



UNIVERSITY of VAASA



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Evaluations of Operative Competitiveness of Global Manufacturing Strategies

1/23/2008

1



1/23/2008

2

University of Vaasa, Finland



1/23/2008

3

I. Introduction

Future competitiveness of manufacturing operations under the dynamic and complex situations in the global markets relies on forward-thinking strategies.

Companies should typically utilize multifocus manufacturing strategies in a holistic way.

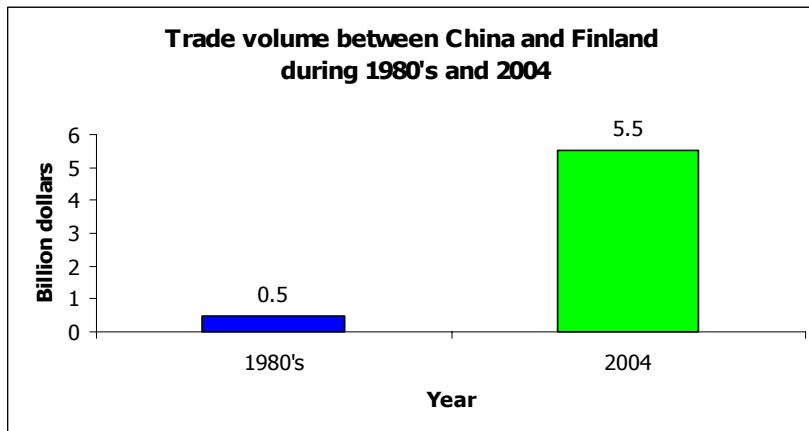
Objective/questions; analyzing and evaluating competitiveness of operative strategies to contribute to the Decision Making processes such as:

1. In which countries, or in which types or groups of businesses the companies should belong to and compete to perform operationally in the best way?
2. What kind of decision makers (profiles) the businesses should use? Can we develop the decision makers outcome, and how to do it?

1/23/2008

4

“China Effect” to Economy in Finland This Growth is Not Enough for EU!



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5

Growth possibility for the manufacturing in many EU-countries is abroad.

However, in EU-15, employment in the high tech manufacturing sector decreased between 1999 and 2004 (-2.0%) (“China Effect”).

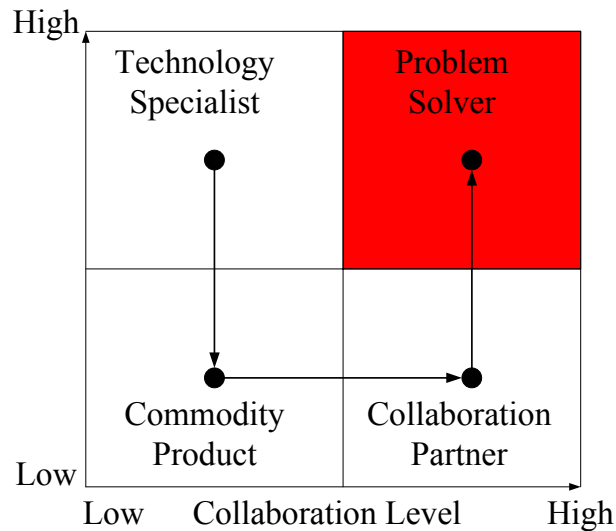
BUT, a number of countries recorded an increase compared to the total manufacturing sector; Belgium, the Czech Republic, Germany, Estonia, Spain, Italy, Lithuania, Hungary, Portugal, Slovenia and Slovakia.

Source: Eurostat 2007

1/23/2008

6

Development Route for Global Industries



What Trends to Ride on?

Important trends in world trade, dynamics/complexity/networks and KIBS economy

(e.g. 3 alternative Scenarios of Shell Corp)

Adaptation by socio-economic transformation processes to the rapid and huge changes in globalization (Garnsey&McGlade 2006)

1/23/2008

8

II. Theoretical Frame of Reference

Resource based view of a firm, especially human resource based strategy of an organization (Wernerfelt 1984)

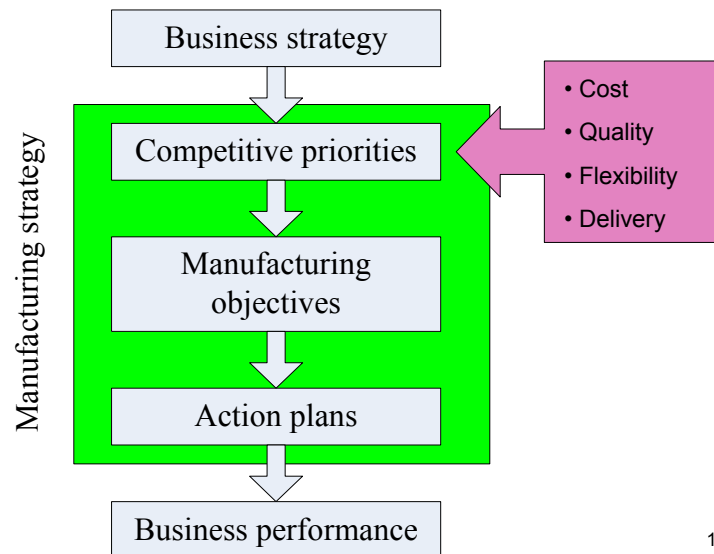
Miles & Snow (1978); prospector, analyzer and defender groups

J. Takala et al articles on multifocused Manufacturing Strategies and Transformational Leadership (Lists of Refs)

1/23/2008

9

A Process model for Manufacturing Strategy



1/23/2008

10

RAL concept

Classification

- Group A : Prospector ; innovator
- Group B : Analyzer ; balancing Q, C, T
- Group C : Defender ; cost leader

R= Responsiveness; "speed by which the system satisfies unanticipated requirements",
A=Agility; "speed by which the system adapts to the optimal cost structure", and
L= Leanness; "minimizes waste in all resources and activities".

1/23/2008 11

Op Competitiveness in different Groups

Prospectors

Analysers

Defenders

1/23/2008 12

III. Methods

AHP and analytical models for analyzing and evaluating multifocused manufacturing strategies and transformational leadership.

The sample from more than 10 countries and from different dynamic/complex/more and more global companies (about 200 from which about 100 analysed by now).

