";
Early 1997	Dubai pilot/prototype is reduced in scope (Standard Financials only) and goes live; Management of FIST re-assigned; Scope of FIST changed to develop a global information systems plan; Total Project Cost of FIST: US\$ 8m.

FINDINGS AND INTERPRETATION OF THE CASE

The analysis of the case is based on interviews with key management and staff of the Co-op in Australasia, North America and Europe. Furthermore, a selection of internal documents (memos, minutes and reports) was used to underpin and extend the information gathered in the interviews. Coding the interview transcripts (some 400 pages) and the supporting documentation (93 documents, combined of some 2500 pages) yielded an initial set of 133 basic, 'substantive' categories in the terminology of Glaser & Strauss [7]. These were then conceptualised, condensed and affiliated into 27 major categories. From those, 13 'core' categories were developed.

In terms of [7], theory is a process in which 'categories' – the key influence factors - act upon each other in the form of 'relations'. Categories are directly grounded in observed fact, whereas 'relations' are conceptualised by inference from the unfolding story in order to bring to it a temporal, correlational; or even causal order. The core categories found in the Co-op case fall into two domains, depending on whether the category stems from the business or information technology arena. In both domains the factors contributed to considerable dynamics in the interplay between categories. The following paragraphs set out a summary of the core categories and their relationships. For details see [14].

The business dynamics categories are the main influence over the Co-op's position vis-à-vis information technology and the international information system. The Nature of the Business, is the most fundamental category. Its structural uniqueness determines the essential characteristics of the **Global Business Strategy**. Similarly, the particulars of its evolution have caused this strategy to change in a distinct **Migration of Global Strategy**. All three of these factors combine to form a **Tradition of Autonomy** among the Co-op's local offices and regions. Although assisted by other

influences, this Tradition of Autonomy is the main shaper of an attitude of **Rejection of the Global Information System**, which in itself is then a major influence in the development of the FIST project. The other information technology related category is a **Lack of IT Experience** in information technology matters at the Co-op's headquarters. The political element of the Co-op's nature of business is a partial reason for this. In turn, the Co-op's naivety in information technology at the centre reinforces the Tradition of Local Autonomy, this time with respect to information systems.

Four 'conditioning' factors shape the character of the three 'effector' categories in the information technology group. The most fundamental conditioner is the category of **Conceptual Capability** to conceptualise and think through thorny issues. The lack (or low level) of it has had a dampening effect on the other conditioning categories, but most of all on **Analysis**, the repository of the (mostly erroneous) paradigms used in the system building activity. These were complemented by the (often low) quality of the **Information Systems Professional Skills** brought to bear and the evidence of a pronounced inadequacy to comprehend international issues, summarised in the **Domestic Mindset** category. In concert they affect most of all the standardised, centrist nature of the international system, brought together in the **Global Standard IS Design** category. This is the main interface with the business domain. The two other effectors are the fact that the whole project is an **IS Initiative** and the tendency to resort to political power-play, termed **IS by Force**.

Whilst most of the categories affect each other in a number of ways, the two dynamics domains seem to set up a force field (in the sense of [15]), as an arena for the interactions between the business and information technology interests. Figure 1 illustrates this. The force field is dominated by the interplay of four key categories: **Global Standard IS Design**

