The research of virtual production in wood industry

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Abstract

Enterprises with inflexible production structures can no longer survive in a turbulent market, as they cannot react to changes that would lead to their development. In order to satisfy specific customer needs related to quality, quantity, cost and delivery terms, it is necessary to restructure the existing enterprises according to the Taylor principle. One of reconstruction possibilities is the implementation of new co-operation forms that lead to virtual enterprises i.e. changeable networks. A changeable network can only achieve efficiency by means of a modern information and communication technology. This paper presents an idea of a changeable network that can be acceptable for all participants within a virtual enterprise.

Key words: wood industry, co-operation, virtual enterprise, changeable network, information

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The enterprises that will use the knowledge and research results in their transition to the virtual business at reorganising and transforming their activities will withstand the organisation changes faster and less painfully and will find it easier to adjust to the turbulent conditions in economy (TIPURIĆ / MARKULIN 2002).
2 Materials and methods
2 Materiali in metode

Strategic alliances are agreements between firms in which each commits resources to achieve a common set of objectives. A strategic alliance is a formal relationship formed between two or more parties to pursue a set of agreed upon goals or to meet a critical business need while remaining independent organizations.

Partners may provide the strategic alliance with resources such as products, distribution channels, manufacturing capability, project funding, capital equipment, knowledge, expertise, or intellectual property. The alliance is a cooperation or collaboration, which aims for a synergy where each partner hopes that the benefits from the alliance will be greater than those from individual efforts. The alliance often involves technology transfer (access to knowledge and expertise), economic specialization, shared expenses and shared risk.

A virtual organization is an organization existing as a corporate, not-for-profit, educational, or otherwise productive entity that does not have a central geographical location and exists solely through telecommunication tools. A virtual organization comprises a set of (legally) independent organizations that share resources and a skill to achieve its goal, but that is not limited to an alliance for profit enterprises. The interaction among members of the virtual organization is mainly done through computer networks.

A virtual enterprise is a temporary alliance of enterprises that come together to share skills or core competencies and resources in order to better respond to business opportunities, and whose cooperation is supported by computer networks. It is a manifestation of collaborative networks and a particular case of virtual organization.

Experimental research on strategic alliances or virtual organisations was carried out in two parts. In the first part of the research, enterprises from different industrial branches were interviewed on using strategic alliance and virtual organisation. Thirty percent of the eighty-one enterprises that returned the filled in forms expressed a higher profitability than the Slovenian and Croatian percentage. Forty percent of them showed average profitability, while 30% of the enterprises reported lower than the average values.

In the second part of the research, small and medium-sized wood enterprises were chosen from a sample. They were interviewed on the use of the virtual organisation concept. We received seventy-one answers. The sample and the answers are relatively indicating for the situation on the Slovenian and Croatian market.

The results were processed and statistically analysed by Microsoft Office Excel 2003 for Windows computer programme.

3 Results and discussion
3 Rezultati in razprava

The expectations about the participation of enterprises in the strategic alliances are optimistic. Figure 1 shows the expectations of Slovenian and Croatian managers about the future business strategic alliances in Slovenia and Croatia.

Figure 1: Expectations of Slovenian and Croatian managers about the future business strategic alliances in Slovenia and Croatia
Slika 1: Pričakovanja slovenskih in hrvaških managerjev o prihodnjem poslovnem strateškem povezovanju v Sloveniji in na Hrvaškem

Almost two thirds (66.2%) of managers expect that enterprises will be increasingly joining strategic alliances with partners. Another percentage of them (24.6%) think that this increase will be very high. On the other hand, 7.1% of the managers think that the co-operation in the form of strategic alliances will remain at the same or similar level, while only 2.1% believe that the future will bring a decrease in such business activities. Considering the size of these enterprises, small enterprises are extremely pleased about joining strategic alliances (Figure 2).