1/23/2008

13

Demographic Data for Research on Global Manufacturing Strategies

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Company/ Size(no of employees, turnover):

Informant/Name; Informant's Position; Task (Expert and or Managing Group Member); Years of Experience(below 5 years, 5-10 years or more than 10 years):

History/Culture (When founded/founder? etc):

Industry Branch/Cluster (Manufacturing ... Knowledge Intensive Service Area, What Service?(Production, Maintenance etc.), Service Business(%/Turnover):

Strategy (Position/Global/Intent(Situation, Objective for Change)/Op Str Model deployed such as BSC or RAL-model/Objective for Op Str etc):

Technology/Knowledge Strategy (leader...follower):

Ownership (Staff/Domestic or Foreign/What countries?, %):

Customer Ratio (Domestic/Foreign, %):

Average Growth Ratio in last 5 years (Dynamics, High Performance Org):

Type of Business (Production Management, Order or Stock:ETO/MTO/ATO/MTS):

Products and Services (What type?, Complexity, Cost Structure):

Supplier Types (Original Device/Contract Equipment Manufacturer) and Structure (No of Suppliers, Purchases%/Turnover):

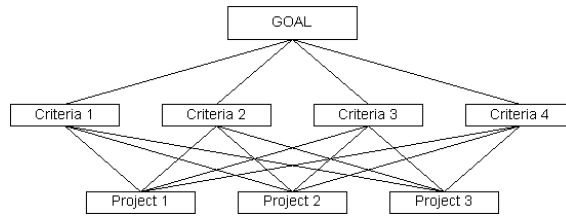
Infra (Inbound/Outbound logistics, ICT/ERP etc, Org Type (Project, Matrix, etc)):

Decision Making Model (BCS/RAL etc) and Process for Op Strategies / Informant's own role and profile in Dec Making (Planner, Decision Maker or Implementation as Expert, Managing Group or Managing Director)/Have the strategies recently been implemented with good success (the operative objectives have been met)?:

1/23/2008

14

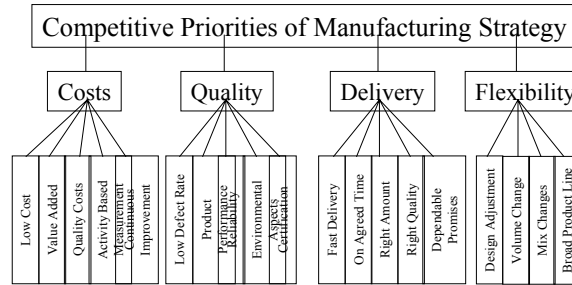
Analytic Hierarchical Process (AHP)



Goal

Main criteria

Sub criteria



1/23/2008

15

AHP pairwise comparison

QUESTION FORM

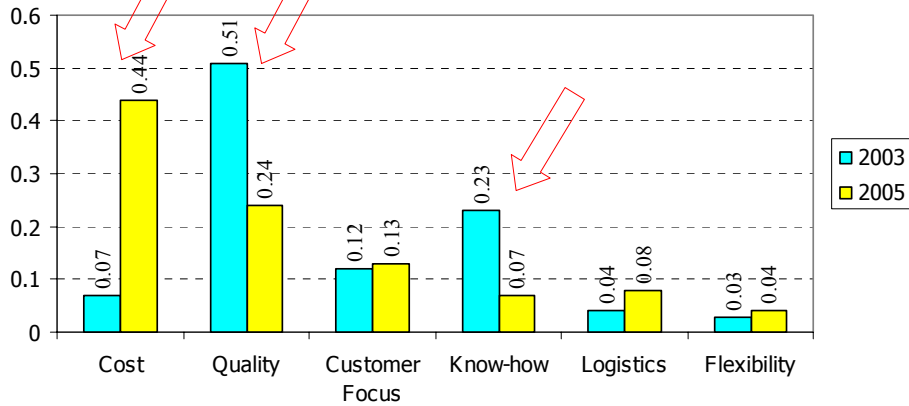
A	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	B
	A important				A and B equally important					B important								

Main Criteria	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	
Costs	9	8	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Customer Focus
Costs	8	9	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Quality
Costs	7	6	9	8	5	4	3	2	1	2	3	4	5	6	7	8	9	Delivery
Costs	6	5	4	9	8	7	6	5	4	3	2	1	2	3	4	5	6	Flexibility
Costs	5	4	3	2	9	8	7	6	5	4	3	2	1	2	3	4	5	Know-how
Customer Focus	4	3	2	1	2	9	8	7	6	5	4	3	2	1	2	3	4	Quality
Customer Focus	3	2	1	2	1	8	9	8	7	6	5	4	3	2	1	2	3	Delivery
Customer Focus	2	1	2	1	2	7	6	9	8	7	6	5	4	3	2	1	2	Flexibility
Customer Focus	1	2	1	2	1	6	5	8	7	6	9	8	7	6	5	4	3	Know-how
Quality	2	1	2	1	2	5	4	3	2	1	2	9	8	7	6	5	4	Delivery
Quality	1	2	1	2	1	4	3	2	1	2	3	8	7	6	5	4	3	Flexibility
Quality	2	1	2	1	2	3	2	1	2	3	1	7	6	5	4	3	2	Know-how
Quality	1	2	1	2	1	2	1	2	3	4	5	6	9	8	7	6	5	Know-how
Delivery	3	2	1	2	1	2	1	2	3	4	5	6	7	8	9	8	7	Flexibility
Delivery	2	1	2	1	2	1	2	3	4	5	6	7	8	9	8	7	6	Know-how
Delivery	1	2	1	2	1	2	3	4	5	6	7	8	9	8	7	6	5	Know-how
Flexibility	2	1	2	1	2	1	2	3	4	5	6	7	8	9	8	7	6	Know-how

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16

The Benchmarking Case Study; notice the dynamics in decision making for asset utilizations!



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17

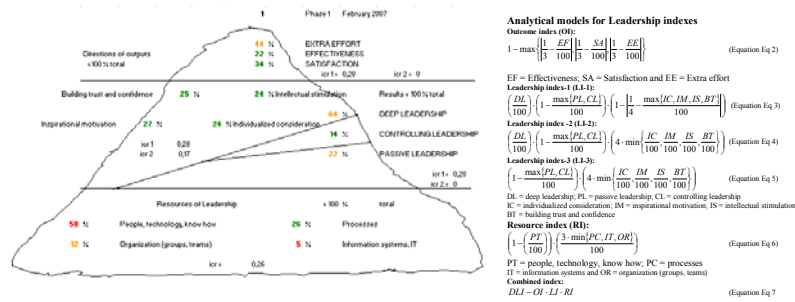
Analytical Models for evaluating op. competitiveness in the groups (examples)

