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Gommans, Dennis

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- Summary -

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Dennis Gommans
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A MANAGEMENT INFORMATION SYSTEM FOR THE PURCHASING DEPARTMENT OF PHILIPS SEMICONDUCTORS NIJMEGEN

Eindhoven University of Technology

Faculty of Technology Management
Department of Industrial Engineering and Management Science

- Master's thesis -

Student: D. Gommans
Id-number: 414562

Primary supervisor: ir. L.J.M. Haffmans
Department of Finance, Accounting and Marketing
Secondary supervisor: dr. H.F.J.M. van Tuijl
Department of Technology and Work
Tertiary supervisor: drs. ing. H.J.M. van der Veeken
Department of Finance, Accounting and Marketing

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Philips Semiconductors Nijmegen B.V.
Purchasing Department, Building FM 1.004
P.O. Box 30008, 6503 HK, Nijmegen
The Netherlands

Company supervisors: F.M.N.M. Rammeloo - *Improvement Manager*
ir. K.H. Vos - *Systems & Procedures Manager*

Abstract

This report describes the research that has been performed in order to develop a Management Information System for the Purchasing Department of Philips Semiconductors Nijmegen. After giving a specification of the determined information variables they have been placed in the framework of the Purchasing Business Balanced Scorecard. Part of the resulting management information structure has been implemented into the organisation and tested with the users.

Management Summary

The Context
The research has been performed for the Purchasing Department of Philips Semiconductors Nijmegen, which takes care of the purchasing of Equipment, Materials and Non-product related goods and services for its internal customers, mainly the site's five wafer production companies (waferfabs). Besides having to report to their management teams, the department also has to operate within the strategic guidelines of the Product Division and Corporate purchasing organisations.

As a strategic tool to achieve world-class performance levels, Purchasing recently formulated a departmental Business Balanced Scorecard, that besides for guiding its internal activities, will also be used to communicate the Purchasing Performance to its main internal customers. The initial version contains eleven distinguished Critical Success Factors, with each having one Key Performance Indicator to measure its performance. The main (purchasing) users of this scorecard are the department's manager (Site Purchasing Manager) and the Improvement Manager, plus the managers of the three distinguished purchasing groups who are also purchasing representative in the management teams of the waferfabs.

Research Plan
At the start of this research the five purchasing managers indicated to have only limited possibilities to have quick access to structured and reliable management information, which they need in order to perform their jobs adequately. In combination with the decision to implement a new ERP-system into the organisation and the further deployment of the Business Balanced Scorecard this has led to the following research assignment.

> *Develop a management information system for the Purchasing Department of Philips Semiconductors Nijmegen B.V. that generates the needed information for the management of strategic, tactical and operational purchasing activities*

The main research precondition was to relate distinguished management information to the formulated scorecard. The deliverables, a purchasing management information structure implemented by means of a Management Information System, have been attained on the basis of the following distinguishable steps:

- determination of the management information *need*;
- development of a management information *structure*;
- implementation case of one variable;
- development of a management information *system*;
- embodiment of the achieved results into the Purchasing organisation.

Determination of the Management Information Need
The information need has been determined on the basis of the needs and wishes of the purchasing managers. In this respect has been chosen for personal interviews, which have been prepared by doing a thorough literature study upon the subject of "purchasing performance". The five interviews with the managers have been structured upon the basis of seven distinguished purchasing aspects. A subsequent analysis of the outcomes resulted in a first list of management information variables.

This initial result has been validated twice. First, the list has been fed back to the management in a group meeting, with again renewed input from literature. This agreed list next has been compared with the existing Purchasing Business Balanced Scorecard to ensure that all Key Performance

Indicators were included. These two steps resulted in a definitive list of 36 distinguished variables, which are shown in Table 0.1, with per variable indicated which purchasing groups need to be informed and with which priority the concerning variable should be implemented into the organisation.

