

A FRAMEWORK FOR RESEARCH OF IT APPLICATION IN CROATIAN CONSTRUCTION COMPANIES

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ABSTRACT

Croatian construction companies are passing dramatically changes by privatisation and restructuring of their business processes. They tend to better adaptation to fast changing business environment, according to the modern market needs. The Croatian (as well Bosnia and Herzegovina) economy is today, and will be in the near future, under huge reconstruction and development efforts.

The market conditions in these Republics are for now: scarcity of financial means, scarcity of personal educated and trained in modern management methods, scarcity of some profiles of skilled people in construction, very strong competition of foreign companies, since Croatian (and B&H) market is now open for foreign competition.

The specific after war conditions include also new legal and business structure (completely new legislative based on the practice of developed western democratic states) new financial structure and institutions (also based on the financial structure of the developed countries).

In the chaining of the subsystems: [ownership - undertaking - management - transformed ownership], information technology is fundamental but not sufficient enabler for quality decision making and efficiently management of the construction processes. Based on the IT application, there are required educated and trained management people, who make adequate decisions, and carry on decision realisation.

By adequate IT application, design and construction processes are probably rationalised and accelerated, by satisfaction of the high quality standards, so that construction companies could easier adapt to market needs.

In the paper is presented research framework and description of the research approach, as well some preliminary results of IT application in Croatian construction.

KEYWORDS

Information technology, Construction processes, Construction Company, Research



BASIC TRENDS BY RECENT CORPORATIONS

The basic trends that are recognised by management scientists can be summarised as:

- ◆ Organisations are becoming knowledge based
- ◆ Knowledge in many disciplines has a shelf life
- ◆ Globalization will drive technology adoption
- ◆ Workgroups are changing
- ◆ Virtual corporations are forming (Currid & Company, 1994.)

Peter Drucker in his Harvard Business Review article “The New Society of Organisations”, HBR, 1992., wrote:

“In this society, knowledge is the primary resource for individuals and for the economy overall. Land, labour and capital - the economist’s traditional factors of production - do not disappear, but they become secondary. They can be obtained, and obtained easily, provided there is specialised knowledge.”

The same author in his article “The Coming of the New Organization” (Drucker 1991.) wrote:

”Now we are entering a third period of change: the shift from the command-and-control organization, the organization of departments and divisions, to the information-based organization, the organization of knowledge specialists. We can perceive, what this organization look like. We can identify some of its main characteristics and requirements. We can point to central problems of values, structure and behaviour. But the job of actually building the information based organization is still ahead of us..”

What are necessary characteristics and requirements (organization, IT, personnel, other) for design and operation of the modern construction company? In which degree IT application (modern information technologies, expert systems, CAD/CAM, GIS, CASE) are influencing the success of the construction company in Croatia? What are other factors influencing (knowledge degree, psychological state, business environment, market)?

Is the information really a resource in Croatian construction company? Is the information adequately used to drive continuous improvement in construction productivity, quality and customer service?

Based on such and other related questions research programme under the title “Development of IT application in Croatian construction companies” has been developed proposed to and accepted by Croatian Ministry for science and technology.

THE RESEARCH GOALS

The established goals of the research programme “Development of IT application in Croatian construction companies” are:

- Continually research of IT application development in companies that are active in design, construction and maintenance of construction objects.
- Comparative overview of IT application state to different criteria

- Proposition of strategy development of IT application in Croatian construction
- Creation of IT data base for information and experience exchange between the foreign and domestic construction companies
- Proposition of education programme of IT application in construction

IT APPLICATION IN THE CROATIAN CONSTRUCTION COMPANIES IN THE YEAR 1990.

According to the limited research study in the year 1990. IT application in the Croatian construction companies has been recognised relatively low degree of the IT application. There were only 4,8% of all construction firms, that owned and used IT.

In the construction companies IT was prevalent used for of the past events recording (for example, all sorts of bookkeeping), which means that IT potential is probably underused for efficient management of the construction (business) processes.

IT has been prevalent used (70 - 100% of capacity) for bookkeeping operations (inventory, payroll, financial books, real estate recording and similar), partially (0-15% of IT capacity) for support of estimating, price calculations, invoicing and with very small part of IT capacity (0-5%) for the technical calculations (structural calculations) as well planning, optimising and control of the construction work processes (projects).

In the meantime, because of the war in Croatia and Bosnia and Herzegovina, there were no any researches of IT application in Croatian construction companies, so we tried last year to establish researches that will accept all changes during eight years period. As we noted, there were huge changes in company's environment, as well in IT technology itself.