Focus on Quality	$\phi \sim 1 - \{(1 - Q\%^{1/3})(1 - T\%)(1 - C\%) \times F\%^{1/3}\}$
Balance Q, C, T	$\lambda \sim 1 - \{(1 - F\%) \times (ABS(\Delta Q * \Delta T * \Delta C))^{1/3}\}$
Focus on Cost	$\varphi \sim 1 - \{(1 - C\%^{1/3})(1 - T\%)(1 - Q\%) \times F\%^{1/3}\}$

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18

Transformational Leadership (profile and indexes)



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19

IV. Results

Validation of the analytical models e.g. by sensitivity analyses of the rankings

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20

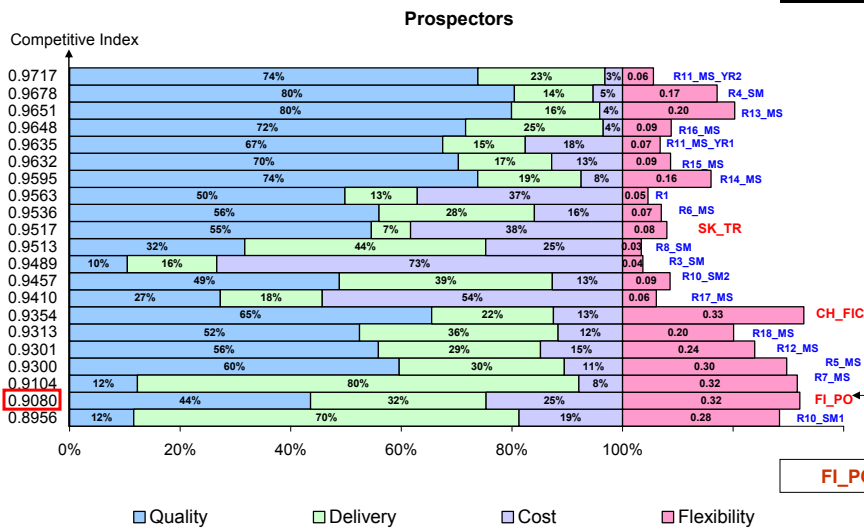
Operative Competitiveness of CNC Manufacturers in each group A, B and C in comparison with Exporters in Oulu Region

*In which countries, or in which types or groups of
businesses the companies should belong to and
compete to perform operationally in the best way?*

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21

Compare with cases from Oulu : Prospectors

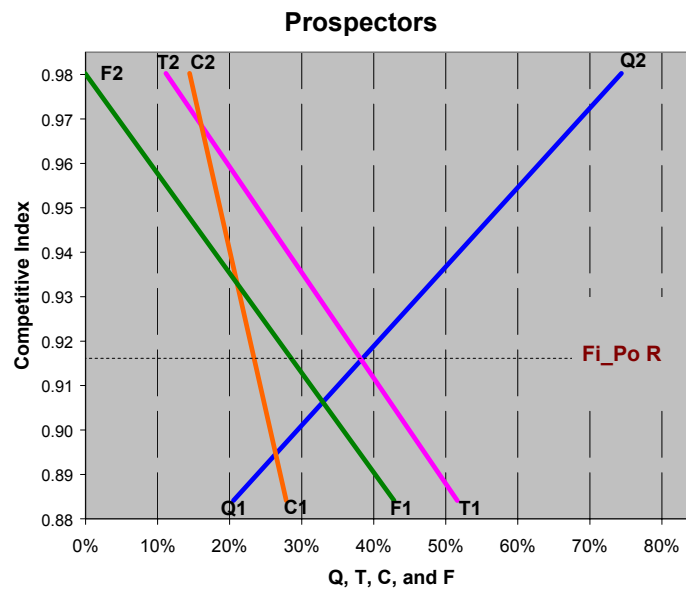


company	Qn	Cn	Tn	Fn	Competitive Level	Rank
XXX	0.597	0.357	0.047	0.250	0.9352	40
XXX	0.655	0.125	0.220	0.328	0.9354	39
XXX	0.549	0.046	0.405	0.182	0.9375	38
XXX	0.134	0.568	0.298	0.039	0.9409	37
XXX	0.273	0.541	0.184	0.061	0.9410	36
XXX	0.433	0.307	0.260	0.079	0.9421	35
XXX	0.370	0.566	0.064	0.087	0.9423	34
XXX	0.663	0.048	0.289	0.252	0.9428	33
XXX	0.500	0.034	0.466	0.118	0.9431	32
XXX	0.637	0.137	0.225	0.188	0.9442	31
XXX	0.333	0.333	0.533	0.048	0.9454	30
XXX	0.488	0.127	0.385	0.086	0.9457	29
XXX	0.727	0.064	0.209	0.299	0.9484	28
XXX	0.420	0.412	0.168	0.095	0.9487	27
XXX	0.169	0.734	0.162	0.037	0.9489	26
XXX	0.655	0.048	0.297	0.156	0.9503	25
XXX	0.317	0.247	0.436	0.034	0.9513	24
XXX	0.546	0.383	0.071	0.080	0.9517	23
XXX	0.540	0.159	0.281	0.070	0.9536	22
XXX	0.617	0.068	0.515	0.097	0.9540	21
XXX	0.752	0.069	0.179	0.255	0.9547	20
XXX	0.498	0.371	0.131	0.046	0.9563	19
XXX	0.694	0.113	0.194	0.133	0.9566	18
XXX	0.723	0.096	0.181	0.170	0.9566	17
XXX	0.601	0.203	0.196	0.067	0.9574	16
XXX	0.763	0.059	0.178	0.240	0.9574	15
XXX	0.738	0.075	0.187	0.160	0.9595	14
XXX	0.699	0.045	0.256	0.105	0.9608	13
XXX	0.703	0.138	0.169	0.087	0.9632	12
XXX	0.675	0.176	0.149	0.068	0.9635	11
XXX	0.716	0.035	0.249	0.088	0.9648	10
XXX	0.799	0.041	0.159	0.203	0.9651	9
XXX	0.665	0.032	0.303	0.052	0.9665	8
XXX	0.805	0.053	0.142	0.171	0.9678	7
XXX	0.720	0.196	0.085	0.055	0.9699	6
XXX	0.738	0.032	0.230	0.056	0.9717	5
XXX	0.716	0.105	0.179	0.041	0.9724	4
XXX	0.804	0.146	0.050	0.094	0.9736	3
XXX	0.711	0.183	0.107	0.026	0.9760	2
XXX	0.819	0.113	0.068	0.048	0.9803	1