Figure 2: Expectations of the managements of small, medium and large enterprises on promoting the entry into strategic alliances
Slika 2: Pričakovanja managementa majhnih, srednje velikih in velikih podjetij o pospešenem vstopanju v strateške povezave
A major advantage of strategic alliances is the possibility of contributing to the general competitiveness of enterprises by different business functions. Within the research, the managers were interviewed on the part of business functions that are most suitable for such kind of co-operation.

More than half of the managers (50.8%) consider the entry into new markets as a good support for organising strategic alliances. A slightly lower percentage of managers (48.0%) think that the function of research and development could be a good environment for strategic alliances. Further on, 42.3% of managers believe that production is crucial, while almost the same number of them (38.9%) regard logistics as essential. For 33.1% of the interviewed managers, technology plays the most important role and 30.9% think that marketing is the most important function, while 27.2% of them think that supply activities are essential. Only 14.8% of the examined believe that there is a possibility of strategic alliances through financial functions of the enterprises.

Considering the analysis based on the size of the enterprise, the managers of smaller enterprises think that production is the best support for strategic alliances. Medium and large enterprises look for strategic partners mainly in the areas of research and development (Figure 4).

The results of the experimental research on the establishment of virtual organisation in small and medium wood enterprises have shown the following significant results:

- 89% of small and medium enterprises believe that the virtual organisation alliance will have better business results;

![Figure 3: Appropriate business function for participating in a strategic alliance](image)

**Figure 3:** Appropriate business function for participating in a strategic alliance

**Slika 3:** Primerne poslovne funkcije za sodelovanje v strateških povezavah

![Figure 4: The most suitable business function for participating in a strategic alliance according to the managers of small, medium and large enterprises](image)

**Figure 4:** The most suitable business function for participating in a strategic alliance according to the managers of small, medium and large enterprises

**Slika 4:** Najbolj primerne poslovne funkcije za sodelovanje v strateških povezavah po mnenju managerjev majhnih, srednje velikih in velikih podjetij
– 81% of small and medium enterprises think that virtual organisation is a better variant than the development of formal limitations of classical enterprises;
– 50% of them already use some kind of business contacts and relations with virtual organisations.

An interesting feature is the proportion of total income of small and medium enterprises achieved at different network levels. The following are the results of interviewing small and medium enterprises that use some kinds of business alliances:

– Most managers of small and medium enterprises (38%) have no data on the income percentage realised by business alliance;
– The income proportion of a business alliance within the total income of such enterprises shows that:
  • 16% of small and medium enterprises realise up to 10% of their income through such alliances;
  • 23% of small and medium enterprises realise 10%–25% of their income through such alliances;
  • 10% of small and medium enterprises realise 26%–50% of their income through such alliances;
  • As many as 13% of small and medium enterprises realise 50% or more of their income through such alliances, which is a good result.

Figure 5 shows the income percentages of small and medium wood enterprises realised by business associations.

![Figure 5: Income percentages in small and medium wood enterprises realised through production network](image)

Slika 5: Odstotek prihodka, ki so ga majhna in srednje velika lesna podjetja realizirala skozi mrežno proizvodnjo

Amongst the enterprises that use some kind of business alliances, 72% are satisfied with this type of cooperation. According to the obtained results we may establish that Slovenian and Croatian enterprises are trying to follow modern organisation trends. However, the reason for this seems to be the inclusion of market competition, or their imitation, and the need of intervention. This shows the misunderstanding of such business models. As a result, the errors in choosing the right strategy are also reflected as the errors in choosing the right business partner. The errors in strategic changes can then discourage the managers in making decisions on organisation innovations. Those enterprises that have been successfully united forming quality partnership networks realise better business results (TIPURIĆ / KOLAKOVIĆ 2002).

