Organisation design in operations management

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Abstract *The organisational design of production systems is thought to be one of the key determinants of their performance. Therefore, in order to enable them to contribute effectively to the successful creation of products and services, OM practitioners need up-to-date, comprehensive and sufficiently detailed organisation design theory. However, 27 case studies aimed at identifying and explaining design performance relationships produced results that could not be explained using organisation theory (OT), while operations management (OM) theory did not provide much help either. OM, because the discipline lacks good organisation design theory. OT, because of some severe limitations, which are mostly due to the paradigmatic directions this discipline has taken. Consequently, OM has to take up the gauntlet itself. An agenda for OM-driven organisation research is proposed, which builds on the strengths of OT, takes away its major weaknesses, and is believed to contribute to the development of actionable organisation design theory.*

Introduction

This article evolved from two studies of the relationships between the design and performance of production systems. The first study, reported by Draaijer (1993) and Draaijer and Boer (1995), involved 19 case studies, while the second study was reported by Ruffini (1999) and involved eight case studies. However well-developed both studies were, in terms of conceptualisation and operationalisation, methodology and analysis, they failed to produce satisfactory results. The hypothesis underlying both studies was that there is a one-to-one relationship between internal and external fit, and success. This hypothesis is widely accepted, albeit sometimes implicitly, in theories of organisation (e.g. Mintzberg, 1979), operations management (e.g. Hill, 1991) and manufacturing strategy (e.g. Hayes and Wheelwright, 1984) alike. However, both studies essentially failed to confirm this hypothesis. As Draaijer and Boer (1995, p.12) put it: "... companies that have organized their production systems very differently are still able to meet similar market demands, whereas companies that have similar production systems are capable of meeting very different sets of market demands".

Both studies, although they pertained to the organisational design of production systems, had to rely on organisation theory (OT) for their operationalisation, simply because operations management (OM) lacks good theory on organisational design. Apparently, OT does not help much either. Yet, the research question was and is relevant to OM practitioners (the organisational design of a production system is thought to be a key

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determinant of the system's performance) and to OM scholars (no theory currently available, and OT appears to provide little help to fill the gap).

The conclusion the authors had to draw from this is that there is an urgent need for OM to develop good theory itself. Given the applied nature of the discipline, such a theory should be actionable, that is, useful for and usable by OM practitioners, and of the middle range, that is, comprehensive and sufficiently detailed at the same time. The objective of this article, therefore, is to propose an agenda for OM-driven research, which is believed to contribute to the development of such an organisation design theory.

The article is structured as follows. First, a review of the achievements of OM will show that OM practitioners need, while OM scholars have failed to develop, good theory on the organisational design of successful production systems. Next, three of the eight case studies performed by Ruffini (1999) are presented together with some of their background. The analysis of these cases confirms that the consistency hypothesis underlying the study does not appear to hold. Subsequently, an attempt is made to explain the findings using two dominant but competing OT paradigms. As this attempt fails, for several reasons outlined in the article, the authors could not but conclude that (again) OM has no good theory of organisational design, while OT appears to be of little help either. Consequently, OM needs to develop its own theory of organisational design, and an agenda for research towards this objective is proposed. Subsequently, the implications that agenda would have had for the design of case studies such as the ones performed by Draaijer and Ruffini are given. The article concludes with some remarks on the complex but, at the same time, challenging nature of the research agenda proposed.

Organisation design in operations management theory

The nature of operations management

Production organisations have always had to deal with many different changes in, or coming from, their environment. Examples illustrating this for the past couple of decades include:

- new methods for and approaches to product design (e.g. design for assembly, component standardisation, end item diversification);
- ever-tougher market demands (e.g. quality, speed, diversity);
- the development of new technologies (e.g. new manufacturing and assembly techniques, factory automation, information and communication technology, CAD/CAM, ERP);
- new forms of organisation (e.g. matrix organisation, teamwork, networks).

Playing a central role in the successful creation of products and services (Slack *et al.*, 1995), operations management (OM) can be characterised as the function responsible for (Skinner, 1985; Hill, 1985; Paashuis and Boer, 1997; Boer and Krabbendam, 1999):

- making and implementing decisions about the design of a company's operational, operations management and maintenance processes, the

technologies (incorporated in people and resources) needed to perform these processes, and the organisational arrangements (structure and culture) dividing and co-ordinating the processes[1];

- ensuring that these decisions align properly (internal consistency) and that they are examined in the light of their contribution to the manufacturing tasks, i.e. providing the capacities and capabilities that are needed for the company to qualify for, and to win orders in, the market place (external consistency);
- managing this, what ought to be an, ongoing process of: planning and designing, implementing, monitoring, learning, (re-)planning and (re-)designing, etc.