company	Qn	Cn	Tn	Fn	Competitive Level	Rank
XXX	0.228	0.268	0.504	0.371	0.8841	77
XXX	0.349	0.211	0.440	0.455	0.8886	76
XXX	0.244	0.364	0.392	0.295	0.8913	75
XXX	0.332	0.060	0.607	0.559	0.8914	74
XXX	0.551	0.179	0.269	0.798	0.8940	73
XXX	0.298	0.069	0.633	0.469	0.8941	72
XXX	0.328	0.330	0.343	0.336	0.8949	71
XXX	0.116	0.187	0.697	0.281	0.8956	70
XXX	0.223	0.705	0.071	0.440	0.8976	69
XXX	0.356	0.051	0.553	0.453	0.8995	68
XXX	0.414	0.121	0.466	0.420	0.9012	67
XXX	0.333	0.333	0.333	0.250	0.9053	66
XXX	0.382	0.089	0.529	0.339	0.9076	65
FI Po	0.436	0.247	0.318	0.321	0.9080	64
XXX	0.322	0.208	0.470	0.242	0.9080	63
XXX	0.123	0.679	0.798	0.316	0.9104	62
XXX	0.160	0.611	0.228	0.142	0.9148	61
FI Po R	0.501	0.204	0.295	0.303	0.9170	60
XXX	0.348	0.236	0.417	0.137	0.9245	59
XXX	0.388	0.263	0.338	0.153	0.9250	58
XXX	0.295	0.034	0.671	0.189	0.9263	57
XXX	0.561	0.065	0.374	0.304	0.9264	56
XXX	0.466	0.376	0.158	0.187	0.9270	55
XXX	0.383	0.104	0.513	0.161	0.9273	54
XXX	0.419	0.037	0.544	0.193	0.9282	53
XXX	0.468	0.069	0.466	0.200	0.9284	52
XXX	0.548	0.226	0.226	0.237	0.9286	51
XXX	0.402	0.428	0.171	0.142	0.9287	50
XXX	0.596	0.105	0.299	0.297	0.9300	49
XXX	0.518	0.188	0.291	0.239	0.9301	48
XXX	0.505	0.308	0.187	0.180	0.9309	47
XXX	0.534	0.116	0.359	0.201	0.9313	46
XXX	0.205	0.208	0.587	0.083	0.9313	45
XXX	0.387	0.380	0.233	0.109	0.9328	44
XXX	0.218	0.716	0.066	0.128	0.9328	43
XXX	0.589	0.106	0.305	0.243	0.9338	42
XXX	0.635	0.079	0.286	0.309	0.9345	41

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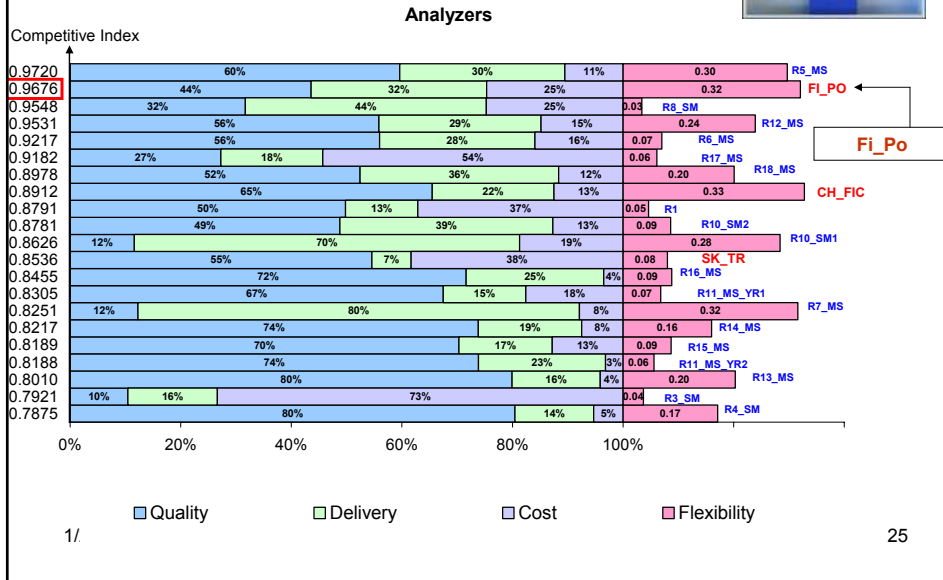
23



