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Management information system based on the balanced scorecard

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Abstract

Purpose – This study seeks to describe the planning and implementation in Finland of a campus-wide management information system using a rigorous planning methodology.

Design/methodology/approach – The structure of the management information system is planned on the basis of the management process, where strategic management and the balanced scorecard approach have important roles.

Findings – The balanced scorecard approach is useful not only in accomplishing the objectives, measures and targets of the institutional strategy but also in the planning of the management information system.

Practical implications – The findings of the study are useful for educational administrators, project managers, software developers and usability specialists.

Originality/value – This study contributes to the knowledge and practice of campus-wide information systems applying the balanced scorecard approach as a basis for the management information system to translate the strategy into action.

Keywords Higher education, Strategic planning, Balanced scorecard, Management information systems, Finland

Paper type Case study

Introduction

The autonomy of higher education institutions (HEI) has increased in recent decades. The development towards autonomy has, on the other hand, increased the accountability of HEIs to their stakeholders including the Ministry of Education, owners and students. The increased accountability emphasises strategic management and the efficient implementation of strategic plans. Appropriate information technology (IT) is needed to support management in higher education.

Strategic management is a matter of mapping the route between the perceived present situation and the desired future situation (Wheale, 1991; West-Burnham, 1994). Strategic management involves taking stock of the educational policy, local economy and other factors in the organisation's environment. It adapts the organisation to its environment, but on the other hand, tries to exert a positive effect on the development of its local community (Middlewood and Lumby, 1998; Bush and Coleman, 2000; Kettunen, 2003).

The balanced scorecard approach developed by Kaplan and Norton (1992, 1993) is a framework for the communication and implementation of strategy. The approach creates a shared understanding of the selected strategies, because it translates the strategy into tangible objectives and balances them into four different objectives: customer, finance, internal processes and learning.

The balanced scorecard has been used extensively in Finnish HEIs. It supplements traditional accounting information. It does not only describe the monetary figures but also reports on the real course of events in the organisations. Therefore the management information system should include a description and measures as to how

the strategic objectives will be achieved. The balanced scorecard is easily left halfway due to the fact that the existing information systems do not directly support the approach.

This study describes how a management information system using the balanced scorecard was planned and implemented at Turku Polytechnic. The entire management process was described during the development project to generate information for the IT instruments. The management information system developed is clearly strategic, because it directly supports and shapes the competitive strategy of an organisation as explained by Remenyi (1990).

The balanced scorecard approach was introduced in 2002 at Turku Polytechnic. It was followed by the thorough description of the management system starting at the beginning of 2004. The data warehouse approach turned out to be useful in capturing data from the diverse source system and storing them in the integrated database. Finally an information system with a portal was developed during the years 2004-2005. The new portal is open to management and personnel of the HEI. It will increase the transparency of how the objectives will be achieved. The management system enhances strategic dialogue and supports the commitment of the personnel to the chosen strategic outlines.

Strategic planning is the bridge for the future

The educational policy has increased the autonomy of Finnish polytechnics. One important step in this development is the new Polytechnics Act of 2003. This change is part of a broader Western development, which, according to Lampinen (2004), is characterised by decreasing direct steering of HEIs by central government. One of the manifestations of deregulation in Finland is that municipal or private owners have been allowed to maintain polytechnics.

The higher education policy is called result-oriented doctrine (Niemelä, 2004). The official rhetoric emphasises the self-directedness of HEIs. It holds HEIs accountable for how they deploy their resources. At the same time HEIs are given more options and power to decide which operations they focus on and where they target their resources. The normative and resources regulation by the state has changed into information and result-oriented steering (Raivola, 2000). HEIs are expected to meet the needs of society and to act as societal service providers.

It is evident that the increased autonomy presupposes much stronger management at HEIs. Analyses of autonomy and self-regulation in higher education do not provide specific tools for management in higher education (Maassen and Stensaker, 2003). Strategic management is a strong candidate for the framework of management and it is widely used in Finnish HEIs. To understand the issue better, one must contemplate the essence of strategic management to achieve a better future in higher education.