We shall observe the architecture of the production network and the functioning of the leading enterprise (1999–2005). This enterprise should develop a production network that would welcome independent, adjustable and innovative units. The aim of creating strategic alliances is to increase the adjustability and capability of reacting to buyers’ demands, to stimulate independency and synchronisation of small and medium wood processing enterprises and furniture manufacturers. The project of production network consists of an organisation and production structure with business and production processes based on modern organisation concepts. The leading enterprise has thus been encouraged to develop virtual network production, while a precondition for the competitiveness of the production within the work division has been realised. The leading enterprise in such a strategic structure consists of six departments: manufactured board production, sawmill with seasoning facilities, service and administration. This is accompanied by eleven small and medium-sized wood processing enterprises and furniture manufacturers. The organisation structure of the leading enterprise contains a virtual enterprise whose structure consists of the cooperating association, forming the production network and the distribution and sales centre of wood products. The leading enterprise and the cooperating partners are not separated by competition, but communicate and try to fulfil the market functionalities. The leading enterprise assigns one part of its market orders to the medium, small and trade enterprises. The cooperating partners are in this way united into the leading enterprise. In case of a reduced demand, they can easily focus on the local market changing their supply. The virtual enterprise has unlimited possibilities. Its basic aim is to increase the competitive capability on the market and to seize its larger segment.

Supported by the production network of its cooperating partners, the leading enterprise can thus achieve better adjustability to the market and the production. The cooperating partners carry out a number of services for the leading enterprise (e.g. cross-cutting, resaving and planning, shaping, turning, sand milling, drilling, joining, gluing, surface finishing, assembling, packing, storing before delivery, etc.).

The distribution sales centre whose virtual enterprise has the task to collect products from the cooperating partners...
and assemble them. Its further field of work is wholesale
and retail, the issue of work orders according to the buyer’s
desires and demands, the preparation of the technology,
the building of the production network according to the
work order, the establishment of the capacities, and the
distribution of jobs within the network.

Modern information-communication technology is
applied to the data processing and the preparation of work
orders. The following are the aims of a virtual enterprise:
- higher adjustability and orientation towards the
market,
- to size a larger market segment,
- to increase the capacity use,
- bigger production volume,
- better use of the products,
- higher competitiveness of the products’ prices,
- to increase the profitability,
- to establish a quality-oriented management,
- to focus on the technological process,
- a production network as a priority element of
forming the organisation,
- reinforcement of the firm’s own responsibility,
- team work,
- application of information/communication
technology,
- cooperation beyond the firm’s area (buyer –
supplier),
- gradual introduction of development measures.

The preconditions for proper inclusion of the virtual
enterprise into the world work division and the global
market contest have thus been established.

4 Conclusion
4 Zakluček

The described system of production networks
enables lower product prices, seizure of a larger market
segment, and higher competitiveness and profitability,
enabling better control of costs, production time, quality
and quantity of wood products. It also helps to reduce
capital binding. Lower are also the investments into the
enterprise infrastructure. The waste disposal issue is also
reduced, since one part of the enterprise waste returns
to the manufactured board production. Innovations and
advancements of the production, work organisation,
products, etc., are achieved by network change. The
functions of management, coordination and controlling are
established within the virtual enterprise, offering modern
logistic support to the production network. Altogether, a
better control of the total production costs and high quality
of wood products and services are achieved. The leading
enterprise has all sorts of possibilities of capital investments
and new product projects, marketing, supply, trade,
transport, etc. The participation contributes to the widening
of the network and operation relations (rising employment,
wider product assortment, innovating processes, etc.)

Expectations of the Slovenian and Croatian managers
about the future business strategic alliances in Slovenia and
Croatia are very interesting. 66.2% of managers expect that
enterprises will be increasingly joining strategic alliances
with partners. About half of the managers consider the
entrance into new markets as a good support for organising
strategic alliances. They also think that the function of
research and development could be a good environment for
strategic alliances. A lot of small and medium enterprises
think that the virtual organisation alliance will have better
business results. Amongst the enterprises that use some
kind of business alliances, 72% are satisfied with this type
of cooperation.