Achievements of OM research

The OM research community has played a key role in the development of concepts, tools and techniques supporting OM practitioners (operations managers, but also other employees at various levels in organisations involved in the design and change of operational systems) to perform their critical function effectively. Indeed, take any random sample of OM textbooks, and it will appear that they present a wide range of supportive concepts, tools, and techniques related to:

- the design of products/services and processes, with some reference to organisation design, and a description of methods for, e.g. work, time and motion study;
- process planning and control, including capacity planning, inventory control, scheduling, quality and maintenance, concepts related to these areas (e.g. MRP, JIT, TQM), as well as their underlying methods and techniques (e.g. BoM, kanban, SPC);
- performance control, with reference to some key performance indicators;
- operations strategy.

The lack of organisation design theory in OM theory

If there is some truth in the conclusion of Swamidass (1991, p.798), that "OM research lags practice, and ... practitioners do not seem to use research findings because [they] consider most OM research to be irrelevant, incomplete, narrow, trivial, and unrealistic", this certainly holds for the position of organisation design in OM.

Relative to the research effort put into the role of, and links between, (operations) strategy, markets (customer demands), products, processes and technology, the role of organisation design as one of the determinants of the effectiveness of operations is seriously underexposed. Although OM scholars have contributed to the development of organisation theory, for example in the form of group technology as an enabler of autonomous teams, these contributions are scarce, and very partial.

Also, in terms of the teaching material currently available, each of the many OM textbooks that we have checked does present a couple of sections or

perhaps even a chapter on the subject, but these texts are usually rather weak, that is, outdated and shallow. Most textbooks go hardly further than a superficial presentation, basically, of Woodward's (1965) early contribution to contingency theory. It would seem to us that a lot has happened since in the theory and practice of organisation design.

In other words, the OM research community has denied or, at best, neglected the problematic nature of organisation. Could it be that, paraphrasing Galbraith (1958), OM scholars assume that the problem of organisation has been solved? If that is the case, and we are inclined to think so, it is about time for the discipline to take the OM practitioners' entirely different experiences and needs more seriously. Organisation, more so than process design or technology, tends to be their main worry. Paraphrasing Skinner (1969), they could say that organisation is the missing link in operations management theory.

Field research into the organisation of production systems

In an attempt to contribute to filling this gap, a range of studies was developed in which two of the authors participated as principle researcher of one of the studies, and supervisor of the whole range respectively. The studies were aimed at finding relationships between the organisational design and the performance of production systems. Two of those studies had been completed by the time the present article was written and they provide the backbone of the article. The first study was reported by Draaijer (1993) and, later, Draaijer and Boer (1995) and involved 19 case studies. A more recent study, reported by Ruffini (1999), involved eight case studies.

In both studies, the relationships between the design and the performance of the production systems of the case study companies were described and analysed using the process-based contingency model of organisations (see, e.g. Boer and Krabbendam, 1993, 1999). This model regards organisations as systems of people who, possibly using (physical) resources, perform various processes. Primary processes transform informational and/or material inputs into products and/or services. The outputs of strategic and adaptive management processes are planning and design decisions on future product-market-technology-organisation combination(s) (see Boer and During, 2000). Maintenance processes actually implement those decisions and keep the resulting system "up-to-date". Operations management activities monitor and control the day-to-day functioning of the system. In order that the different processes can be performed, various technologies are needed, which are incorporated in people ("humanware") and resources (software, hardware). Finally, organisational arrangements divide and co-ordinate (the constituent activities of) the various processes. Note that in terms of this model, the term organisational design is used to denote the configuration of processes, people, resources and organisational arrangements. The underlying hypothesis of the model is that internal fit (of the system) and external fit (between the system and its environment) determine the effectiveness of the system's performance.

The objective of the case studies was to put flesh on the bones of this hypothesis, by trying to find successful configurations (Draaijer, 1993), and to

identify which structural characteristics (elements and/or relationships) exercise a dominant influence on the performance of the system (Ruffini, 1999). In both studies, the process-based contingency model of organisation was used. A wide range of contingency theories of organisation was used to operationalise the system and its environment; operations strategy theories were used to operationalise the performance of the system. The methodology in both studies was interviews based on half-open questionnaires, with various different employees, in particular middle and higher management, who were expected to be sufficiently knowledgeable about the design, functioning and performance of the focal system.

The next section will present three of Ruffini's cases, which are representative of the whole sample, to illustrate the argument developed in the present article. For further details on the background of the research and extensive descriptions of all the 19 and eight cases we refer to Draaijer (1993) and Ruffini (1999) respectively.

Three case studies of the relationships between the design and performance of production systems

This section describes the product, the market (customer demands, sales), and the design (layout, process choice, planning/scheduling characteristics) and performance of the production system of three industrial companies. Subsequently, these data and, more particularly, the relationships between them, will be interpreted, to suggest, unfortunately, that the consistency hypothesis cannot be confirmed. This, then, provides the basis for the argument in the rest of the article.