The strategies typically focus the activities of HEIs in specific fields of education or other activities to meet the needs of the local community and society. Another typical strategy is the operations excellence theme, which can also be described in terms of cost efficiency. HEIs try to improve the efficiency of their processes in order to direct more resources to improved quality and increased output. These strategies are presented in a generic form by Porter (1990), but they may assume different kind of forms according to the needs of the organisation (Kettunen, 2002).

The strategic themes of an organisation have their roots in the general strategies and strategic thinking. Strategic themes describe what management believes must be done to achieve the desired outcomes and succeed in the future. Each HEI has a unique set of strategic themes, which are specific to its environment and internal potential to meet the needs of the students, employers and other stakeholders.

The main strategic theme of Turku Polytechnic is "high quality learning", which is described by five specific themes as follows.

High quality learning:

(1) External impact on the growth areas of the region.

(2) Quality from cost efficiency.

(3) Research and development to serve education and working life.

(4) Education to meet the needs of the region.

(5) Turku Polytechnic to develop the entrepreneurship in Southwest Finland.

The strategy takes into account the development plans of the region, the efficiency of the internal processes and the main activities of the HEI including research, education and entrepreneurship. The strategy process of all levels of the organisation produces objectives, which are linked together in a consistent and coherent manner. This incorporates strong central steering, strategic management and incentive-based financing. The management of HEIs is assuming more integrated, strict but at the same time loose forms (Meyer, 2002).

Balanced scorecard translates strategy into action

The evaluation of internal processes and outcomes is essential in the development of HEIs. The main tools of quality assurance are self-evaluations and external audits. They are, however, often one-off projects left outside of overall management. As a consequence, they impact slowly through the general discussion, but their direct impact on the development of operations is typically small. The efficient management of HEIs needs continuous evaluation, which is part of the management information system.

It is noteworthy how great an importance is attached to the management in the overall evaluations and quality audits of HEIs. A similar emphasis occurs in many well-known quality award criteria such as EFQM. Another important component in the evaluation of organisations is the strategic plan and how it is integrated to the internal processes. It is evident that the evaluation of the strategy and its implementation need a proper framework.

The modest impact of evaluations on the management is paradoxical. Hämäläinen and Kantola (2002) emphasise that the evaluations of the Finnish Higher Education Evaluation Council specifically aim at developing the performance of HEIs, not at overseeing or controlling it. The HEIs are allowed to participate in the planning of the evaluations, which increases their commitment to the assessment and encourages them in-depth self-evaluations and the utilisation of the evaluation reports. Evaluation may not necessarily receive the attention it deserves unless it is integrated into the management information system.

The balanced scorecard introduced by Kaplan and Norton (1996, 2001 and 2004) has become the mechanism for planning, creating strategic awareness among the members

of the organisation and translating the strategy into action. The experiences of the study by Kettunen (2004) testify to the applicability of the balanced scorecard, in both the evaluation of strategies and also across a wide range of operations. The balanced scorecard can be used in evaluation, because it has been used in the planning, description and implementation of the strategy.

The balanced scorecard framework usually includes four perspectives:

(1) *Customer*. The customer perspective includes the desired objectives of regional development. It also describes the student and employer satisfaction generated in the internal processes.

(2) *Finance*. The financial perspective describes the public funding and external income. The funding is aligned with the internal processes and structures in the budget of an organisation.

(3) *Internal processes*. The internal processes perspective describes the internal sequential processes and structures of organisational units. These processes create value for customers.

(4) *Learning*. The learning perspective describes the drivers for future performance and what learning and capabilities are required in the internal processes.

Four perspectives have been found to be necessary and sufficient in both private and public organisations (Kaplan and Norton, 1996, 2001). The customer perspective has been divided in some Finnish public sector organisations, such as the City of Turku, into social and customer service perspectives, but this does not essentially add any contribution to the implementation of the strategy in higher education. Therefore four perspectives have been used in our case.

