Reconfigurable Strategic Guidelines for Successful Co-operative Value Creation

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Abstract
Manufacturing co-operations, innovation think tanks and technology clusters are well-known and profitable elements of a modern company's structure.The fast pace of typical product life cycles and innovation rates make it necessary to gain as much external knowledge as possible to optimise supply chain organisation. The aim of this quantitative, empirical study is to develop strategic guidelines out of the most influential success factors of manufacturing co-operations. These guidelines should be reconfigurable and easily adoptable to the situations co-operations regularly face. In order to reach these objectives the authors identified 110 success factors and analysed their cross-factorial relationships. Strategic guidelines were then formed and were evaluated by 16 senior managers of various fields, e.g. the aviation and space, transportation, strategy consulting and publishing industry. On average these managers direct 1247 employees.

1 SITUATION

A study concerning innovation management points out that companies are able to operate most profitably when they are actively co-operating with suppliers and customers [1]. Research and development as well as manufacturing co-operations help to stabilise a company's situation among its competitors especially when it comes to the deployment of highly innovative products. The new focus on interactive value creation and the permeable boundaries of companies is supported by recent scientific research by [2,3,4] and by the overall megatrend towards personalisation and individualisation [5,6,7].

Researchers describe that the way customers recognise products has changed during the last two decades [7]. Customers increasingly expect to purchase not only a product but also gain access to a broad variety of product-related service benefits – the so called: product-service-bundle [8]. Without taking advantage of all available sources of know-how and experience on the open market manufacturers will be unable to generate sufficient product-service-packages.

Acknowledging that establishing business co-operations and networks are key skills [9,10,11] this still leaves the question for the right partner. Manufacturers face a highly competitive environment where the protection of intellectual property soars up to the focal task of management boards. Even medium-sized businesses have to face the world market as their key market [12]. Considering that their environment is so tough, these businesses cannot just open up their boundaries, allow their knowledge to be spread and hope for the best. However what should the leaders of companies do who want to gain the advantages of a more "open production" [3,4,5]without taking the risk of being exploited? The answer is that they need to establish strong and resilient relationships with reliable suppliers and customers.

2 REQUIREMENTS OF SUCCESSFUL CO-OPERATIONS

One way to realise the often proclaimed but rarely implemented mantra of vital business co-operations is to use the well structured, transparently generated and easily reconfigurable strategic guidelines presented in this contribution. These guidelines have been built to be used and are optimised for medium to large sized companies in the manufacturing industry.

The guidelines help to increase the efficiency of manufacturing co-operations in addition to strengthening their robustness in order to drive economic success [13]. For example the guidelines are able to provide support by avoiding a sudden appearance of stock-out-situations among a complex supply chain which can be critical for suppliers and OEMs. Stock-out-situations are likely to happen when the process organisation between partners is not synchronised consistently. The resulting frictional losses which are enforced by communication problems

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often directly lead to severe economic losses [13]. One way to avoid incidents like this is to precisely analyse which success factors influence the payoff of business co-operations in the manufacturing industry. In this contribution, the large amount of possible factors is grouped into influential fields and further into influential factors (Figure 1).

Regardless of branch or industry there are five basic principles which apply to all sorts of business co-operations. When thinking about optimising a supply chain which involves several partners these principles act as a first checklist to implement before developing specific strategic guidelines, fitted to a business model:

1. The **critical mass** needs to be reached. This means that entrepreneurs on the one hand have to quantitatively acquire enough potential partners to actually establish a co-operation network. On the other hand they will have to generate a persuasive mass of information transaction, idea spreading and lively communication between the involved partners [14].
2. All partners need to have the **intention to co-operate**. What sounds self-evident is crucial to every successful network. Exchange programs of research and development employees and a philosophy towards reconfigurable teams across companies' borders create additional reliance [15,16].
3. During a co-operation relationship the emergence of information asymmetry is inevitable. To avoid potential opportunistic behaviour from one of the partners **personal andinformal relationships** need to be established early [15,16].
4. When establishing a business co-operation there has to be at least one large **focal company**. Firstly this is necessary because smaller suppliers and other members of the network need to align themselves with the bigger partner. Secondly a large focal partner creates a special charisma for a young and new co-operation network, which supports potential customers in their investment decisions [12,17].
5. Having reached a larger amount of people and companies involved in the co-operation it becomes useful to establish a **network management organisation**. It will optimise the process organisation and cover network marketing aspects [17].