Case study descriptions

Company A

- *Products*. Top end of the middle-market segment. Cooking plates, consisting of ± 50 parts; complete cookers consisting of ± 160 parts. The complexity of the components is mostly low.
- *Customer demands*. The qualifiers for the company are: delivery reliability; delivery time; product quality; and service program. Order winners are: price level; recognisable design; fast in copying new trends; and high level of functional variety.
- *Production layout and characteristics* (see Figure 1).

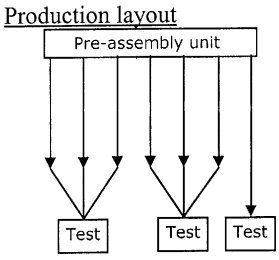

Figure 1.
Production layout and characteristics of Company A

- *Sales*. 50,000 to 100,000 units a year; some small seasonal fluctuations.
- *Performance*. Delivery reliability is usually around 98 per cent, but tends to drop when a large number of new products are introduced. Component stock level is high due to long supply lead times and large quantities that have to be ordered to receive discounts. Delivery times are short (delivery from stock).

Company B

- *Products*. Cookers, cooking plates and ovens for the up-market segment. A lot of variants per product group. Product and component complexity are similar to company A.
- *Customer demands*. The qualifiers are: short delivery time; delivery reliability; quality; and after sales service. Order winners: design; large variety, especially in colour combinations; innovativeness of products; and company image.
- *Sales*. 150,000 to 200,000 units a year; seasonal fluctuations: $\pm$ 10-20 per cent.
- *Production layout and characteristics* (see Figure 1)

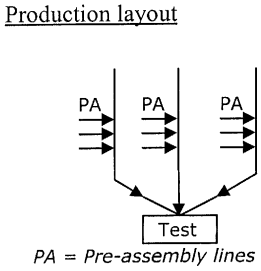

Figure 2.
Production layout and characteristics for Company B

- *Performance*. Of all orders, 10 per cent are rush orders and have to be made in less than a day. The system is so flexible that this is achieved without any extra effort. Production lead-time is several hours only. Changeover times between different products are zero. There is no end item stock, but component stock level is $\pm$ 7 weeks, due to the large number of variants offered. Delivery reliability is between 95 and 100 per cent.

Company C

- *Products*. Central heating boilers for the up-market segment. About 30-40 variants for the home market; more variants for the export market. A boiler has 150-170 components. The component complexity is low to moderate. Parts commonality is about 70 per cent.
- *Customer demands*. The qualifiers are: delivery time; delivery reliability; functional variety; and product quality. Order winners are the company's: marketing policy; innovative products; and corporate image.

- *Sales.* 25,000 to 40,000 units a year. Clear seasonal pattern, but weather-dependent and, thus, unpredictable demand fluctuations.
- *Production layout and characteristics*(see Figure 3).

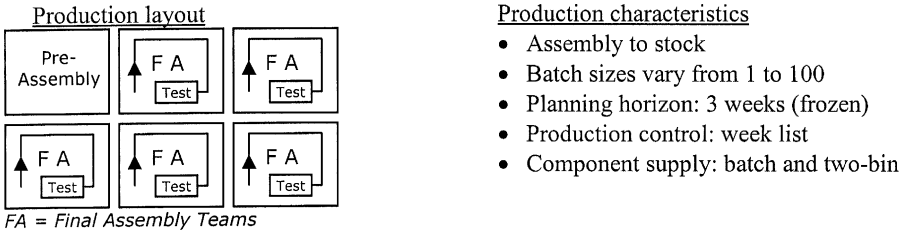

Figure 3.
Production layout and characteristics for Company C

- *Performance.* Delivery time is less than 24 hours. Delivery reliability is 95-100 per cent. Significant differences between final assembly teams in terms of output (up to 30 per cent) and flexibility. Stock levels for end items are four to six weeks. In low season stock is built for high season. Stock levels of components are high, due to low buying power, leading to large order quantities.

Case study analysis

The analysis of the cases summarised in Table I shows that there are quite a few similarities between the case companies.

Similarities. All three companies score high in terms of the external indicators delivery time, delivery reliability and product variety. All of them are labour-intensive assembly plants. Test facilities are the only expensive equipment. In all cases the manufacturing of parts has been outsourced. In all three cases, customers, management and employees alike are satisfied with the design, functioning, performance of, and products produced by, the production system.

Differences. There are also some significant differences, namely in terms of process choice (customer order de-coupling point – CODP), the links between pre-assembly and final assembly, and stock points. These differences are reflected in the internal performance of the respective companies, such as stock levels, work-in-progress (WIP), flexibility and efficiency. Company B, for example, has optimised for time, and accepted slack in terms of efficiency and variety. Companies A and C have optimised for efficiency, at the expense of throughput time and end item stock.