When applying the balanced scorecard it is evident that measuring is not just reporting past events, but also planning for the future with the help of measures. Management can communicate to the personnel what are the important objectives are. The budgeting and internal processes must be aligned with all the desired objectives. The achieving of objectives in the different perspectives is evaluated in the reporting phase. The linkages between the objectives and other dynamic features of the strategy must be explicitly taken into account in the management information system.

The balanced scorecard communicates the strategic objectives of the organisation and the means of achieving them. Members of the organisation in all the administrative units are able to understand the contents of the strategy and their own respective roles in executing it. A systematic description supports the implementation of the strategy. The success of the strategy can be assessed by observing the outcomes from the balanced scorecard.

Figure 1 presents the strategy map of Turku Polytechnic. The concept of a strategy map was introduced by Kaplan and Norton (2001, 2004). A strategy map is like a road map, which describes only the main characteristics of the strategy on the way to a better future. A strategy map includes a linked series of objectives located in the different perspectives and incorporates a set of cause-and-effect relationships among the objectives. The definition of the objectives and linkages may be based on research, experience or hypotheses.

The customer perspective includes two objectives, namely regional development and customer satisfaction. These objectives can be achieved as a result of the
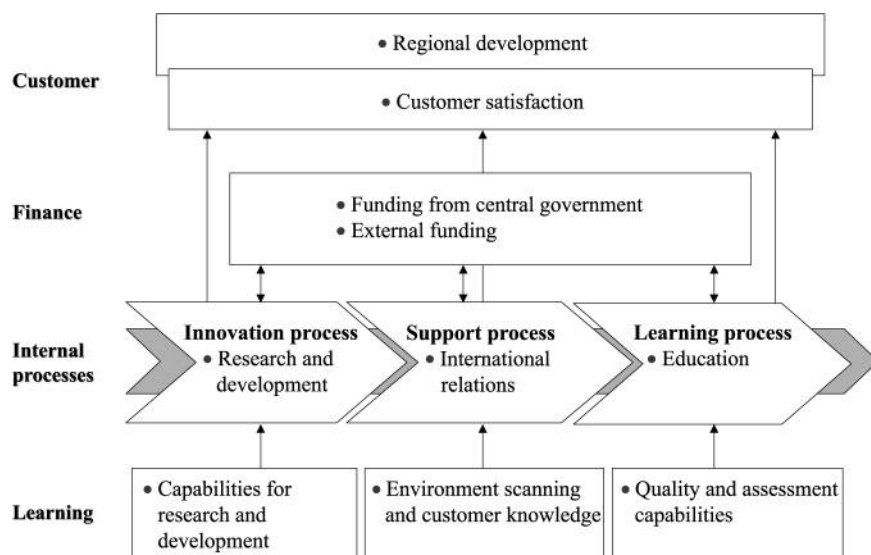
Figure 1.
Strategy map of Turku
Polytechnic

innovation, support and learning processes described in the internal processes. The financial perspective includes funding from central government and external funding. The learning perspective includes objectives which are prerequisites for efficient internal processes. HEIs must have capabilities for research and development. They must also have knowledge of their local, national and international customers and partners in order to plan the education to meet their needs. The HEIs must also have quality and assessment capabilities accompanied by pedagogical skills.

Table I describes the overall balanced scorecard of Turku Polytechnic. It includes objectives, measures and targets for each year of the planning period. The measures and targets are updated annually as a result of negotiations between the senior management team and each administrative unit. Each of these units has their own balanced scorecard, which is aggregated to the overall balanced scorecard. The columns for 2003-2004 include actual figures. The targets for the planning period 2005-2007 were set in 2004.

Already in 2002 it was realised that utilising the balanced scorecard properly would require a more sophisticated IT support system. The difficulties in applying the balanced scorecard at Turku Polytechnic were attributed to two problems:

(1) *Ambiguity of measures*. The content and the definitions of measures were ambiguous. The level of interpretability was too high. Misunderstandings were common, and thus the reliability of information was inadequate. This undermines reliance on the balanced scorecard and its utilisation in strategic management.