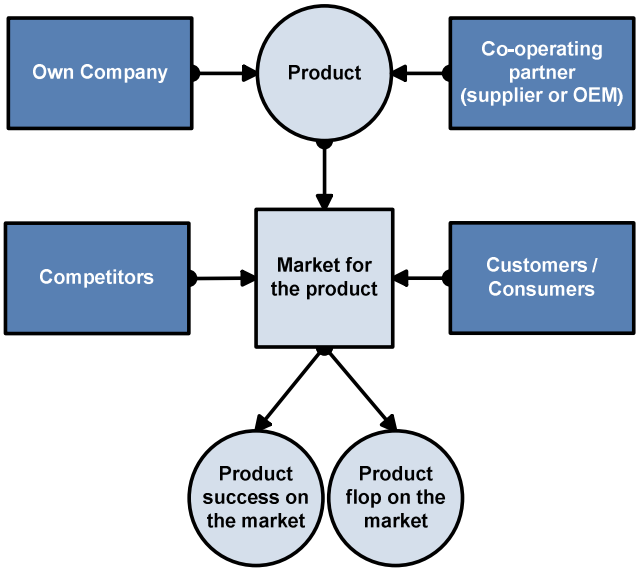

Figure 1: Four influential fields of co-operative success.

3 SCIENTIFIC APROACH

The aim of this study is to identify the influential factors of successful co-operative value creation and to form strategic guidelines out of them. The focus point of the study was to build strategic guidelines which are easily applicable to the manufacturing industry and at the same time develop a methodology which can be used as a tool to create newly reconfigurable guidelines for specific parts of this branch. To reach these goals a five-step methodological approach has been conducted.

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3.1 Preliminary study

Execution of a preliminary online-study with 72 academic respondents (B.Sc., M.Sc., Dr.Ing. and Prof.Dr.) to check and optimise the methodological steps from 2 to 5.

3.2 Identification

Identification of 110 influential factors of successful manufacturing co-operations by evaluating eight explorative interviews with German entrepreneurs of the aviation industry, four scientific lectures, several brainstorming sessions and scientific literature [2,4,12,13,15,16,18].

3.3 Selection

Filtering of the 44 most important influential factors by using the findings of the preliminary study and systematic analysis of their cross-factorial influence by using a direct influence matrix [19].

3.4 Development

Development of a highly reconfigurable methodology to collect, arrange and assess influential factors, before automatically merging them into strategic guidelines. Creation of 13 strategic guidelines for optimising the success of manufacturing co-operations by causally linking the 44 most important influential factors (based on their systematic analysis in the direct influence matrix).

3.5 Evaluation

Validation of all 13 strategic guidelines by 16 senior managers of Airbus, EADS Deutschland, Cassidian, Rockwell Collins Deutschland, Eurocopter Group, A. T. Kearney, the Aviation Cluster Hamburg Metropolitan Region, VerlagsgruppeHandelsblatt, Deutsche Bahn and several smaller companies who on average direct 1247 employees. This step was conducted via telephone and personal interviews which lasted on average 38 minutes and took place in Hamburg, Germany from May to July 2012.

4 RECONFIGURABLE STRATEGIC GUIDELINES FOR SUCCESSFUL CO-OPERATIVE VALUE CREATION

The scientific evaluations of this topic lead to 13 strategic guidelines for successful business co-operations in the manufacturing industry. To use these guidelines executives should pick one success factor to optimise among their own co-operation. Then they are able to check which process factors stimulate their success factors and which initial factors start the whole guideline (see 4.2 to 4.5). The result will be an initial factor, which is relatively easy to activate but which stimulates very important and resounding success factors of the whole co-operative endeavour.

4.1 Overview of success factors

The following passage gives an overview of the success factors of all 13 strategic guidelines:

1. Both partners' technical ability to cooperate in manufacturing processes
2. Partners' culture of communication
3. Efficiency of product-focused knowledge exchange
4. Ability to avoid product flops
5. Both partners' technical ability to cooperate during the research and development phase
6. Ability to split assets and liabilities among partners
7. Intensity of competition among the market sector
8. Information transaction and coordination costs
9. Both partners' social motivation to co-operate
10. Assumed benefit of a manufacturing co-operation
11. Quality of informal relations between both partners
12. Professional experience of co-operation teams
13. Incompleteness of contracts

The authors analysed how modern production co-operations can be quickly reconfigured to meet the majority of these factors. To give an impression of how the guidelines can be used the four most resounding ones will be

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displayed. All of the displayed factors influence each other, which is indicated by the direction of the connecting arrows. The numbers at the arrows indicate the average percentage agreement of the 16 surveyed experts of the strength of a connection between the factors.