RESEARCH SUBJECT

How many and how is IT used in construction business processes? What is state of the art in IT application in Croatian construction processes? Do actual IT application is supporting quick and quality construction company development? What is state of the art in management techniques application in relations of:

Common relations:

Croatian construction - some foreign constructions?

Construction - other economy branches, domestic and foreign?

Preparations - Design - Construction - Maintenance of construction objects?

State - private companies?

Correlation of the IT application and construction company success; etc.

Organization relations:

Personnel (managers and information systems personnel)

IT equipment

Company efficiency (profit, service levels)

Organization type (Project, phase, territory, professional, mixed)

Such comparisons should enable clearer recognition of the state and trends of construction companies development. That would build the information base for making recommendations for further Croatian construction company development in the area of IT application.

Collected research data can be used for IT transfer between construction companies, new IT technology experience transfer, investment cost estimation, personnel education development etc.

This data base could be very useful for the process of the construction company privatisation and restructuring in Croatia, as well help by establishing of the internationally competitive modern construction companies.

PROPOSITIONS

Information systems, by IT application, should support of decision making by phases: a) situation recognition, b) phase of making choices between alternative activity sets for realisation of business goals and plans and c) phase of decision controlling. All phases are realised by three known decision levels: strategic, tactical and operational.

By the developing the research programme we made several propositions on the characteristics and requirements of the modern information-based construction company organization:

1. The company's management is systematically educated and trained in modern management techniques and IT uses.
2. The management and staff people are capable in direct IT using.
3. The construction company is prevalent private owned.
4. The modern construction company versus classical command and control company, has less hierarchical organizational levels.
5. The modern construction company use advanced IT (expert systems, CAD/CAM, CASE; GIS; OR etc.).
6. In the modern construction companies managers are regularly and directly using IT capabilities - for example PC on the managers table.
7. The modern construction company is using LANs/WANs, i.e. Internet/Intranet.

Based on these and other propositions there were developed research questions that should enable collection first set of research data, as the basis for further refinements and researches.

THE QUESTIONNAIRE

The questionnaire was at the end of December 1997. distributed to 85 construction firms in Croatia. It was sent to contractors, consulting firms, designers and construction materials producers.

There were 22 filled questionnaires returned at the end of January 1998.

The questionnaire has 38 questions, that are grouped according to following areas:

- Company ownership: state - private

- Main activities - processes
- Number of employees and structure (productive, non-productive, management)
- Company turnover in Croatia and abroad
- Company's organizational structure
- Information systems development and operations
- Operation systems, data bases, programming languages, CASE tools, DSS, expert systems
- Hardware
- IT personnel
- Development plans
- Business process reengineering plans and reasons for
- Networks (LAN/WAN)

In the questionnaire was proposed some "standard" set of application programs and information subsystems: CAD(computer aided design), EDI(electronic data interchange), GIS (geographic information systems), Internet/Intranet, Construction Estimating, surveying and work unit calculations, Bookkeeping, Personnel planning and payroll, Work orders, Strategically and tactical planning and control, Construction management, Financial management, Material management, Equipment management, Structure calculations.

SOME QUESTIONS

In the time of paper writing there are not completely processed inquiry data, but some questions are simple for processing. For example, on question: "Do You consider IT application was one of the critical factors of competitive capability of Your company last Year?"

Roughly 60% answers was NO!

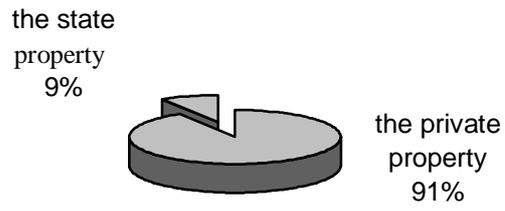
On the question: "Do You foresee IT as critical factor of competitive capability in the future?"

Some 14% of answers were NEVER.