(2) *Manual maintenance*. The maintenance of the management information system database containing the measures of the balanced scorecard was manual and thus arduous despite the fact that outcomes were followed and targets were set only once in a year. The data could not be transferred into the database directly from the basic information systems, among them student administration,

Perspectives and objectives	Measures	2003	2004	2005	2006	2007
Customer						
Regional development	Employed graduates (%)	63	60	75	75	75
	Graduates who remain in the region (%)	75	75	75	75	75
Customer satisfaction	No. of applicants per study place	5.2	5.1	4.6	4.7	4.8
	Student satisfaction on a scale of 1-5 where 5 is highest	3.3	3.3	3.3	3.4	3.5
	Employer satisfaction on a scale of 1-5 where 5 is highest	3.3	3.7	3.9	4.0	4.0
Finance						
Funding from central government	No. of students	7,357	7,196	7,400	7,400	7,400
	No. of young students	6,119	6,017	6,150	6,150	6,150
	No. of adult students	1,238	1,179	1,250	1,250	1,250
External funding	External fundings % of total expenses	12	13	16	18	20
	Funding of research and development, (%) of total expenses	4.3	5.0	8	9	9
Internal processes						
Research and development	No. of researchers	24	32	40	50	50
	No. of R&D projects	54	94	136	149	159
	No. of publications in own series	31	30	62	72	84
	No. of published articles	88	85	97	118	146
International relations	No. of outgoing exchange students	284	256	323	353	380
	No. of incoming exchange students	154	201	248	279	307
Education	Intake (%) of study places	105	107	105	105	105
	Drop-outs (%) of students	7.6	9.5	5	5	5
	Average no. of credits (ECTS)	39	51	51	51	51
	Average length of study in years	4.2	4.1	4	4	4
	No. of degrees	1,358	1,483	1,500	1,500	1,500
	No. of days in continuing education (thousands)	127	110	110	110	110
	No. of participants in continuing education	7,204	5,292	6,000	6,000	6,000
Learning						
Capabilities for research and development	No. of licentiate degrees	49	49	76	84	84
	No. of doctorates	27	36	46	61	66
	No. of employees in postgraduate education	86	98	87	96	103
	No. of employees in other long-term education	184	163	180	180	180
Environment scanning and customer knowledge	No. of teachers in working life exchange	21	34	29	31	33
	No. of internal audits	20	19	14	14	14
Quality and assessment capabilities	No. of management reviews	1	1	2	2	2
	No. of external evaluations	6	4	3	3	3

Table I.
Balanced scorecard of
Turku Polytechnic

personnel management and financial management systems. The data had to be manually recorded in the database. The use of measures combining data from several basic systems was practically impossible.

Our experiences show that the balanced scorecard may well be an insufficient tool to communicate and implement the strategy due to the unreliable measures and troublesome calculation. A proper management information system presupposes modelling the entire management process and tailoring all the necessary components of the IT support system to meet the needs of the organisation.

The management process is the basis for the management information system

The project for management development was launched in 2004 at Turku Polytechnic. At the beginning of the project, an analysis of the existing state of affairs showed that the connection between strategic and operative planning was unclear. The target steering of the Ministry of Education, strategic planning, balanced scorecard, budget, action plans and the workload plans of the personnel appeared too much as separate phenomena.

The management process includes a sequence of management activities, which includes the following elements:

(1) *Objectives*. The strategic planning produces objectives based on the learning and capabilities of the organisation.

(2) *Operations*. The operations of the internal processes are planned to achieve objectives.

(3) *Resources*. Financial resources are allocated in the budgeting process for the operations in a way which enables achieving the objectives.

(4) *Results*. Operations are carried out and steered to achieve the desired objectives within an agreed time and budget. The achievement of the results is monitored and ensured.

It can be seen that the elements of the management process are in line with the dynamic features of the balanced scorecard.

The executive management of the polytechnic organise annual internal target negotiations with each administrative unit. The negotiations include the evaluation of the results achieved, the development of operations, the allocation of resources and the agreement about the measures and target values of the balanced scorecard. The internal target negotiations were felt to be frustrating due to unreliable data.