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24

Compare with cases from Oulu : Analyzers

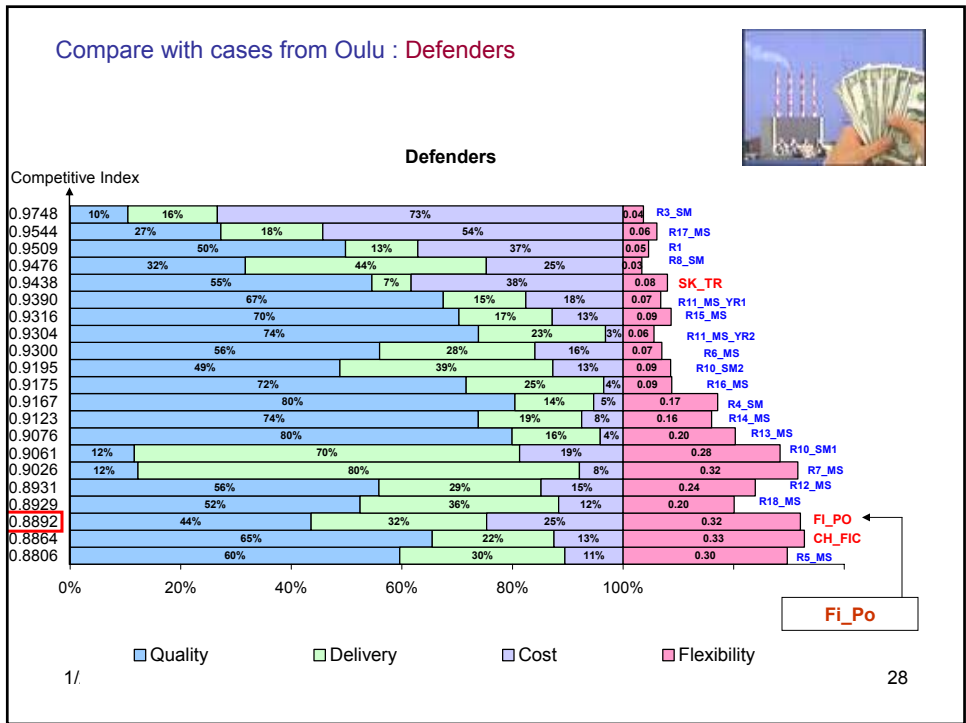
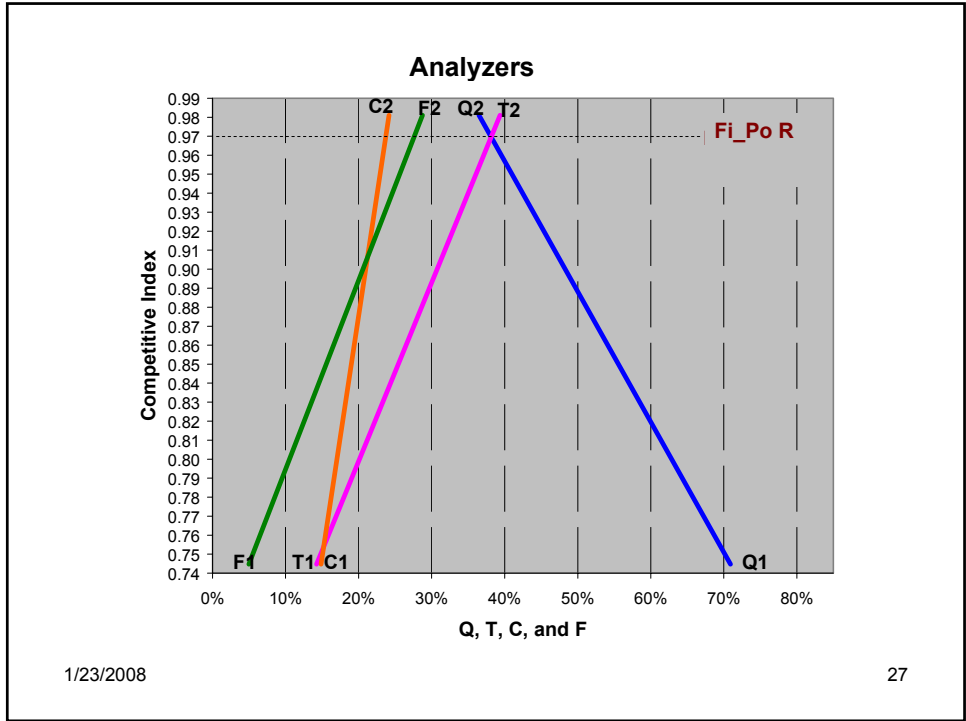


Company	Qn	Cn	Tn	Fn	LAMDA	Rank
XXX	0.655	0.125	0.220	0.328	0.8912	40
XXX	0.420	0.412	0.168	0.056	0.8913	39
XXX	0.223	0.705	0.071	0.440	0.8977	38
XXX	0.524	0.116	0.359	0.201	0.8978	37
XXX	0.382	0.089	0.629	0.339	0.9006	36
XXX	0.402	0.428	0.171	0.142	0.9031	35
XXX	0.466	0.376	0.158	0.187	0.9062	34
XXX	0.617	0.068	0.315	0.097	0.9111	33
XXX	0.356	0.051	0.593	0.453	0.9170	32
XXX	0.414	0.121	0.466	0.420	0.9173	31
XXX	0.271	0.543	0.184	0.061	0.9182	30
XXX	0.548	0.226	0.226	0.237	0.9199	29
XXX	0.560	0.159	0.281	0.070	0.9217	28
XXX	0.663	0.048	0.289	0.252	0.9289	27
XXX	0.635	0.079	0.286	0.309	0.9331	26
XXX	0.387	0.380	0.233	0.109	0.9346	25
XXX	0.295	0.034	0.671	0.169	0.9372	24
XXX	0.665	0.032	0.303	0.052	0.9414	23
XXX	0.346	0.236	0.417	0.137	0.9425	22
XXX	0.332	0.060	0.607	0.559	0.9440	21
XXX	0.322	0.208	0.470	0.242	0.9494	20
XXX	0.655	0.048	0.297	0.156	0.9497	19
XXX	0.558	0.148	0.293	0.239	0.9531	18
XXX	0.589	0.106	0.305	0.243	0.9533	17
XXX	0.228	0.268	0.504	0.371	0.9535	16
XXX	0.244	0.364	0.392	0.295	0.9537	15
XXX	0.517	0.247	0.436	0.034	0.9548	14
XXX	0.505	0.308	0.187	0.180	0.9557	13
XXX	0.349	0.211	0.440	0.455	0.9562	12
XXX	0.398	0.263	0.338	0.153	0.9583	11
XXX	0.134	0.568	0.298	0.039	0.9612	10
Fi Po	0.436	0.247	0.318	0.321	0.9676	9
XXX	0.333	0.333	0.333	0.048	0.9699	8
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XXX	0.433	0.307	0.260	0.079	0.9715	6
XXX	0.596	0.105	0.399	0.297	0.9720	5
XXX	0.298	0.069	0.633	0.493	0.9735	4
XXX	0.333	0.333	0.333	0.250	0.9763	3
XXX	0.328	0.330	0.343	0.336	0.9794	2
XXX	0.551	0.179	0.269	0.796	0.9811	1

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XXX	0.819	0.113	0.068	0.048	0.7447	77
XXX	0.804	0.146	0.050	0.094	0.7687	76
XXX	0.805	0.053	0.142	0.171	0.7875	75
XXX	0.104	0.734	0.162	0.037	0.7921	74
XXX	0.799	0.041	0.159	0.203	0.8210	73
XXX	0.716	0.105	0.179	0.041	0.8052	72
XXX	0.711	0.183	0.107	0.026	0.8053	71
XXX	0.720	0.196	0.085	0.055	0.8104	70
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XXX	0.419	0.037	0.544	0.193	0.8490	57
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XXX	0.549	0.046	0.405	0.182	0.8538	55
XXX	0.370	0.566	0.054	0.087	0.8576	54
XXX	0.466	0.069	0.466	0.200	0.8592	53
XXX	0.699	0.045	0.256	0.105	0.8603	52
XXX	0.727	0.064	0.209	0.299	0.8605	51
XXX	0.116	0.187	0.697	0.284	0.8626	50
XXX	0.691	0.203	0.196	0.067	0.8715	49
XXX	0.637	0.137	0.225	0.188	0.8765	48
XXX	0.488	0.127	0.385	0.086	0.8781	47
XXX	0.498	0.171	0.131	0.046	0.8791	46
XXX	0.383	0.104	0.513	0.161	0.8795	45
XXX	0.180	0.611	0.228	0.142	0.8809	44
XXX	0.205	0.208	0.587	0.083	0.8815	43
XXX	0.597	0.367	0.047	0.250	0.8845	42
XXX	0.561	0.065	0.374	0.304	0.8907	41