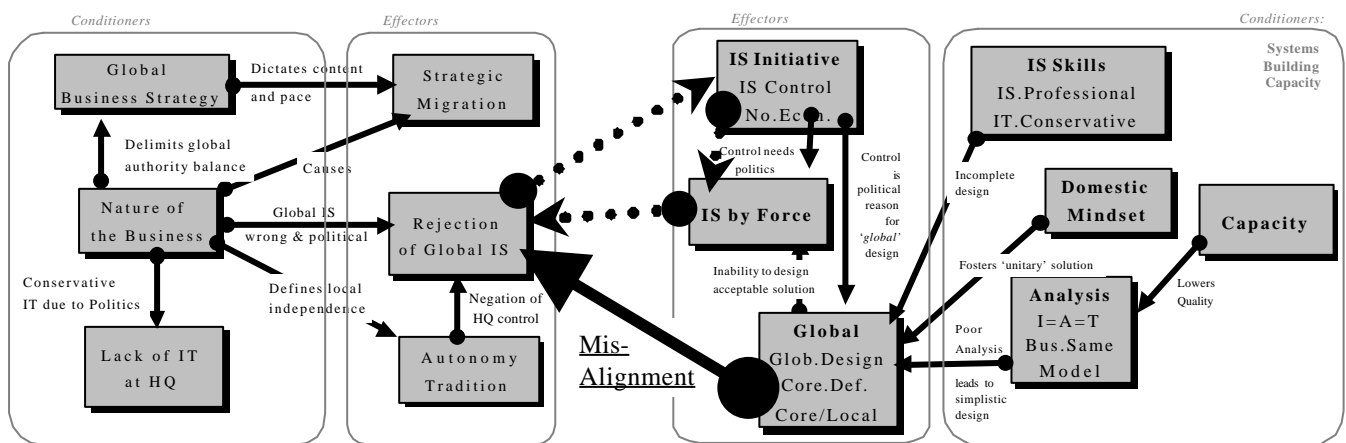


Figure 1. Force Field of Business and IT Dynamics: Interplay of main categories and relations

is a causal factor in the **Rejection of the Global System**, which in turn affects **IS Initiative** and **IS by Force**.

So far, categories have been viewed as static elements, as 'hidden' properties of the story. However, theory links categories together and shows the relationships between them. At this stage, the way in which categories influence each other in a cause-and-effect manner needs to be investigated.

Whilst most of the categories affect each other in a number of ways, the two dynamics domains seem to set up a force field (in the sense of Lewin, 1952), as an arena for the interactions between the business and information technology interests. The force field is dominated by the interplay of two key categories. The major interplay is between the **Global IS Design** category, which is a causal factor in the business **Rejection of the Global System**.

The interactions between the opposing sides of the force field were driven by the confrontational stance of business and IT across a range of issues characterised by antagonistic self-interest of both central and regional business entities versus the information technology faction. The forces acting in that field were of considerable magnitude and eventually engaged the opposing sides in a cycle of rejection and reaction which in the end proved strong enough to stop the information systems project altogether. Figure 2 depicts the essential dynamics of the force field.

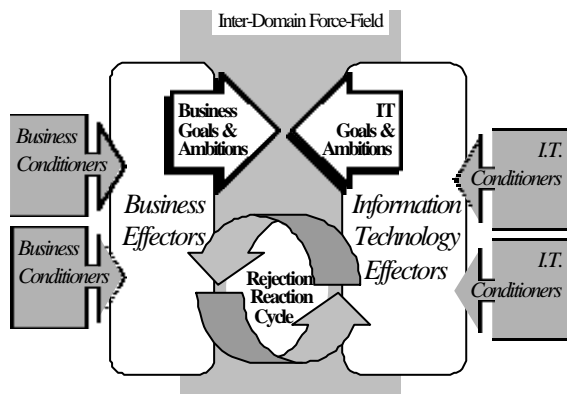


Figure 2. Force Field, demonstrating the clash between Information Technology and Business antagonists

The roots of the confrontation, the inappropriateness of the **Global IS Design**, however, has itself a deeper cause. The character of the system as an unbending standard design for all, without regard for differences in size, business culture, markets or strategies is an outcome of the Information Technology people's interpretation of the wishes of the CEO. They translated the thrust for increased global co-ordination

(to achieve a 'transnational' **Global Business Strategy** for the Co-op) as a return to full central control, as befitting the 'global' stance the Co-op had taken in the beginning. The regional business people saw this as an attempt to roll back their autonomy – and predictably acted against this notion. In doing so, and because they suspected the CEO (as the 'head' of the central forces) as covertly backing this regressive move, they included resistance against the 'transnational' thrust together with the **Rejection of the Global Information System**. Depicted as vectors, the

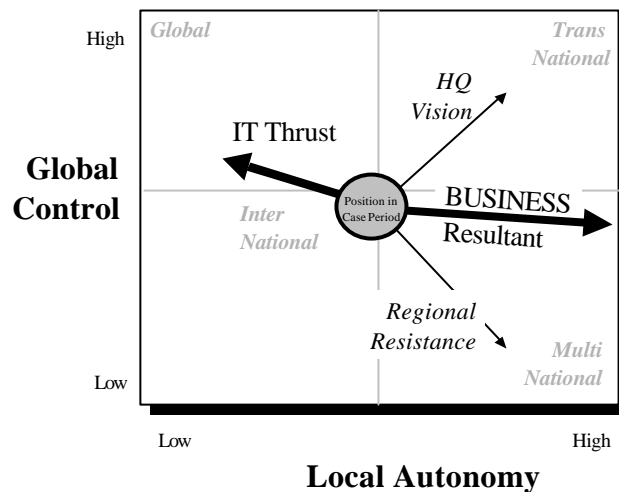


Figure 3. Vectors of Strategic Thrust in the Co-op

respective strategic thrusts of the actors are shown in Figure 3.