Discussion and conclusion. The case studies suggest that rather different production systems may yield very similar types and levels of performance. This is in line with the conclusion drawn by Draaijer (1993) and Draaijer and Boer (1995) who, in addition, found similar production systems to produce very different performances. Consequently, the consistency hypothesis underlying the research does not seem to hold.

	Company A	Company B	Company C
Market performance			
Delivery time	++	++	++
Delivery reliability	++	++	++
Variety[a]	+	++	+
Design choices			
CODP	Assembly to stock separate, both centrally controlled	Assembly to order integrated	Assembly to stock separate: pre-assembly controls final assembly
Pre-assembly and final assembly			
Control parameter	Efficiency	Time	Efficiency and flexibility
Slack in	Time	Efficiency and variety	Time
Internal performance			
Parts stock	High	High	High
WIP (days)	5	< 1	5
End item stock	High	None	High
Flexibility[b]	+	++	0/+
Efficiency[c]	+	0	+/0

Notes: [a] *Variety*. Company B actually sells less than it offers and can produce with its current production system

[b] *Flexibility*. At this moment company B is much more flexible than is required by the mix they sell

[c] *Efficiency*. In company C, efficiency varies per team. The lower efficiency of company B can be explained by the fact that their design is optimised for flexibility; their higher margins allow them to accept extra component stock and handling. Due to a very keen product design the differences in efficiency between company A and B are less than one would expect

Table I.
A comparison of the three companies

Obviously this is problematic for OM practitioners. Would this mean that they can just adopt any organisation design, irrespective of their context and performance goals? We shall now turn to organisation theory, to try to develop an answer to this question.

An organisation theory perspective on the case study results

The results of the case studies appear to touch upon an ongoing debate in organisation theory (OT) on whether or not organisations have strategic choice when designing their structure. This debate was set off by Child (1972), who challenged the then prevailing view that, under norms of effectiveness[2], the contingencies in the environment of organisations determine their structure. Child's article has set off a stream of research advocating that organisations have strategic choice when designing their organisation structure. As a result, the general view has shifted from a strong belief in determinism towards an increasing recognition of the role of strategic choice (Donaldson, 1996). Nevertheless, as demonstrated by a special issue of *Organization Studies* on action, structure and organizations published in 1997, the discussion is far from conclusive.

Two recent publications are representative of the debate. According to Donaldson (1996), there is no question of strategic choice. Once chosen, "... the

environment ... shapes [the organization's] strategy, technology, size and required innovation rate. These contingencies in turn determine ... the structure the organization needs to adopt if it is to operate effectively" (p. 2), meaning "that there is no real strategic choice" (p. 51). Based on partially the same (!) sources, Gresov and Drazin (1997) argue for strategic choice: "the final ... performance of an organization ... can be achieved through multiple different organizational structures even if the contingencies the organization faces are the same" (p. 403-4). '[T]he environment ... determines the function(s) the organization must perform, but not its specific structures" (p. 407).

Do the case study results reject the determinist approach in OT?

As the empirical data available suggest that different organisational forms in similar environments can yield equal performances, it is very tempting to reject determinism. However, we hesitate to draw this conclusion for several reasons, three of which we would like to address here.

First, an analysis on another level of aggregation might have led to different conclusions. On a high level of aggregation the three cases are rather similar (labour-intensive assembly yielding similar types/levels of performance): evidence for determinism! Only a closer look into the processes shows that there are significant design differences (and yet similar performances).

Second, the use of other, more precise measurement scales might have led to different conclusions. For example, we choose a simple, qualitative five-point scale (– –, –, 0, +, ++) to measure performance. A more precise or quantitative scale could well have resulted in differences in (measured) performance.

Third, the research focused on a part of the three organisations (production), and on a part of their context (the marketplace). Consequently, there may have been limitations hidden to us, e.g. elsewhere in the organisation, in the labour market, local culture or related to technologies, available that left the organisation designers with the present design as their only option. This would suggest, in line with Donaldson's argument, that we should take a second look at the cases, covering those aspects as well. However, as the next subsection suggests, it is questionable whether this would have led to different results.

Do the case study results support the strategic choice approach in OT?

At first sight, the cases strongly support the strategic choice hypothesis, but on closer consideration this would not be a very satisfactory conclusion either.

First, for exactly the same reasons as mentioned above, it cannot be concluded on empirical grounds that the companies had any design space when structuring their organisation.

Second, it is not clear if all three cases concern best practice. As Donaldson (1996) has pointed out, companies can sustain a misfit for a considerable amount of time without serious consequences. It cannot be concluded from the data available whether there is currently such a misfit in the case companies, or not. For example, it cannot be excluded that the management of the three companies, although currently satisfied with the performance, foresees that the overall cost level of their factory is too high and has to be reduced to remain

competitive. Regaining fit could result in one single best structure similar for all three companies, which would consequently support the argument for determinism.