Virtual enterprise has also certain disadvantages. It
should have a large sales_SUPPLY market of wood products
and should educate the employed cooperating staff in
the fields of marketing, logistics, engineering, the “new
economy”, e-business, etc. Between the leading enterprise
and its cooperating partners there is infrequently a sense
of distrust. Cooperating partners have old cost-rising
production technology. The flow of the material entails
additional, undesired transport among the cooperating
partners, which increases product prices. The quick
changes of strategies and competition, the changes of
the present technologies with the development of the
new ones, and the changing buyers’ requirements are the
impacts upon a virtual enterprise. The buyer’s influence is
an essential feature of the concept. The absence of modern
information and communication technology inhibits the
communications among the virtual enterprise constituents.
The cooperating partners bear business risks. A necessary
precondition for this is a high competence for individual
jobs and services. The participants are fully responsible
for the terms, quality and quantity of the products and
services. It is important to establish cooperation despite
the competition, because cooperating partners compete among
each other, e.g. by the prices of their services and job
assignments, while they participate in the same production
network. The lack of initial financial means for starting
and developing production network is another weak point.
It is explained by the long cycle of the turnover in wood
processing and furniture manufacture. The economic
indices have not confirmed a particularly high rise and
successfulness of the virtual network production.

5 Summary

In order to survive in the global environment,
Slovenian and Croatian wood-processing enterprises must
specialise in the fields in which they can achieve best
results, on the basis of which they could develop and create
partnerships with complementary business partners.

However, the transformation process (virtualisation)
of Slovenian and Croatian enterprises is slow and accom-
panied by a number of strategic errors that cause crises and enterprise destruction.

Wood processing enterprises must learn fast, implement the acquired knowledge, and permanently develop new ideas. They must also develop a working environment and accept changes, because a change is an opportunity for survival and faster development. The acceptance and adjustment to these requirements are indispensable at the present time.

A significant application of the virtual concept organisation at a micro-level would enable a fast and painless transformation of classical enterprises. At a macro-level, it would increase the competitiveness in wood industry.

According to the presented requirements of a general approach to the development of a virtual enterprise, we may conclude that such an approach enables a series of advantages in wood product manufacturing, although there are certain disadvantages. The forests and forestlands of Slovenia and Croatia are the basis of an intensive development of wood processing and furniture manufacture. A guideline in a leading enterprise reconstruction is the acceptance of the new cooperating and supplying relations focused upon the virtual enterprise and its production network. The chief guideline of a virtual enterprise is the possibility that a product is made at any time and everywhere, in any form and size. This means that the whole organisation of the leading enterprise should be established so that it can offer its buyers individual and immediate supply of the desired product. This is the central place in the development of organisation and production structures, and it offers unlimited possibilities on the wood product market.

5 Povzetek

Če želijo slovenska in hrvaška lesno-industrijska podjetja preživetvi v globalnem okolju, se morajo specializirati za področja, v katerih lahko dosežejo najboljše rezultate, na katerih bodo razvijala in oblikovala partnerske specializirati za področja, v katerih lahko dosežejo najboljše podjetja preživeti v globalnem okolju, se morajo tako povečala konkurenčnost celotne lesne branže.

Na osnovi rezultatov raziskave in prikazanih zahtev po splošnem pristopu k razvoju virtualnega podjetja lahko zaključimo, da tak pristop zagotavlja številne prednosti v lesni proizvodnji, ima pa tudi določene pomanjkljivosti. Slovenski in hrvaški gozdi so osnova za intenziven razvoj predelave lesa in proizvodnje pohištva. Ena izmed smeri rekonstrukcije vodilnih podjetij je sprejem novih odnosov s kooperanti in dobavitelji, pri čemer je treba težiti k virtualnemu podjetju in njegovi proizvodni mreži. Rdeča nit virtualnega podjetja je možnost, da se proizvod lahko izdela vedno in povsod, v vsaki obliki in velikosti. To pomeni, da se mora celotna organizacija vodilnega podjetja postaviti tako, da svojim kupcem omogoča individualno in trenutno nabavo želenih proizvodov. To je osrednje mesto v razvoju organizacijskih in proizvodnih struktur in omogoča neomejene možnosti na trgu lesnih proizvodov.

6 References

6 Viri