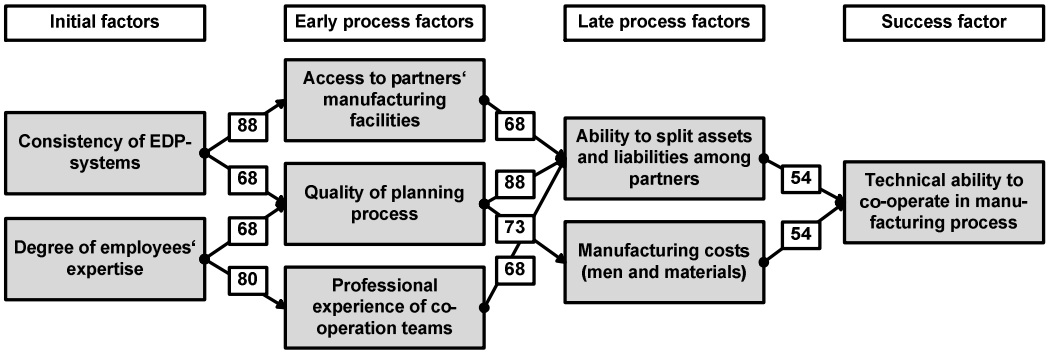

Figure 2: Guideline 1: Both partners' technical ability to cooperate in manufacturing process.

4.2 Guideline 1: Both partners' technical ability to cooperate in manufacturing process

Having identified the technical ability to cooperate as a factor which deserves optimisation managers should use this strategic guideline (Figure 2). The guideline shows that it is possible to enhance the quality of a planning process by optimising the consistency of the EDP-systems co-operating partners use at their supply chain interface. Enforced by this increased consistency manufacturing costs can later on be reduced significantly. Supported by insight of the partner's manufacturing facilities it is possible to increase both partners' satisfaction after splitting assets and liabilities (68 % experts' approval). This chain of causally linked incidents helps tremendously by improving both partners' technical ability to co-operate during the manufacturing process.

However one should not believe that continuous EDP-systems are a daily routine in every successful manufacturing company. Too often adequate planning software is substituted by simple charts,lists, registers or other makeshift solutions where important information is filed in an unstructured way. This forces engineers to invest time and effort into interpreting ambiguous information which often results in slips of the pen [20]. The common quality of planning processes shows that there is a lot of room for further optimisation. Consistently installed milestone planning software is a key aspect which is used too rarely [19].

A resounding 88 % of the interviewed experts agree that optimised planning processes would help to gain more out of every manufacturing co-operation. Only this planning makes it possible to handle thousands of parts, components and semi-finished products across borders of companies and countries. Partners who are successful enough to have reached a state where their technical ability to co-operate during the manufacturing process is optimised to a satisfactory extent, should begin to concern themselves with enhancing the culture of communication which is practised between their companies.

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4.3 Guideline 2: Partners' culture of communication

Entrepreneurs who want to optimise the culture of communication that is practised between them and their partners should adopt this guideline (Figure 3). Initially one has the opportunity to increase own market reconnaissance efforts in order to raise general market transparency. Employees who are engaged in co-operation teams at a partner's company will benefit from this as higher market transparency stimulates the professional experience they are able to gain. Due to the fact that there is more information available between the co-operating companies the impression of participating in a useful endeavour increases (69 % experts' approval). This late process factor improves the culture of communication which connects both partners.