26

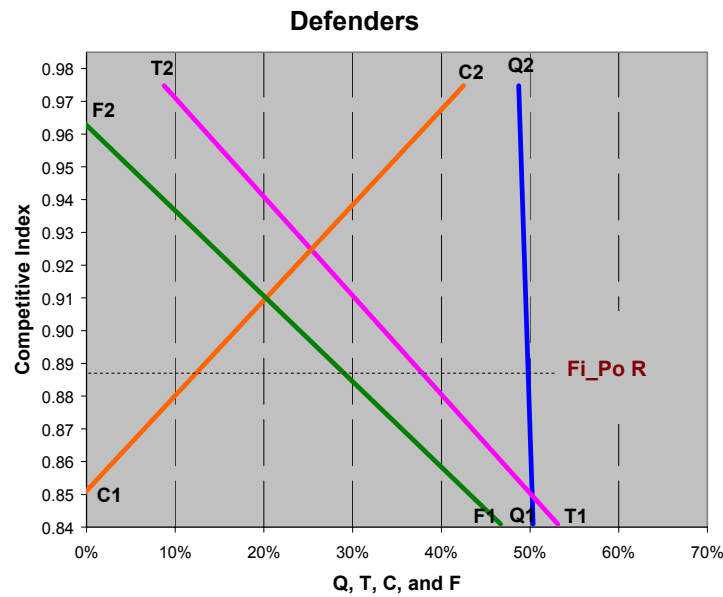


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XXX	0.402	0.428	0.171	0.142	0.9304	24
XXX	0.703	0.128	0.169	0.087	0.9316	23
XXX	0.205	0.208	0.587	0.083	0.9316	22
XXX	0.387	0.380	0.233	0.109	0.9321	21
XXX	0.433	0.307	0.260	0.079	0.9347	20
XXX	0.801	0.233	0.196	0.087	0.9367	19
XXX	0.223	0.705	0.071	0.440	0.9375	18
XXX	0.675	0.176	0.149	0.068	0.9390	17
XXX	0.804	0.146	0.050	0.094	0.9432	16
XXX	0.546	0.383	0.071	0.080	0.9438	15
XXX	0.333	0.333	0.333	0.048	0.9454	14
XXX	0.716	0.105	0.179	0.041	0.9457	13
XXX	0.160	0.611	0.228	0.142	0.9463	12
XXX	0.317	0.247	0.436	0.034	0.9476	11
XXX	0.720	0.196	0.085	0.055	0.9481	10
XXX	0.420	0.412	0.168	0.056	0.9483	9
XXX	0.498	0.371	0.131	0.046	0.9509	8
XXX	0.370	0.566	0.084	0.087	0.9519	7
XXX	0.819	0.113	0.068	0.048	0.9537	6
XXX	0.273	0.543	0.184	0.061	0.9544	5
XXX	0.711	0.183	0.107	0.026	0.9584	4
XXX	0.218	0.716	0.086	0.128	0.9598	3
XXX	0.134	0.568	0.298	0.039	0.9626	2
XXX	0.104	0.734	0.162	0.037	0.9748	1

company	Qn	Cn	Fn	Tn	Competitive Level	Rank
XXX	0.332	0.060	0.607	0.559	0.9409	77
XXX	0.551	0.179	0.269	0.796	0.9458	76
XXX	0.356	0.051	0.593	0.453	0.9470	75
XXX	0.298	0.069	0.633	0.493	0.9533	74
XXX	0.414	0.121	0.666	0.420	0.9619	73
XXX	0.382	0.089	0.529	0.339	0.9672	72
XXX	0.561	0.095	0.374	0.304	0.9681	71
XXX	0.349	0.211	0.440	0.455	0.9711	70
XXX	0.635	0.079	0.286	0.309	0.9772	69
XXX	0.419	0.037	0.544	0.193	0.9774	68
XXX	0.863	0.048	0.289	0.252	0.9799	67
XXX	0.596	0.105	0.299	0.277	0.9806	66
XXX	0.549	0.046	0.405	0.182	0.9829	65
XXX	0.466	0.069	0.466	0.209	0.9835	64
XXX	0.655	0.125	0.220	0.328	0.9864	63
XXX	0.295	0.034	0.671	0.189	0.9873	62
XXX	0.727	0.064	0.209	0.299	0.9875	61
XXX	0.589	0.106	0.305	0.243	0.9879	60
FI Po R	0.501	0.204	0.295	0.303	0.8885	59
XXX	0.228	0.288	0.504	0.371	0.8892	58
FI Po	0.436	0.247	0.316	0.321	0.8892	57
XXX	0.521	0.116	0.359	0.201	0.8929	56
XXX	0.558	0.148	0.293	0.239	0.8931	55
XXX	0.500	0.034	0.466	0.118	0.8944	54
XXX	0.328	0.330	0.543	0.336	0.8952	53
XXX	0.322	0.208	0.470	0.242	0.8959	52
XXX	0.655	0.048	0.297	0.156	0.8968	51
XXX	0.383	0.104	0.513	0.181	0.8985	50
XXX	0.752	0.089	0.179	0.255	0.8985	49
XXX	0.763	0.059	0.178	0.240	0.9002	48
XXX	0.548	0.226	0.229	0.237	0.9024	47
XXX	0.121	0.979	0.798	0.316	0.9026	46
XXX	0.244	0.364	0.392	0.295	0.9038	45
XXX	0.333	0.333	0.333	0.250	0.9053	44
XXX	0.537	0.137	0.225	0.188	0.9057	43
XXX	0.116	0.187	0.697	0.384	0.9061	42
XXX	0.799	0.041	0.159	0.203	0.9076	41
XXX	0.723	0.086	0.181	0.170	0.9122	40

1/23/2008

29



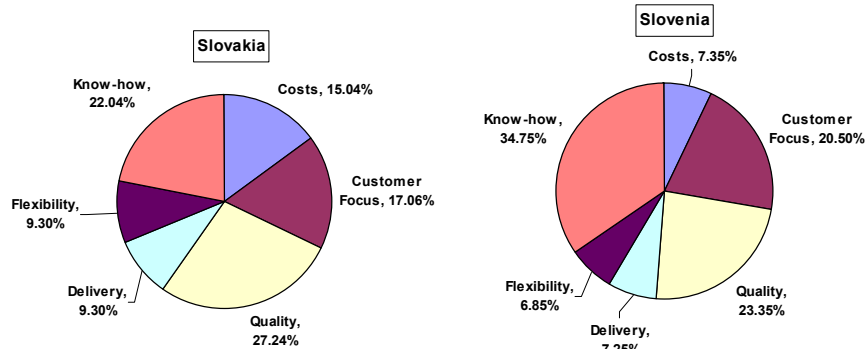
1/23/2008

30

Comparisons of Slovakia (5) and Slovenia (2) cases among the wider international group of case studies, See MIC'2007 paper Takala et al

