Abstract

Traditional factors of production, like natural resources, labor and capital have lost significance. At the same time the importance of intangible inputs, like information and knowledge, increased. Nowadays if one talks about knowledge it refers to the Intellectual Capital of enterprises. Already today the part of the production factor knowledge is estimated to account on average 60% of the total value creation of the enterprises with increasing tendency. The stronger focus on intangible assets has also an influence on Mass Customization. Up to now the economical aspect of Mass Customization has been mainly measured by means of traditional accounting methods. However, in addition to this aspect, it is important to ask what contribution Mass Customization may have on the development of the Intellectual Capital of an enterprise.

Keywords: Intellectual Capital Statement, Knowledge Management, Mass Customization

1. THE INTANGIBLE ECONOMY

1.1 Introduction

In the past decades our production process has changed. Traditional factors of production, like natural resources, labor and capital have lost significance. At the same time the importance of intangible inputs, like information and knowledge, increased. This shift in significance from tangible to intangible factors of production however, did not lead to changes in the traditional accounting and measurement systems [1].

Figure 1: The resource base of the 21st century enterprise [2]

In a mass-production economy with homogeneous goods, the knowledge content of goods was low and the most important phase of the production process was manufacturing, since firms relied on economies of scale for market performance. Hence, tangible factors of production were held to be the most important, and economic productivity was held to be determined by a direct, causal relationship with the amount of physical capital and labor employed. Today, the knowledge content of goods is of an order higher, and the pre-manufacturing phase is the key phase for value-creation [2]. An ever growing part of products of modern enterprises depends directly or indirectly on knowledge. Already today the part of the production factor knowledge is estimated to account on average 60% of the total value creation of the enterprises with increasing tendency [3].

According to Andriessen [1] there are seven characteristics of the intangible economy:

1. Knowledge replace labor and capital as a fundamental resource in production
2. The knowledge content of products and services is growing rapidly
3. The intangible economy is an economy in which services are as important as products
4. It is an economy in which the economic laws are different
5. In the intangible economy the concept of ownership of the resources has changed
6. The intangible economy is an economy in which the characteristics of labor have changed
7. As a result, organizations have changed

1.2 The value of Intangibles

The evaluation of knowledge plays in this aspect an important role. Nowadays if one talks about Intellectual Capital he refers to the knowledge of Enterprises. Strongly simplified as well as isolated from evaluation problems and from market psychology Intellectual Capital corresponds to the market-to-book value of an enterprise [4].

While trying to define closer the Intellectual Capital it can be concluded, that many various terms are used. Some of them include intangible assets, intangible goods, intellectual property, intangible assets, intangibles [5]. Especially Alznauer/Kiefer/Wille [6] indicate that using a
term of Intellectual Capital is frequently not valid, instead intellectual property term should be used, because it is about assets [7].

The number of methods for the determination of the Intellectual Capital has grown strongly in recent years. Sveiby [8] has listed chronologically 28 methods. It can be concluded, that the model for the Intellectual Capital Statement does not exist yet, and that each one exhibits both strengths and weaknesses [9,10]. While measuring the Intellectual Capital two approaches can be mentioned.

The deductive approach comes from the assessment market-to-book value of an enterprise. In this process information from balance sheets and quotations are used (…). The inductive approach is based on the description influencing factors of every single knowledge component of an enterprise in order to provide starting points to his development [11].

In the framework of this work, the Intellectual Capital Statement – Made in Germany [12] will be taken as a basis for further considerations.

2. MASS CUSTOMIZATION – TANGIBLES AND INTANGIBLES

2.1 The four levels of Mass Customization

Stan Davis, who coined the phrase in 1987, refers to Mass Customization when the same large number of customers can be reached as in mass markets of the industrial economy, and simultaneously they can be treated individually as in the customized markets of pre-industrial economies [13]. In order to address the implementation issues of Mass Customization, Tseng and Jiao [14] provide a working definition of Mass Customization that is very useful. The objective of Mass Customization is to deliver goods and services that meet individual customers’ needs with near mass production efficiency [15].