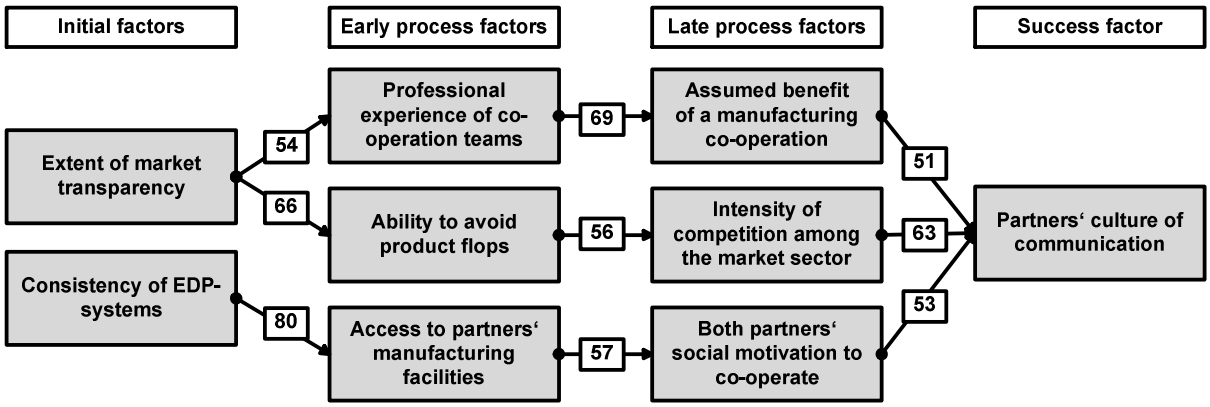

Figure 3: Guideline 2: Partners' culture of communication.

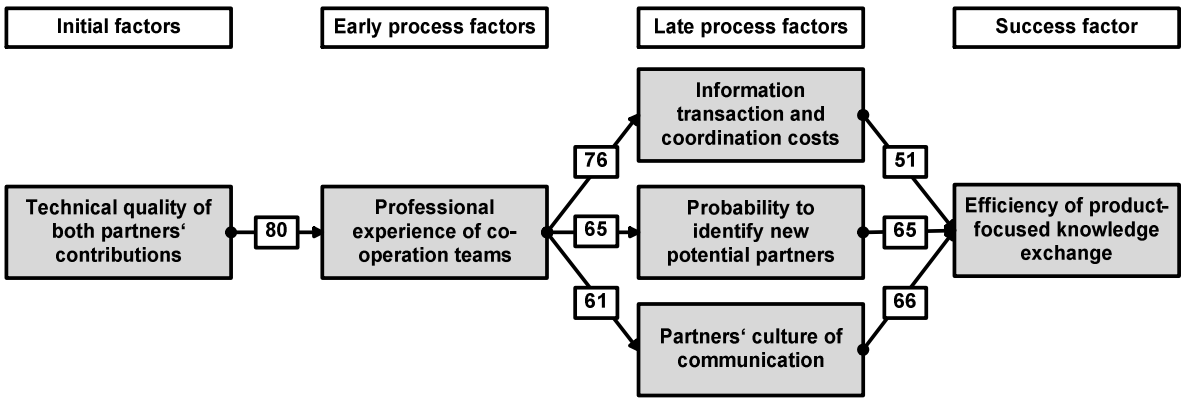

Figure 4: Guideline 3: Efficiency of product-focused knowledge exchange.

The same initial factor helps to improve the culture of communication in a second way. A healthy 66 % of the experts interviewed agree that a higher market transparency has a positive effect on the probability of whether a product becomes a flop or not. This will then ease the competitiveness within the market sector a company is in, which leads to a more lively culture of communication between co-operating partners.

The above-mentioned consistency of EDP-systems also supports this strategic guideline. However in this context of communication it furthermore boosts the motivation both partners develop for conducting co-operative endeavours (57 % experts' approval). This incident for his part tightens both partners' communicational integration (53 % experts' approval).

After partners have ensured their technical ability to co-operate (Guideline 1) and have established a healthy culture of communication it is important to make sure the product-focused information transaction is run in an efficient way.

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4.4 Guideline 3: Efficiency of product-focused knowledge exchange

Most of the interviewed experts agree that product-specific internal knowledge is one of the most valuable goods a manufacturing company owns. They further agree that external partners should only have access to this knowledge to a certain and very controlled extent. At the same time vital business co-operations need an environment where company secrets and internal intellectual property are transferred widely unhindered in order to keep the corporate endeavour functioning (Figure 4).

One interviewee solves the dilemma in an elegant way by saying that "it is usually not necessary to unveil the company's drastic secrets." Based on with this intention one would rather scare off his partners instead of being able to trade intellectual property with them. The same interviewee further explains that it is common practise to only reveal those parts of a documentation with which partners really need to negotiate. As an example he mentions a wing of an airplane. While external data, like geometric dimensions are naturally and necessarily exchanged unhindered, entrepreneurs would tend to be a bit more nit-picking when it comes to the purpose and properties of the internal wiring.