Considerable sums of financial support were allocated to research and educational development with separate decisions outside the target negotiations. The procedure did not support the management of the whole organisation. This was also felt to pose a planning problem in the administrative units. The discrepancies between the ideal and reality indicated the need to redefine the management process and develop a better management information system.

Figure 2 describes the main phases of the management process, where the minor details have been omitted. At first stage of the development project all the detailed phases of the management process were described and developed using flow diagrams

Figure 2.
Main phases of the
management process
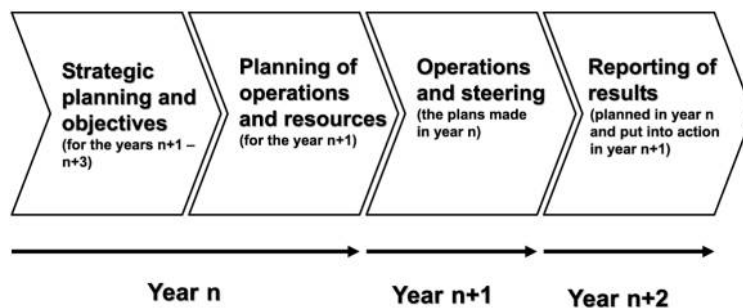
and instruction documents. Changes were made in the timing and meetings included in the management process.

The first phase of the main process takes place from January to April and includes strategic planning and objective setting. The phase incorporates the result analysis of the previous year, the updating of strategy based on the analysis of the environment, the target negotiations with the Ministry of Education and the budget negotiations with the owner of the polytechnic. All the administrative units of the polytechnic draft and update their strategic development framework within the management information system.

The second phase of the management process begins in May and includes operative planning and budgeting for the three next years according to the owner's instructions. By the end of August the polytechnic and the administrative units will complete the plans including the budget, action plans and personnel plans. The Board of the Polytechnic will propose the overall budget to the City of Turku in September. Thereafter the executive management of the Polytechnic will carry out the internal target negotiations with the administrative units in October and November. The city council will ratify the budget proposal in November, after which the necessary adjustments will be made in the budget and action plans at various levels of the organisation.

The third phase includes implementation and monitoring, which takes place the following year. The polytechnic reports on the achievement of economic and operative targets to the City of Turku twice a year. The senior management team and administrative units of the polytechnic follow the economy and operations in meetings using real time reporting.

The fourth phase of the process includes the annual report. This is written during the first quarter of the year to meet the needs of the executive management, owner and other stakeholders. The Ministry of Education also requires reporting about how the agreed targets have been achieved. The self-evaluation report is evaluated in March-April in the target negotiations with the Ministry of Education. Other reports such as the report of the sustainable development are also produced annually.

Development of the management information system

At the beginning of the development project there were great shortcomings in the IT architecture. The data collected for the balanced scorecard were fragmentary and unreliable. The data were collected largely manually. Nor was there any

documentation of the data collection processes. One of the problematic features was that the data collection and processing were tied to individuals. A significant part of the data was in Word and Excel files scattered in the home directories of different individuals.

A lot of overlapping data were collected separately at the Polytechnic. For instance, the basic data needed in the assessment of degree programmes by the Higher Education Evaluation Council was collected all over again without utilising the existing data annually collected for the statistical AMKOTA report of the Ministry of Education. The continuous usability of information was weak and inadequate. It is evident that this kind of scattered IT architecture is inadequate for the management information system.

The goal set for the development project was to create an appropriate, uniform and open management information system to support the management process. It was obvious that the system planned would provide clear benefits as generally required for such projects (Galliers and Sutherland, 1991; Galliers *et al.*, 1995). The purpose was also to forge firm links between the objectives, operations, resources and results. It was also important that the strategic planning and the balanced scorecard with all the necessary elements would permeate all levels of the organisation from the institutional level to the level of the administrative units to the degree programmes and also the level of individual employees.

The linking of individuals to the management process can be achieved by linking the individual workload plans to the action plans of the administrative units. Typically the teachers and other personnel have their workload plans which are approved annually by the educational directors. This enables the alignment of human resources with the objectives of the administrative units. In project management it is also important to link the working hours to the goals of the project.

