How to Cope with Environmental Uncertainty: A Framework of Integrated Flexibility Dimensions in Manufacturing Companies

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Flexibility in manufacturing companies has received much attention in theory and practice recently, but a framework to derive the needed amount of flexibility based on environmental uncertainties on an integrated corporate level, hasn't been developed yet. Various types of flexibility have been described, defined and aggregated. Flexibility types such as mix, rerouting, volume, new product and many other types of flexibility have been identified as very important for a company to survive in a dynamic environment. The limitation of this research is the single focus of the researchers on their functional interests (e.g. manufacturing, sourcing, marketing, …) which leads to partial optimisation. To solve the dilemma the researchers derived four relevant structural fields which are critical for a strategic flexibility. The combination of these fields with their interdependencies leads to an integrated framework.

To develop this framework the researchers started with an intensive desk research and with an analysis of thirty strategic projects in manufacturing companies in Western Europe. The result was a draft that was validated through action research within seven additional manufacturing companies in Western Europe.

The main result of the desk research was that flexibility is on the one hand a well known topic but on the other hand there is no common understanding of the meaning. Discussions with companies clearly have shown that flexibility is understood as a very important concept in dynamic environments but how to derive an appropriate amount of flexibility or how to know which factors contribute to flexibility was rather unclear.

Based on these discussions and inputs from ancient findings the researchers developed a framework of integrated flexibility dimensions which summarizes four relevant fields for management decisions: scope, resources, structure and human resources.

The fields are each defined through two interrelated dimensions. These dimensions are built up along tension lines reflecting the most appropriate positioning for a static or a flexible manufacturer. Every field is shown in a grid. Both axes of the grid reflect the tension between a stable and a flexible position of a company.

The field scope with the two dimensions "customer needs" and "focus" reflects the market positioning of a company. The stable position of the axis "customer need" addresses standard customers with stable needs. The flexible organization has to realize latent needs and can surprise the customer. On the tension line "focus" the stable position symbolizes standard products whereas in the opposite position solutions are offered that include the product as well as services.

The field resources with the dimensions "use" and "character" involve the discussion about the required manufacturing flexibility. In the dimension "use" the area of tension is defined by the stable position where a company proceeds only in its own context and the flexible position where a company uses its resources in multiple contexts. The axis "character" is spread out by the stable position single-use of a resource which is a suitable position due to repetitive tasks and the flexible position with multiple-use resources.

The third field includes the potential of the human resources (HR development and level of qualification) and outlines the importance of the employees to achieve the required flexibility. The dimension "HR development" represents the decision between a unsystematic (stable environment) and systematic HR development (dynamic environment). The level of qualification in a stable position only needs low trained employees whereas a flexible position requires a high level of qualification.

The fourth field contains the internal and external structure and is the most reactive one. The first axis includes the stable position with hierarchical structures whereas in the flexible position process orientation helps to address changing requirements. The external axis shows the cooperation of the company with its suppliers. In a stable position, only classical market conditions take place. The flexible position is strengthened through the development of a cooperation.

The four fields developed as shown above, have been further validated in seven manufacturing companies. The results of the action research with the companies showed that the framework with the four fields scope, resources, human resources and structure involve the relevant dimensions of strategic flexibility.

To find out the needed amount of flexibility, a company has to position itself in all eight tension lines. Based on this positioning, the company can see on which tension line(s) they are more or less flexible than on other tension lines. A hypothesis of the researcher is, that a company that fits in its environment most successfully should be positioned in a balanced way on all axes what means that the radius on all axes has to be the same. The validation of this hypothesis is the content of further research.