However OEMs basically understand those peculiarities of their suppliers knowing that they distribute their products to more than one customer and that they take a certain amount of risk by partly unveiling their efforts [20]. When it comes to co-operations where a high amount of bidirectional know-how migration is crucial large non-disclosure-agreements have become a common instrument. These contracts form a reliable and unambiguous regulatory framework around the relevant parts of a company's secrets [4].

Through analysing the strategic guidelines it becomes obvious that an efficient and satisfying exchange of product-focused knowledge and company secrets is triggered by three main stimuli. While the above mentioned culture of communication within partnering companies is the strongest driver efficient product-focused knowledge exchange (66% experts' approval) two completely new factors appear here. Interestingly, according to the experts, the costs which result from communicating have a relatively small influence on the efficiency of communication (only 51 % experts' approval). One interviewee who works as senior vice president for a large aircraft manufacturer in northern Germany puts it like this: "Being in the position to ship components and semi-finished products all around the world only for final assembly, we do not really worry about costs for information transaction." Keeping this aviation-related fact in mind there is a very helpful implication in this guideline. By improving the input offered by employees in a business co-operation, the professional experience gained by all members of this co-operation is enormous (80 % experts' approval). Via two other important influential factors this will stimulate the efficiency of cross-company information transaction. Through obeying these first three guidelines, co-operating manufacturing companies can minimize frictional losses, inspire communication and optimize the way they exchange knowledge. It now becomes necessary to also take one rather external aspect into consideration.

4.5 Guideline 4: Ability to avoid product flops

Products often fail despite their developers and engineers conviction of having created something breathtaking. The probability of suffering a product flop or the ability to avoid it is a typical external factor in manufacturing co-operations that is driven by customers and competitors (Figure 5).

In addition the configuration of a product or good itself has large impact on its probability to fail on the market. The interviewed experts broadly agree that there is a direct connection between the complexity of a product and the controllability of its supply chain (90 % experts' approval). Furthermore this influential factor drives the degree of agility a research and development team can react with (90 % experts' approval). The strongly linked chain of cause and effect culminates in the company's ability to avoid massive product flops. Through taking these four strategic guidelines seriously entrepreneurs can cover the most vital aspects of co-operational success.

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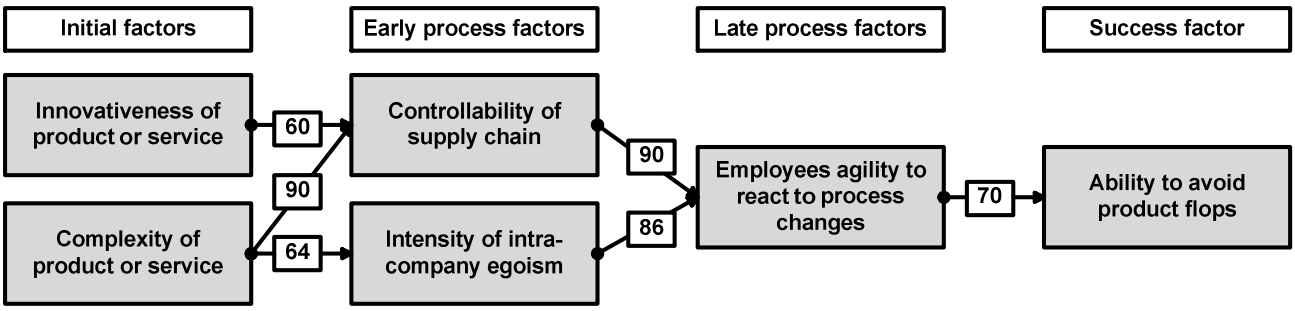

Figure 5: Guideline 4: Ability to avoid product flops.

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5 SUMMARY

For this study the authors analysed the 110 most important influential factors for the success of modern manufacturing co-operations between suppliers and original equipment manufacturers. A specific methodology was used based on the scenario technique [19]. This allowed to systematically creating 13 strategic guidelines by setting 44 influential factors in causally linked sequences. The significance of our results has been approved by 16 senior managers from several leading companies in the aviation and defence industry.

These reconfigurable strategic guidelines provide a portfolio of measures to improve and optimise business co-operations and to lead the daily gained experience into conceptual knowledge. Managers and entrepreneurs will have to choose which of them to use and which part of their supply chain they want to improve.

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