1/23/2008

31

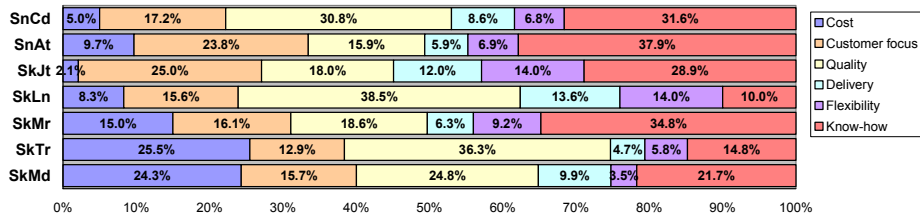


Dominant feature and industrial characteristic

The strategic intent to customer focus would be a little bit stronger in Slovenia than in Slovakia. In Slovenia know how is much stronger compared to Slovakia. Stronger customer focus and especially Know-How indicate more clear KIBS orientation in Slovenia. (Kamdee et al 2007)

1/23/2008

32



The weights in Slovenia and Slovakia case by case

1/23/2008

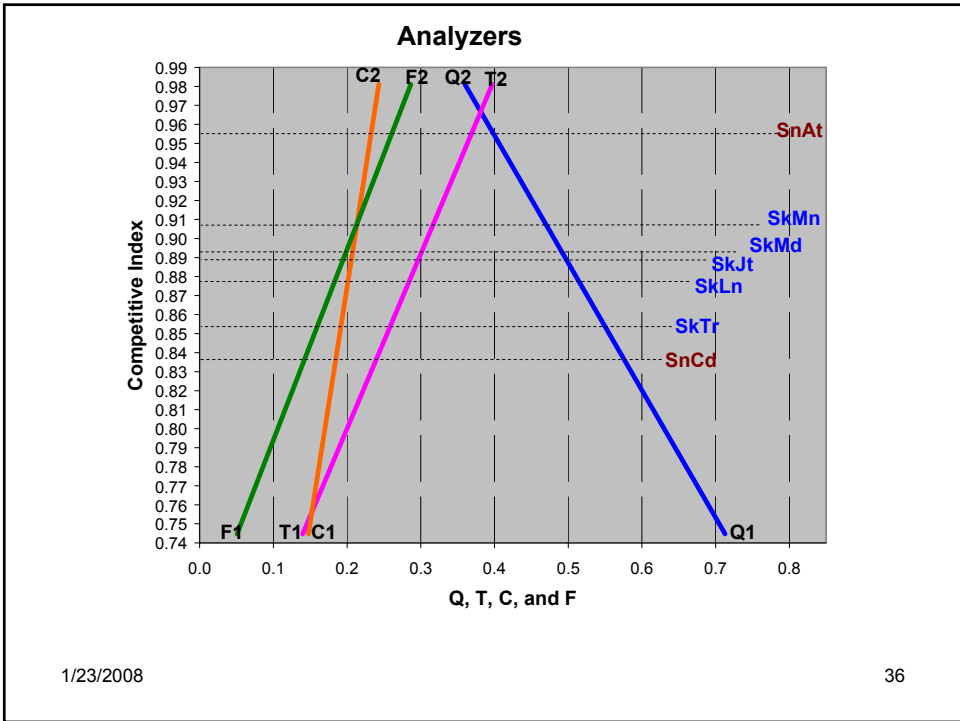
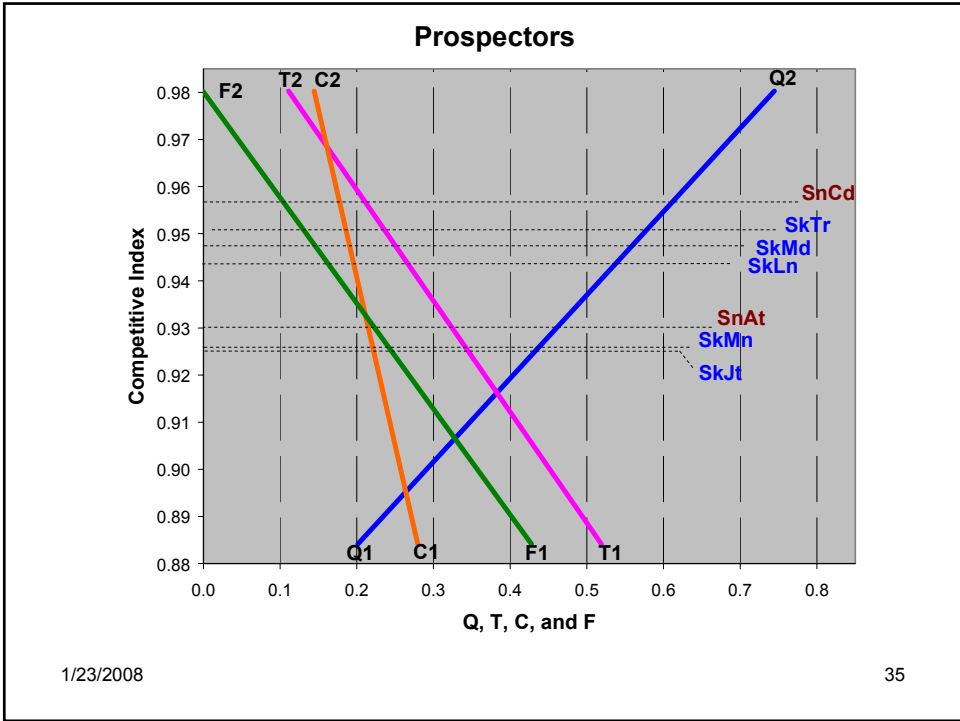
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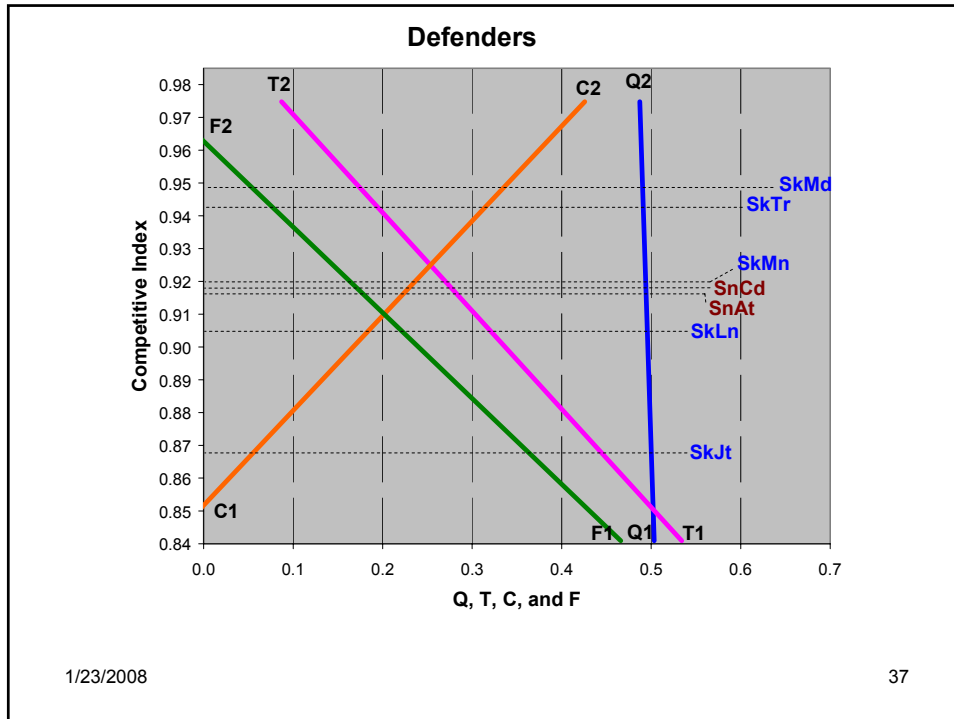
Proportional value of quality, cost, and time in normalized scale of 1 and flexibility and competitive index value in each organization's type