The process description is a necessary phase, because it helps the administrators to identify and avoid overlapping operations. The process development also facilitates scheduling to take account of the target steering and AMKOTA statistics of the Ministry of Education and the budgeting and monitoring of the owner. It was therefore appropriate to schedule the internal target negotiations of Turku Polytechnic for October and November, making the target negotiations a genuine management tool.

The project also included the definition of concepts and the writing of process documents, which are necessary for the automation of the data processing and IT support. About 700 concepts were found at different levels of the organisation and defined for the information system. Rules were defined for the aggregation and transformation of the source data created at the lower levels of the institution.

The data warehouse approach was used for effective utilization of the existing data. Data warehousing captures data from separate basic data sources and directs them into an integrated database (Inmon, 1996; Guan *et al.*, 2002), which facilitates the management information system. The essential data for management are no longer acquired arduously from separate basic data sources or personal files.

A new portal was developed to exploit the advantages of data warehousing. It was planned to make the portal of the management information system available to various individuals. The members of the organisation will have varying user rights and roles in the portal. The portal has a library of electronic forms, enabling different

organisational units to draft their strategic plans, action plans, budgets, workload plans and reports. The portal also includes software for project management.

The development programmes of the institution were integrated into the management system. The executive management has taken strategic initiatives to support research and educational development to meet the needs of the local community and society. An internal competition was arranged to allocate central funding for the best development projects. The project proposals of the various administrative units were assessed and finally settled in the internal target negotiations.

A strategic development framework was built into the portal for the institution and its administrative units. The detailed planning of documents located in the framework is necessary to enable the automation of the management process. The documents were designed for strategic planning and the balanced scorecard, including strategic objectives and measures. The consistent and concrete action plans of the administrative units can be written using the strategic development framework.

The new integrated management information system has improved the efficiency of information production. It enables continuous production of reliable and up-to-date information, which can be used centralised and decentralised in all the administrative units. The reliability of information production has improved, because the concepts and processes are well-defined. The new system also allocates the time of administrators so that the focus of management is shifted from data collection to its analysis and interpretation.

Conclusions

The balanced scorecard creates strategic awareness among the members of the organisation and aligns the strategies of different administrative units. It helps to create a shared understanding about the efforts and steps needed for change. The balanced scorecard translates the strategy into tangible objectives and measures. The experiences of this study testify to the applicability of the balanced scorecard as a basis for a campus-wide management information system.

Management in knowledge intensive organisations requires organised and controlled IT architecture. The data warehousing approach provides an integrated database to facilitate the technical infrastructure of management. Data warehousing provides a centralised database that integrates data derived from diverse data sources. It provides an effective means for handling large amounts of data needed in the management process.

A portal was developed for the management information system. The new IT system reads the data from basic data sources and combines them in the data warehouse, where they are available for the portal. The portal can be used by a web browser and it can be used by all the members of the personnel. An advantage of the decentralised system is that teachers and others can directly see how they contribute with their workload plans to the strategy of the administrative unit and the whole institution.

The system supports the re-use of data so that extra data collection can be avoided. The data can be collected from different levels of the organisation and aggregated to the institutional level. Rapid response is often necessary for decision makers in their *ad hoc* information requests. The information can be retrieved whenever needed. The

introduction of the strategy can be continuously monitored openly by everyone in the organisation. The trends and development of operations can be monitored and evaluated in order to make necessary changes to achieve the desired strategic objectives.

References

Bush, T. and Coleman, M. (2000), *Leadership and Strategic Management in Education*, Paul Chapman Publishing, London.

Galliers, R.D. and Sutherland, A.R. (1991), "Information systems management and strategy formulation: 'the stages of growth' model revisited", *Journal of Information Systems*, Vol. 1 No. 2, pp. 89-114.

Galliers, R.D., Swatman, P.M.C. and Swatman, P.A. (1995), "Strategic information systems planning: deriving comparative advantage from EDI", *Journal of Information Technology*, Vol. 10 No. 3, pp. 149-57.