Discussion and conclusion

Due to limitations in the research (aggregation level, measurement method, partial analysis, the question if the cases present best practice) we do not have sufficient evidence to reject determinism or to support strategic choice. Does this mean that we did a lousy job and made a poor research design? We do not think so. This type of research is much too complex to cover in just one or two case studies or any other research design. So, do we have to be patient, just go on, but incorporate more contingencies, performance aspects, aggregation levels, and quantitative metrics in the research? We do not think so either: there is much stronger evidence why both determinism and strategic choice are not tenable as actionable hypotheses for operations managers, although, at the same time, both paradigms present useful insight into the empirical reality that OM scholars and practitioners have to deal with.

The debate on determinism versus strategic choice

A critique of the determinist approach in OT

A careful analysis of Donaldson's work reveals some underlying assumptions that are never made explicit in his text but have a huge impact on the conclusions he has to draw. To mention the most important ones:

- The structuring of organisations is regarded as a deliberate process of design or choice.
- This process is performed by management who: are monolithic; act purely rationally; are perfectly informed; and have infinite information processing capacity.
- The sole or main purpose of the organisation is to meet demands related to shareholder value; hence, there cannot be goal conflict.

In reality, however, the structuring of organisations has radically different characteristics:

- The process is not a fully deliberate activity; there is also a lot of autonomous extra- and intra-organisational interrupts and change taking place (e.g. Mintzberg *et al.*, 1976; Schuring, 1997).
- Not only the management, but a lot of other (internal and external) stakeholders and constituencies affect, or are even actually involved in, what can be characterised as a complex, interactive and continuous process of shaping and reshaping the organisation (e.g. Pfeffer and Salancik, 1978; Goodman and Pennings, 1970).
- Power and politics, problemistic search, bounded rationality, personal preferences, imperfect information, limited information processing capacity, opportunism, satisficing behaviour, coalition formation, and other phenomena related to decision making under uncertainty and to

the role of individuals and organised groups therein, eventually decide whose goals and preferences will dominate (e.g. Simon, 1964; March and Simon, 1958).

The result: more often than not an organisational structure that does not fit perfectly to the characteristics of its context, but one that sufficiently satisfies the needs of its dominant stakeholders. Ruffini's (1999) and also Draaijer's (1993) case studies seem to confirm this: in each case, enough customers are sufficiently satisfied with the company's products, employees are satisfied with their jobs, and the management is satisfied with the performance of the production system.

So, determinism, attractive as this concept may seem for organisation designers: "one single best way", difficult to find perhaps, but it is there if you look carefully, does not present a useful theory for operations managers, as it neglects the presence of other important stakeholders and their influential role.

A critique of the strategic choice approach in OT

Interestingly, the arguments against strategic choice are very similar to the ones we used to reject determinism.

First, the core of Child's (1972) argument against determinism was that the explanatory power of contingency variables is limited, as providing not much more than about half the variance in structure, so there must be strategic choice! Gresov and Drazin (1997) do hardly better: if we would find, under *ceteris paribus* conditions, in a sample of organisations, different structural alternatives that yield the same functional effect, this would mean that there is strategic choice. In this way, strategic choice is more or less postulated, proven through a *reduction ad absurdum*, without further questioning. It seems to us that this provides too weak a basis for organisation designers to build on.

Furthermore, compared to Donaldson (1996), Gresov and Drazin (1997):

- also, though implicitly so, regard the structuring of organisations as a deliberate process, which is performed by, in their terms, organisation designers whom they seem to regard as monolithic. However, whether they also see them as: acting purely rationally, being perfectly informed, and having infinite information processing capacity, is not clear;
- accept that organisations may have to meet a wide set of functional demands and also that there may be conflict between these demands, possibly forcing the organisation designer to choose and to accept sub-optimality.

However, this provides insufficient evidence for strategic choice. Strategic choice requires someone to make the choice, or else no choice is made, and consequently, any organisation design may emerge and survive as long as it satisfies stakeholder requirements. And this seems to reflect reality much better. The shaping and reshaping of organisations is hardly a process of deliberate action by just one or two organisation designers. Interestingly, this would not be denied by Donaldson (1996, 1997), who just maintains that the result needs to be structural fit, if the design is to succeed.

Underexposure of the process of organisational design in both paradigms

A common feature of both approaches is that they leave the black box of the organisation design process and that of the strategic choice process respectively essentially unopened. In a recent article, Child (1997) wrote: "Strategic choice was associated with an absence of external determination . . . [which] . . . is understandable, given the intention of the 1972 article to critique the then prevailing dominance of determinism, but . . . [this interpretation] . . . overlooks the article's statement that organizational decision-makers also find themselves in a position of having to respond to feedback from the environment if their organizations are not to risk severe market and institutional penalties". He then goes on proposing a process model of organisational structuration, postulating (!) it as a (dynamic, fuzzy and essentially unpredictable) learning process. However, whereas the 1972 article pointed out that organisational structure evolves from decisions made by a dominant coalition rather than a single decision-maker, the 1997 article uses words like ". . . social interactions both within organizations and with external parties . . .", with those involved within organisations referred to as "individuals", "(organizational) actors", "(organizational) members" and "organizational decision-makers". In other words, ". . . today it has become . . . more appropriate for [strategic choice] to engage with those who would deconstruct organizational life down to the untrammelled actions of sense-making individuals" (Child, 1997, p. 72).