company	Quality	Cost	Time	Flexibility	Prospector		Analyzer		Defender	
					Competitive Level	Rank	Competitive Level	Rank	Competitive Level	Rank
SkJt	0.561	0.065	0.374	0.304	0.9264	54	0.8907	39	0.8681	68
SkMn	0.466	0.376	0.158	0.187	0.9270	53	0.9062	32	0.9207	28
SkLn	0.637	0.137	0.225	0.188	0.9442	30	0.8765	46	0.9057	41
SkMd	0.420	0.412	0.168	0.056	0.9487	26	0.8913	37	0.9483	9
SkTr	0.546	0.383	0.071	0.080	0.9517	22	0.8536	54	0.9438	15
SnAt	0.505	0.308	0.187	0.180	0.9309	47	0.9557	12	0.9169	33
SnCd	0.694	0.113	0.194	0.133	0.9566	18	0.8363	58	0.9182	31

1/23/2008

34





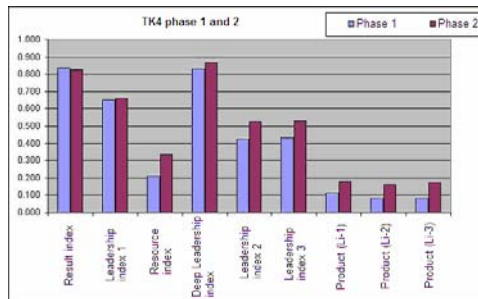
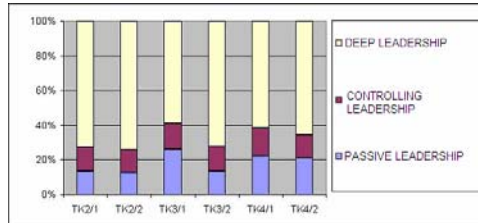
IV Results (cont.)

Examples of analyses of the profiles and outcomes of transformational leadership (indexes), and

What kind of decision makers the businesses should use? And How?

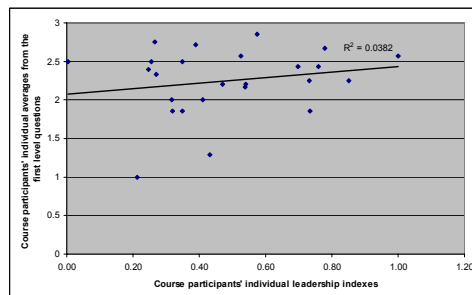
1/23/2008 38

Transformational Leadership in different courses and phases (1 and 2) - Notice the Improvement between the phases due to a quite short training!



39

Outcome as a function of Transformational Leadership index for one course; Notice the increasing Outcome versus Leadership Index with the low lin. reg. coefficient!



1/23/2008

40

V Evaluation, Discussion about the results

Challenges from company to company, country to country, situation to situation calibrations and improvements of operative competitiveness in micro (company) level in manufacturing and leadership. Ref. Takala et al MIC'07paper.

E.g. how we calibrate/improve quality and flexibility when even the definitions/determinations don't match together? (time and costs probably easier)

And, how we move from macro level statistics and market surveys to micro level?

And, how we move to forward-thinking MSI and TLI strategies?

And, operative competitiveness should have effect to outcomes, such as market share, profitability, (working) environment, entrepreneurship,...

1/23/2008

41

VI Future Research and Conclusion

Linking strategies to competitive operations - following reasonably fast Shell globalization scenario - by measuring the outcomes versus MSI and TLI indexes, and statistical validation and verification of the analytical models and outcomes from MSI and TLI indexes.

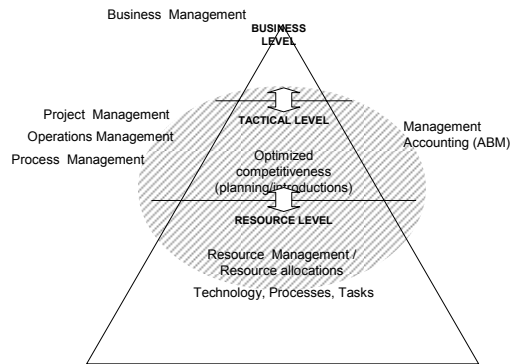
Conclusions for KIBS:

The industries are not putting conscious efforts in KM maybe because of the lack of understanding the connection with the operating performance.

1/23/2008

42

Future Challenges; (an example) How to Integrate MSI and LSI in Designing/Operating/Maintaining a Power Plant?



1/23/2008

43

Thanks for the attention!

• Comments and Questions

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1/23/2008

44

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