MEASURING PERFORMANCE OF AGRI-FOOD SUPPLY CHAINS

A thesis presented in partial fulfilment of the

requirements for the degree of

Doctor of Philosophy

in

Supply Chain Management

at Massey University, Palmerston North,

New Zealand

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2004

ABSTRACT

During the past two decades Supply Chain Management (SCM) has become a popular topic of business discussions. SCM presents a business philosophy of improving the long-term performance of individual companies and the supply chain (SC) as a whole and, as a result, attains or sustains a company's competitive position. The practical implementation of SCM has a number of constraints. The basic problems facing SCM are difficulties in adopting a SCM philosophy, the lack of general theory, difficulties of system thinking, and the unique characteristics of agribusiness SCs.

Contemporary SCM theory is mainly descriptive and modern SCM research is predominately deductive. Research on SC performance measurement systems (PMSs) has not provided co-ordinated measurement of the bi-directional system flows (material, financial and informational). Available systems do not provide quantifiable measures for the network optimisation decision-making process.

In this study an alternative approach to SCM problem resolution was developed. The three SC flows were integrated through the evaluation of their normalised performance measurements (NPMs). The NPM system was developed based on the primary concept that the performance of each SC flow within a SC may be uniformly measured using comparable sets of characteristics. This primary concept was then used as a basis to evaluate higher levels of system performance such as two-party contractual performance and then the performance of the total SC. Special attention was paid to the strategic level of SC analysis and optimisation. The suggested methodology was used to demonstrate how performance improvement of the SC as a whole is interrelated to the performance improvement of individual companies.

Case evaluation of the proposed methodology allowed identification of the supply chain wave effect. This effect quantifies how the performance of one chain member affects the performance levels of other system participants. The application of game theory to the methodology indicated that a stable optimum SC strategy might be reached when business performances are balanced along the chain. The case study suggested that chain participants tend to move toward a stable optimum strategy over time.

This research may be used as a prescriptive tool for a range of agri-food chain studies. Extended case evaluation is required to test the robustness of the suggested methods.

Acknowledgements

I would like to thank my supervisors, Professor William C. Bailey and Doctor Ramaswami Sridharan, for their help, advice, and patience.

I would like to express my special gratitude to three Russian grain trading companies who supported me, always had time to meet me, and shared their valuable information with me during more than four years.

Thanks to all my friends, acquaintances and students from around the world for their support and love.

My dear special friend Gavin always wanted me to accomplish this writing. I am very grateful to him for all he has done for me.

My family: The Cat, my mother and my son always support me and I am always grateful for that.

Finally, my cordial thanks to New Zealand, which has become my second home country, and to Massey University, which has become my second home.

Lidia V. Norina

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Glossary of Abbreviations and Terms

Abbreviations

ABC	-	Activity Based Costing
AV	-	Actual Value
C	-	Quality Characteristic
C&D	-	Strategic Control and Development
ECR	-	Efficient Consumer Response
EV	-	Expected Value
EVA	-	Economic Value Analysis
F	-	Financial Flow Activities
FTP	-	Normalised Performance of Financial Flow
GMO	-	Genetically Modified Organisms
I	-	Information Flow Activities
IT	-	Information Technology
M	-	Material Flow Activities
MFP	-	The Total Normalised Material Flow Performance Value
NAV	-	Normalised Acceptance Value
NDT	-	Normalised Delivery Time Acceptance Value
NDV	-	Normalised Volume Acceptance Value
NOPAT	-	Net Operating Profit After Taxes
NPC	-	The Measure of Normalised Performance of the Customer in the Chain
NPM	-	Normalised Performance Measure
NPMS	-	Normalised Performance Measurement System
NPS	-	The Measure of Normalised Performance of the Supplier in the Chain
O	-	Over-achievement
$\overline{O}$	-	Acceptable Premium Overachievement
P	-	Performance
p_1	-	The Total Normalised Value of Quality
p_2	-	The Total Normalised Value of Delivery

PMS	-	Performance Measurement System
PR	-	Productivity
SC	-	Supply Chain
SCM	-	Supply Chain Management
SCP	-	Supply Chain Participant
SCOR	-	Supply Chain Operation Reference Model
TANP	-	Total Actual Normalised Performance
TC	-	Total Customer's Contractual Normalised Performance
TDQM	-	Total Data Quality Management
TS	-	Total Supplier's Contractual Normalised Performance
U	-	Under-achievement
$\overline{U}$	-	Acceptable Discount Underachievement

Terms (introduced in this thesis)