There are various papers on the economy of Mass Customization [18, 19, 20, 21]. It is often argued that on the one hand Mass Customization leads to a higher cost level and on the other hand it may lead to the reduction of costs (Figure 3). According to Piller/Stotko [16] the Mass Customization Strategy is sustainable, when the increase in costs can be balanced by the higher price and the potential for the new cost reductions. Altogether a conclusion may be drawn, that the total cost function is positive for Mass Customization Strategy, therefore the additional value for an enterprise is created. The coherence is a follows [16]:

- Increasing potential of profit: Acquisition, new business segments, image effects, increased willingness to pay.
- Costs with respect to the increasing potential of profit: Costs with respect to the customer integration, set up of variants, risk set up from the customer point of view and investment in the customer credibility.
- Cost reduction potential: Economies of Modularity, Economies of Decoupling, Economies of Integration, Economies of Relationship.
- Costs with respect to the potential of costs reduction: Investment in the flexible performance systems, measures in the reduction of complexity, information and communication effort in production.

According to Freund [22] the pure consideration of costs is not sufficient.

2.3 Intangible Economy: Economies of Mass Customization

In the Intangible Economy the question is: What is the contribution of Mass Customization to this important part of an enterprises’ value? A good start to answer this question is to look at the important role of information in Mass Customization Strategy [23]. The focus was shifted
from the information loop [19] to the knowledge loop (Figure 4).

The link between information and knowledge in Mass Customization Strategy is as follows [24]: (...) companies pursuing Mass customization successfully build an integrated information flow that not only covers one transaction but improves the knowledge base of the whole company by information gathered during the fulfillment of a customer-specific order. Companies successfully pursuing Mass Customization build an integrated knowledge flow – that not only covers one transaction but uses information gathered during the fulfillment of a customer specific order to improve the knowledge base of the specific company (...). The representation of these processes in a knowledge loop.

Knowledge is an abstract concept; it has no referent as the measurement of knowledge can contribute to the Intellectual Capital of an enterprise. Based on the Intellectual Capital Statement – Made in Germany this should be analyzed.

3. INTELLECTUAL CAPITAL STATEMENT – MADE IN GERMANY

3.1 Introduction

The Intellectual Capital Statement – Made in Germany is an instrument to assets and to develop the Intellectual Capital of an organization. It shows how organizational and business goals are linked to the internal processes and the Intellectual Capital of the organization using indicators to visualize these element [30].

![Figure 5: The Intellectual Capital Statement model developed by the Intellectual Capital Statement Project Group [30]](image)
(customer relations, relations with suppliers, relations with the public, etc.) [30].

The complete Intellectual Capital Statement is drafted in six steps [30]:

### 3.2 Intellectual Capital and Influencing Factors

Definitions according to the Intellectual Capital Statement – Made in Germany [30]:

- **Influencing Factor**: In the event of changes, influencing factors affect business success and the organization’s achievement of its goals. They can also relate to tangible (such as plant and machinery), financial (for instance loan and equity capital flows) and intangible assets (such as employee skills and organizational culture).

- **Human capital** covers amongst other things the skills, abilities and motivation of employees. Human capital is owned by employees who can take their knowledge home with them or on to their next employer. Human capital cannot be completely controlled by the organization. Examples of typical influencing factors:
  - HC1: Basic and further training of employees,
  - HC2: Building staff experience,
  - HC3: Building social skills,
  - HC4: Motivating staff, and
  - HC5: Building management competence.

- **Structural capital** covers all those structures and processes which the employees need in order to be productive and innovative overall. It consists of all those intelligent structures which remain when the employees leave the organization after work. Examples of typical influencing factors:
  - SC1: Developing product innovations (research & development),
  - SC2: Developing process and procedural innovations,
  - SC3: Organizing management processes,
  - SC4: Developing a corporate culture,
  - SC5: Cooperating and communicating internally,
  - SC6: Providing information technology and explicit knowledge, and
  - SC7: Transferring and ensuring knowledge.