The role of the management in the process of organisational design

The two paradigms also have different views on the role of the management in the process of organisational design. Whereas the determinists seem to overestimate the "unique role" (Weimer and Van Riemsdijk, 1998, p. 9) of management, the contemporary view on strategic choice apparently denies a special position for the management. Both positions are difficult to accept for a realistic management discipline like OM.

Paradigmatic incommensurability

When considering the usefulness of determinism and strategic choice for the development of actionable organisation design theory for OM practitioners, a fundamental factor to be taken into account is that of paradigmatic incommensurability. In fact the determinism strategic choice debate is a discussion between "deaf" representatives of competing paradigms.

On paradigmatic grounds, the determinists, with Donaldson as their icon, have to focus their research on a rather limited set of objective variables and how these variables vary from organisation to organisation, and then compare the results across numerous organisations. Their aim is to identify which contextual variables determine organisational structure, and how. As Donaldson (1997, p. 85) puts it: "The approach is to see how much can be explained by working with a few variables".

Child's 1972 article on strategic choice is a call for a different object and type of research. He advocates a much broader scope, which, though only half-

heartedly so, incorporates the process of choice itself. He does so because in his opinion, the old approach, determinism, is not able to explain the variation in formal structural arrangements encountered in practice.

In so doing, Child (1972) seems to be an example of what Kuhn (1970) meant when he concluded that new paradigms are developed when the old paradigm shows anomalies. Popper (1972), however, has pointed out that paradigms should not be rejected too easily, or else their potential will not completely be developed. Donaldson's credo, to stick to determinism so long as this paradigm is able to explain the vast majority of organisation structures encountered in empirical data (Donaldson, 1997), seems to reflect Popper's view.

When paradigms enter into a debate about research, each group uses its own paradigm to argue for that paradigm's defence and this often results in "a debate between the deaf" (Kuhn, 1970). This also seems to have been the case in the strategic choice-determinism debate right from the start. The proponents of determinism believe in the "one best" organisational structure and try to extend the body of knowledge on the relationships between context, structure and effectiveness. Referring to the variety of equally effective organisational forms, the adherents of strategic choice deny the existence of the "one best" way, and propose to study how the decision-making process affects the design "choice" made. However, we are afraid that the adoption of a process focus in strategic choice, as proposed by Child (1997), does not solve this problem; it only makes it clearer. The strategic choice determinism discussion is not, and cannot be, a true debate, simply because both schools focus on different aspects of organisational reality. In summary:

- Both approaches represent different views of the world. This lies at the basis of the "debate between the deaf".
- Both schools have different objects of study. The determinists are interested in the outcomes, not in the process of organisation design. Initially, the strategic choice approach was also mostly interested in the outcomes but has gradually shifted its focus to the process of organisation design and, more particularly, the role of strategic choice therein, without, however, really opening the black box and linking the process to its outcomes.
- The determinists' research question calls for quantitative research and statistical analyses, looking for the "laws" that determine organisation structure. The early contribution of strategic choice was based on the same methodology, while the contemporary approach rather calls for in-depth, longitudinal process research based on, for example, case studies.
- The level of analysis of the determinists is the organisation, and the organisation designer is "individualised". The early strategic choice approach seemed to adopt a similar level of analysis, but represented the organisation designer as a dominant coalition, that is, a group of relatively powerful people. The contemporary approach basically adopts an actor-level of analysis.

- The effectiveness criterion used by the determinists is limited to organisation-level "shareholder" criteria. The early strategic choice approach did not challenge this, while the contemporary approach does not seem to be interested in organisation-level effectiveness at all. The objective is to describe and explain what happens during the organisation design process, recognising, though, that one set of explanatory factors would be the "success criteria" of "the members of [the] organisation" and "external norms" of "success-defining bodies" (Child, 1997, pp. 68-9).
- In terms of theory development, both schools' primary interest is in developing descriptive and explanatory, rather than actionable, theory.

Discussion and implications for operations management

Due to their paradigmatic premises, both schools consider and, consequently, explain only part of reality, and have in fact developed into incommensurable positions. This may be acceptable on theoretical grounds, but is a major barrier for an applied discipline like OM and, most of all, for its practitioners. Furthermore, the applicability of OT for OM practitioners is generally poor. Both schools see it as their task to build theory, which describes and explains organisational reality on a very high (organisation) or low (individual) level of analysis, rather than to develop actionable knowledge on a level of detail that is really suitable for organisation designers. Finally, the effectiveness criterion proposed by both schools is too narrow or even too conceptual for OM practitioners to be useful.