Regional management puts in a show of resistance against the – suspected – increase in central control and makes its own case of increased regional and local independence from head office. The central strategic vision, however, is pointed towards more regional autonomy – albeit balanced by an equal amount of central control over global concerns (e.g. branding, global product strategies, etc). The Information Technology people misunderstand both and push strongly for a policy of control, exerted by standard information systems, implemented on standard technology platforms and following standardised routine. In the end, the Information Technology strategic thrust is nearly diametrically opposed to the – resultant – direction of where the business wants to go. The resulting extreme misalignment between business and information technology strategies is the main factor in establishing the force field and the major determinant of the strength of the adversarial interactions between the antagonists. Furthermore, the interactions in the force field were to take on a cyclical character. The initial refusal of the business to accept or implement the global system in turn lead to an intensification of the **IS**

Initiative category. This was especially the case after the initial attempts to incorporate business objections into the **Global IS Design** had floundered (for reasons of deficient ‘Systems Building Capacity’, which is the collective term for the ‘conditioner’ categories in the Information Technology domain).

The other reaction to the business side’s lack of co-operation was to attempt to introduce the **IS** by **Force**, using political power play to achieve user acceptance and facilitate implementation of the global system.

The three categories, namely **Rejection of the Global System**, **IS Initiative** and **IS by Force** subsequently get locked in a cause-effect loop (as defined by Miles & Huberman, 1994):

- Rejection in turn intensified the isolation of the IS people (expressed in the IS Initiative category) and lead them to try and
- implement the IS by Force, attempting to achieve by political means what they could not do by consensus and rational co-operation with the business people.
- These political power plays were met with increased Rejection of the Global Information System, which then started the cycle of rejection/isolation/politics all over again.

The triangular interaction between the categories takes the form of a set of cyclical moves (shown in Figure 4). The case history shows a number of iterations through this circle.

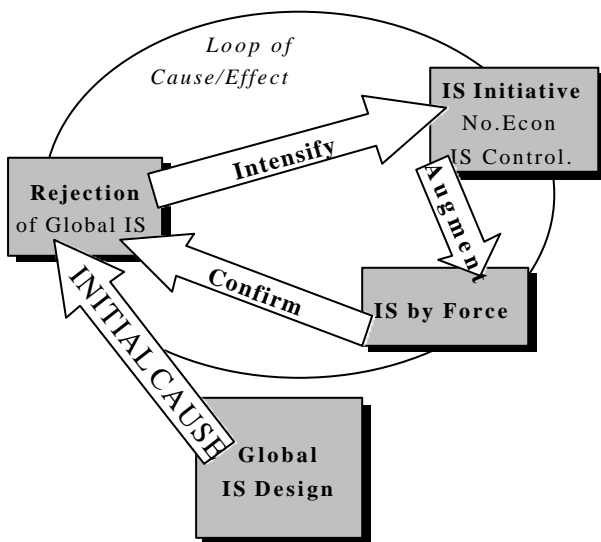


Figure 4. Cause and Effect loop: Rejection of the International Information System – Reaction by the Information Technology function

CONCLUSION AND FUTURE RESEARCH

The Co-op’s case yielded a rich set of categories and relations, of a relevant and detailed nature so as to encourage the beginnings of the formulation of a substantive theory of the factors that affect and the shape and the process of building an international information systems. This vindicates the use of cases and the grounded theory method as a vehicle to elicit insights into this complex field.

The case of the Co-op’s attempt to generate an international information system indicates the importance of strategy alignment between the multi-national firm and its information technology function in terms of the Global Business Strategy followed by the enterprise. The case further showed that the requirements for professionalism and in-depth understanding of international issues are essential for even starting an international information systems project. Absence of any of these ingredients seems conducive to establishing an environment for political interaction in a ‘force field’, which is unproductive and does not further the implementation and acceptance of the international information systems. Engaging in political battles, especially, detracts from the objectives of the exercise and ultimately results in the demise of the project altogether.

In order to start formulating a more detailed – and verifiable – theory, however, a number of the categories need more detail before they are ‘saturated’ in terms of the grounded theory methodology. ‘Theoretical sampling’ for similar or contrasting cases needs now to occur to make this possible.

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