- **Relational capital** describes an organization’s relations with customers and suppliers, as well as with other partners and the public. Examples of typical influencing factors:
  - RC1: Caring for customer relationships,
  - RC2: Caring for supplier relationships,
  - RC3: Pursuing social commitment, work with
  - RC4: Associations and public relations,
  - RC5: Caring for relationships with investors and owners,
  - RC6: Integrating external knowledge.

### 4. MASS CUSTOMIZATION AND IT’S CONTRIBUTION TO INTELLECTUAL CAPITAL STATEMENT – MADE IN GERMANY

#### 4.1 Vision and Business Strategy

The increasing dynamic of economical activities initiates an innovation competition, that makes a continuous adjustment of performance programs necessary and a long term planning in many cases impossible. The increasing pressure on international competition leads today to the fact that in many branches a position advantage is not sufficient, but above all a top position should be achieved on all relevant action fields. In addition to the cost relevant structure there is also the demand for higher quality and technological leadership, but also for agility and higher supply service [16].

Mass Customization offers here a relatively good alternative to the generic concepts of Porter [19], however still misses the knowledge perspective and the corresponding knowledge system strategy with its strategic and operative knowledge targets in the knowledge evaluation.

#### 4.2 Business Processes - Performance Processes

Organizations are as a rule constructed on a division-of-labor basis. All measures and steps aim to provide a product or service that is useful to the customer. It is also possible to describe this as the performance process, which usually commences with an order and leads via purchasing necessary components and preliminary services, as well as processing them (production or service) through to the actual product of the organization. The sales department ensures that the products are sold to current or potential customers. Consequently, the performance processes are the central, most important processes of an organization around which all other processes gather. It is therefore important to be clear about these processes in order to be able to better evaluate the impact of changes [30].

Basic pattern of the potential formation of Mass Customization is the modularization of the enterprise as well as of the product and the process level (...). In the way of the modularization of the enterprise (process level) traditional hierarchic structures will be replaced by integrated customer oriented processes, which will be set up by relatively small and clear units (process modules), that will be tuned via a central non hierarchical coordination forms [16].

If Mass Customization should make an important contribution in the context of the Intellectual Capital Statement - Made in Germany, then next to the Mass Customization processes also the corresponding knowledge processes should be considered.
4.3 Intellectual Capital and Mass Customization

<table>
<thead>
<tr>
<th>Mass Customization</th>
<th>Human Capital (HC)</th>
<th>Structural Capital (SC)</th>
<th>Relational Capital (RC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differentiation Level</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5 6 7</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>Cost Level</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5 6 7</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>Relationship Level</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5 6 7</td>
<td>1 2 3 4 5 6</td>
</tr>
<tr>
<td>Solutionspace Level</td>
<td>1 2 3 4 5</td>
<td>1 2 3 4 5 6 7</td>
<td>1 2 3 4 5 6</td>
</tr>
</tbody>
</table>

Figure 6: Contribution of the four levels of Mass Customization to the Intellectual Capital.

The researchers must comply with the fact, that Mass Customization can influence the development of the Intellectual Capital Statement – Made in Germany. The current discussions must consider the economy of Mass Customization in broader perspective, with Intellectual Capital included.

6. REFERENCES


5. CONCLUSION

The shift in a direction to Intangible Economy indicates that enterprises should not only manage traditional resources (tangibles) but also consider intangible property (intangibles), which also constitutes the enterprises' value. The first more qualitative results show that Mass Customization

- positively influences the vision/strategy of a company, but the knowledge perspective of the strategy should be added.
- Positively influences business processes, but knowledge processes should be added.
- Positively influences Intellectual Capital (Human Capital, Structural Capital and Relational Capital)

In order to prove and substantiate the first outcomes, the influence of Mass Customization on Intellectual Capital should be quantitatively described.