Consequently, simply adopting either of them is no solution as each of them adds only partially to our understanding of how organisations are, or should be, designed. Somewhat paradoxically, perhaps, this does not mean that operations management cannot benefit from organisation theory. Both determinism and strategic choice have something to tell about the reality that OM scholars and practitioners have to deal with. The research agenda presented at the end of the article will include various elements borrowed from both schools.

We started this article with a definition of OM, indicated its key role in the successful creation of products and services, and concluded that organisation design, as one of the key factors contributing to the success of companies, is seriously underexposed in both research and teaching material. Then three of the cases studied by Ruffini (1999) were presented to illustrate that neither OM nor OT can satisfactorily explain the case findings. OM, because of lack of organisation design theory, OT because of problems related to level of analysis, scope and measurement, including that of best practice. Next the key ingredients of two dominant approaches in OT were uncovered and compared. This led to the conclusion that the discussion between the two approaches is a "debate between the deaf", which is unfortunate, as both schools have something to say about the reality of OM.

The obvious conclusion then is: if OM lacks good theory on organisation design, if OT does not have one either and cannot develop one, due to paradigmatic problems, the only way out would be for OM to develop such a

theory of its own. Given the applied nature of the discipline, such a theory should be actionable, that is, useful for and usable by operations managers and other practitioners involved in the design and management of operational systems. A theory, also, which Swamidass (1991) and Weick (1989) would call a mid-range or middle range theory. "Middle range theories are solutions to problems that contain a limited number of assumptions and considerable accuracy and detail in the problem specification. The scope of the problem is also of manageable size. To look for theories of the middle range is to prefigure problems in such a way that the number of opportunities to discover solutions is increased without becoming infinite" (Weick, 1989, p.521).

Key features of this theory would seem to be:

- actionable and mid-range, that is, relevant, complete, wide enough, non-trivial and realistic (thus overcoming Swamidass' (1991, p. 798) critique of OM research), really guiding OM practitioners in their critical task of designing and implementing successful production systems.

In addition, reflecting various comments made earlier in this article, the theory should be:

- stakeholder-based and therefore allowing for multiple-effectiveness criteria but also recognising the special position of the management in organisational decision-making;
- process-based, that is, providing OM practitioners with a better understanding of the dynamic, fuzzy and essentially unpredictable process of organisational structuration, but also and at the same time;
- outcome-based, guiding OM practitioners into setting directions (dos and don'ts) in terms of the relationships between organisation design, contextual complexity and dynamics, and multiple-stakeholder demands.

These requirements lead to the following research agenda.

An agenda for OM-driven organisation research

The development of organisational structures is a process in which a wide variety of parties (stakeholders, constituencies) are involved in many different roles. Some are interested in its products (customers), others want to earn a living (employees, managers, owners), yet others (suppliers) see the organisation as a (potential) customer. It is difficult to imagine that such a bunch of parties would make joint strategic choices.

OM-driven organisation research should therefore use a wide effectiveness criterion and be aimed at describing and trying to understand and explain why and how the interaction between various parties evolves and affects the structure, functioning and performance of the resulting organisation (see Figure 4). At the same time, the outcome of the "design" process should be a functional fit between the organisational design and the stakeholder demands. To this end, research into this fit is needed, in addition to process-oriented research.

These two arguments lead to the following process-oriented research questions:

- Why and how, in the dynamic interaction between various parties, each functioning in their, equally dynamic, context, does emerge who will be part of the dominant coalition (stakeholders) and who will not (other constituents)?
- How does, from this interaction, emerge what can provisionally be called stakeholder strategies?
- The other way around, does this strategy affect who are stakeholders, and if so, how?
- How does this strategy affect which will be the performance goals of the organisation?

How, either based on that strategy and other contextual influences or not, are organisational design decisions made and implemented?

In order to support managers in their attempts to at least try to direct the process into a favourable direction, that is, one that will result in a functional fit between the design of the organisation and environmental demands, a more positivist research question would produce knowledge on:

- Which organisational design fits (functionally, that is, in terms of a broad effectiveness criterion) which stakeholder demands?

It will probably be very useful to consider power, coalition formation, problemistic search, satisficing behaviour, bounded rationality and other concepts established in theories on decision-making and other dynamic processes (Simon, 1964; March and Simon, 1958; Cohen *et al.*, 1972; Cyert and March, 1963), but also, for example, imperfect competition, trust or culture-driven preferences, when addressing these and related questions.