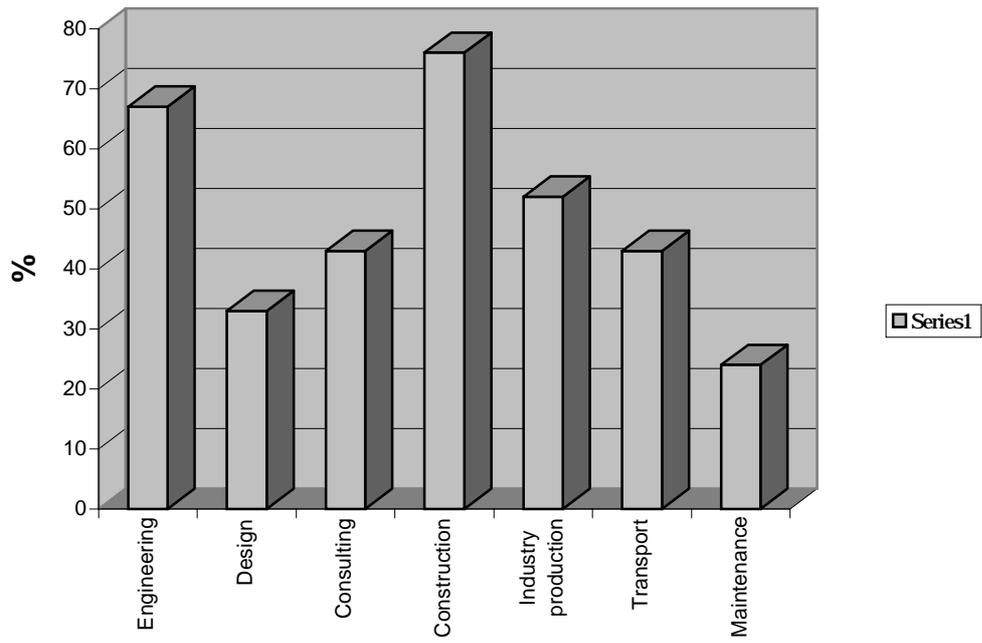
Such answers indicate that Information technology plays an important role in Croatian construction company today, but it does not necessarily play a strategic role, although we have expected higher degree of IT importance in companies. This shows relatively low dependence on IT for everyday business.

Some other questions:

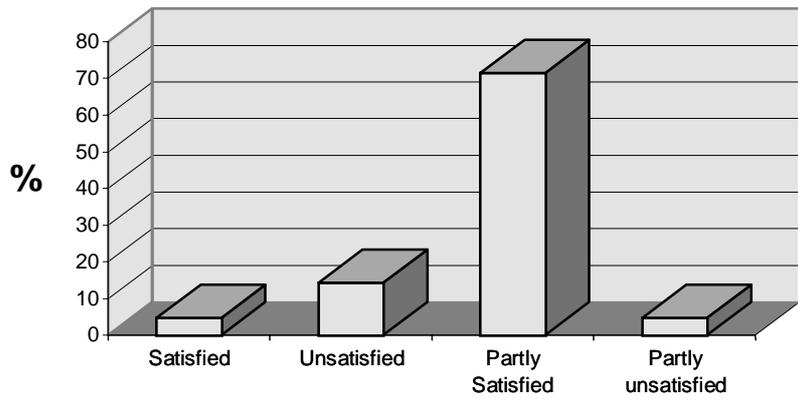
Owners of construction companies



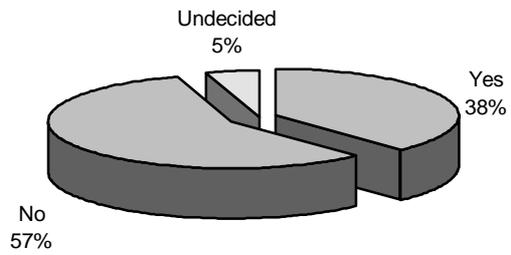
Main Activities of companies



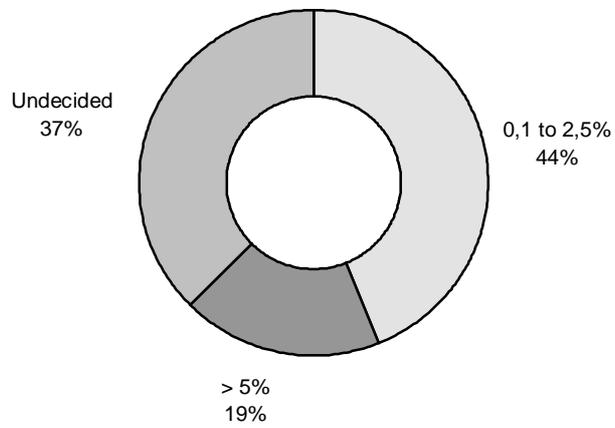
Satisfaction with IT



Is IT useful for business ?



Investment in IT



Will this be changed in the future development of construction processes? Can IT in construction processes in Croatia be a major driver for construction processes transition, even reengineering?

Answers on such questions require more in depth research, which will be made during next three years of planned research.

SUMMARY

The presented framework for the research programme: “Development of IT Application in Croatian Construction” enabled setting of the specific research questions, that are only base for further research programme improvements. There were recognised the characteristics and requirements of the modern information based construction company.

The preliminary results of the research in Croatia, depicted somehow unexpected facts, that require further research.

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