Guan, J., Nunez, W. and Welsh, J.F. (2002), "Institutional strategy and information support: the role of data warehousing in higher education", *Campus-Wide Information Systems*, Vol. 9 No. 5, pp. 168-74.

Hämäläinen, K. and Kantola, I. (2002), "Mitä arvioinnit kertovat ammattikorkeakouluista", in Liljander, J.P. (Ed.), *Omalla Tiellä, Ammattikorkeakoulut Kymmenen Vuotta*, Edita, Helsinki.

Inmon, W.H. (1996), *Building the Data Warehouse*, John Wiley & Sons Inc., New York, NY.

Kaplan, R. and Norton, D. (1992), "The balanced scorecard: measures that drive performance", *Harvard Business Review*, Vol. 70 No. 1, pp. 71-9.

Kaplan, R. and Norton, D. (1993), "Putting the balanced scorecard to work", *Harvard Business Review*, Vol. 71 No. 5, pp. 134-47.

Kaplan, R. and Norton, D. (1996), *The Balanced Scorecard*, Harvard Business School Press, Boston, MA.

Kaplan, R. and Norton, D. (2001), *The Strategy-focused Organisation*, Harvard Business School Press, Boston, MA.

Kaplan, R. and Norton, D. (2004), *Strategy Maps*, Harvard Business School Press, Boston, MA.

Kettunen, J. (2002), "Competitive strategies in higher education", *Journal of Institutional Research*, Vol. 11 No. 2, pp. 38-47.

Kettunen, J. (2003), "Strategic evaluation of institutions by students in higher education", *Perspectives: Policy and Practice in Higher Education*, Vol. 7 No. 1, pp. 14-18.

Kettunen, J. (2004), "The strategic evaluation of regional development", *Assessment and Evaluation in Higher Education*, Vol. 29 No. 3, pp. 357-68.

Lampinen, O. (2004), "Vapaus ja autonomia ammattikorkeakouluissa", in *Ammattikorkeakouluetiikka, Opetusministeriön julkaisuja*, No. 2004:30, Yliopistopaino, Helsinki, pp. 19-25.

Maassen, P. and Stensaker, B. (2003), "Interpretations of self-regulation: the changing state-higher education relationship in Europe", in Begg, R. (Ed.), *The Dialogue between Higher Education Research and Practice*, Kluwer Academic Publishers, Dordrecht, pp. 85-95.

Meyer, H.D. (2002), "The new managerialism in education management: corporatization or organizational learning?", *Journal of Educational Administration*, Vol. 40 No. 6, pp. 534-51.

Middlewood, D. and Lumby, J. (1998), *Strategic Management in Schools and Colleges*, Paul Chapman Publishing Ltd, London.

Niemelä, P. (2004), "Ammattikorkeakoulujen asema, rooli ja arvoperusta", in *Ammattikorkeakouluetiikka, Opetusministeriön julkaisuja*, No. 2004:30, Yliopistopaino, Helsinki, pp. 26-35.

Porter, M. (1990), *The Competitive Advantage of Nations*, Macmillan, London.

Raivola, R. (2000), *Tehoa Vai Laatua Koulutukseen?*, WSOY, Juva.

Remenyi, D.S.J. (1990), *Strategic Information Systems: Development, Implementation, and Case Studies*, NCC Blackwell, Manchester.

West-Burnham, J. (1994), "Strategy, policy and planning", in Bush, T. and West-Burnham, J. (Eds), *The Principles of Educational Management*, Longman, Harlow, pp. 77-99.

Wheale, J. (1991), *Generating Income for Educational Institutions: A Business Planning Approach*, Kogan Page, London.

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6. Juha Kettunen. 2008. A conceptual framework to help evaluate the quality of institutional performance. *Quality Assurance in Education* **16**:4, 322-332. [Abstract] [Full Text] [PDF]

7. Hong Wang. 2006. From "user" to "customer": TQM in academic libraries?. *Library Management* **27**:9, 606-620. [Abstract] [Full Text] [PDF]

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