The case studies revisited

Suppose we had the opportunity to do the case studies again, what then would this research agenda imply for the case study design? First, the agenda

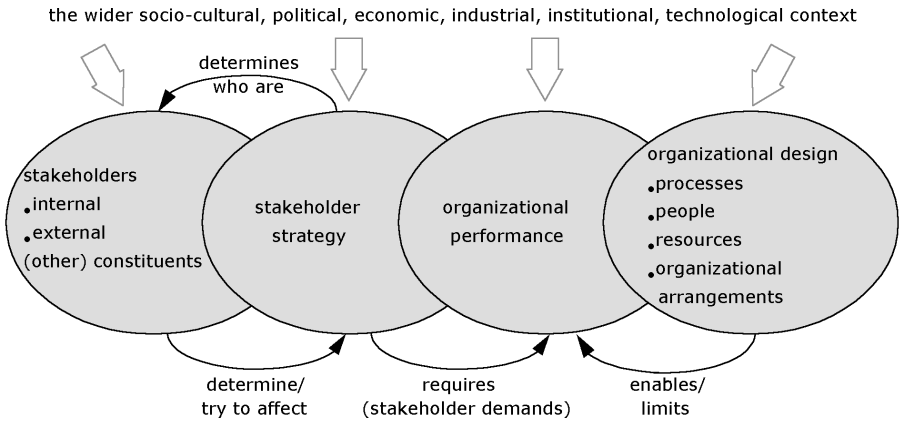

Figure 4.
Core elements of research into organisational design, functioning and performance

suggests a research programme, not a project. Therefore, only part of the issues can and will be dealt with and the case studies would still have focussed primarily on the last question, aimed at mapping and analysing the production systems in basically the same terms as the ones used for the first study. However, the research would need to be extended in that it would:

- Have a longitudinal character, in order to allow that the people really having a say in the design of the production system, their demands, and also the "slack" in their demands (i.e. what performance would still be acceptable for them) can be identified. This would also enable us to get a flavour of how the various stakeholders' preferences, power bases and political behaviour affect the process of organisational design and, through that, its outcomes.
- Measure organisational performance relative to these stakeholders' requirements.
- Assess the influence of the wider context of the production system, both within the case companies (other processes/departments) and outside the company. This would include in particular the design space for the companies due to, for example, technology and culture, and also the limitations for stakeholders (customers, employees) to move to other companies.

Obviously, this research would not yield definitive answers either, but would add even more richness to the case studies and, through that, better explanation of the relationships between the organisational design and the performance of production systems.

Conclusion

This article has proposed a research agenda for OM-driven research on organisational design. The main characteristics of the agenda are that it proposes stakeholder-, process- and outcome-oriented research, which is aimed at developing actionable (useful and usable) mid-range (comprehensive, with sufficient detail) theory of organisation design.

These characteristics derive from the observations that:

- OM currently lacks such a theory;
- OT has developed into paradigms, each of which have something useful to say about the reality that OM researchers and practitioners have to deal with, but whose positions have gradually become incommensurable.

This research agenda does not deny the merits of OT. The challenge for OM will be to tap from, and adapt to, its own particular managerial interest, the richness of OT, while at the same time adopting a much more realistic view on the process of organisation design, the influence of various stakeholders, including the special position of the management function, and accepting the necessity to achieve a functional fit between organisation design and stakeholder demands.

The research agenda proposed here does not present an easy task. The object of the research is very complex, the research is necessarily longitudinal in nature and there are quite a few methodological problems related, for example, to definition and measurement, and to the interpretation of results. Research, in brief, that goes beyond single projects and requires long-term research programmes.

Yet, fundamental, inductive research of this type would add much to the further development of the field of operations management. Most OM theories are based on deductive research methods. Adding field-based empirical research in order to achieve a balanced deductive-inductive approach should strengthen OM research and narrow the gap between practice and research (Swamidass, 1991, pp. 797-8). The final results of the research suggested above will be theory (i.e. laws and generalisations) on how production organisations, their corporate and functional strategies, processes, technologies and organisational arrangements actually develop and function. Such theory would be extremely helpful for the deductive development of practical insights into complex, even fuzzy and messy topics such as production strategy design and implementation, that will provide real support to practitioners in their critical role of managing the process and leading it to successful outcomes. "Those in OM cannot ignore the added opportunities for research that empirical science offers if they want OM to be relevant and useful in this era of change" (Swamidass, 1991, p. 811), especially if the strengths of organisation theory are integrated into operations management research, and if its paradigmatic weaknesses are overcome, as suggested in the present article.

Notes

1. Other authors have conceptualised these decision areas (process, technology and organisational arrangements) as four structural and four infrastructural decision categories (Hayes and Wheelwright, 1984, p. 31), process choice and infrastructure (Hill, 1985, p. 41), or five decision areas in which, according to Skinner (1985, pp. 61-2), trade-off decisions must be made.
2. Most authors on organisation design used criteria related to shareholder value, such as profit(ability), efficiency, ROI, market share, or growth, rather than more general stakeholder-related criteria, to measure effectiveness.

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