Table 0.1: Definitive list of management information variables:

Aspect:	Variable:	BBSC	EQ	MAT	EAC	Avg. priority (1= low, 5= high)
Purchasing involvement in business	Variable 1		X	X	X	2.0
	Variable 2	■	X	X	X	5.0
Commercial (price)	Variable 1		X	X	X	4.7
	Variable 2		X	X	X	4.3
	...		X	X	X	3.5
	...		X	X	X	4.5
	...	■	X	X	X	5.0
	...	■	X	X	X	5.0
	...	■		X		2.0
Technical (quality)	Variable 1	■	X	X	X	5.0
	Variable 2		X	X	X	4.0
	...		X	X	X	3.0
	...		X			4.0
	...				X	4.0
	...		X			3.0
	...	■	X	X	X	5.0
Logistics	Variable 1	■	X	X	X	5.0
	Variable 2		X	X	X	2.0
				X		5.0
					X	4.0
			X			2.0
Communication	Variable 1		X	X	X	2.5
	Variable 2		X	X		3.0
	...		X	X		1.0
Supplier Risk	Variable 1		X	X	X	4.3
Organisation	Variable 1		X	X	X	4.7
	Variable 2		X	X		3.8
	...		X	X	X	3.8
	...		X	X	X	3.0
	...		X	X	X	2.0
	...		X	X		3.5
	...	■	X	X	X	5.0
	...		X	X	X	5.0
CSF's (not mentioned in interviews)	Variable 1	■	X	X	X	5.0
	Variable 2	■	X	X	X	5.0
	...	■	X	X	X	5.0

Management Information Structure

The 36 variables have been specified into more detail by giving verbal descriptions and by determining the sort and level of purchasing activities in which the concerning information was expected to be used. It appeared useful to make a distinction between decision support and performance information. Also has been determined across which "levels of aggregation" (dimensions) the information was needed to be presented.

For each variable subsequently has been determined which of the scorecard Critical Success Factors it referred most to. In this way the 36 variables could be subdivided into 12 "information" groups (eleven success factors and a group non-related), which resulted in the composition of the Purchasing Management Information Structure, the first main deliverable of this research (shown partially in Table 0.2 with regard to the Critical Success Factor "Cost of Goods Sold").

Table 0.2: Purchasing Management Information Structure for "Cost of Goods Sold"

Variable	BBSC	IO	MAT	PAC	Avg. priority (1= low, 5= high)	Meaning	Level of aggregation	Type of information
Critical Success Factor xx								
Key Performance Indicator		☒	☒	☒	5.0	Description	fab	Performance
Supporting variable 1				☒	4.7	...	(fab) commodity , supplier	Performance
Supporting variable 2				☒	4.3		fab, commodity, purchasing group, supplier, order class	Decision support
...				☒	3.5	...	fab, commodity, buyer	Performance
...		☒	☒	☒	3.0	...	fab, commodity	Performance
				☒	4.5		commodity, time, supplier	Decision support
...				☒	2.0	...	fab, currencies	Decision support

Implementation Case

One distinguished management information variable, namely "expenditures to suppliers", has initially been implemented into the organisation. Expenditure information was not available in a structured and reliable way before and is needed as decision support information in all three purchasing groups. The needed data are stored in the purchasing system (PO:F) and have to be presented across the aggregation levels 'commodity", 'order class" and "internal customer". The following steps have been performed:

1) Composing model & determination of source(s) of raw data;
2) Raw data retrieval;
3) Formatting & filtering (records and fields);
4) Summarising data into interpretable output:
    - aggregating raw data;
    - creating an initial version of management information;
    - validation with future users: shown time-buckets, final layout and updating frequency;
    - programming & instalment of definitive tool/ procedure.
5) Embedding management information into the organisation:
    - communication with future users;
    - selection of process owner(s);
    - automating/ structuring refreshment procedures,
   - determination and explanation of maintenance requirements.

Purchasing Management Information System

Besides "expenditures to suppliers", nine other variables have been implemented into the organisation as well. It appeared that the suggested (iterative) procedure, which was presented above, is applicable as a framework for the other variables, although it is recommended to keep in mind that the nature and profundity of each of the distinguished steps depends upon the familiarity, complexity and origin of the needed data.

After an initial provision and testing of the information, a "front sheet" was created for each of the variables, which shortly describes relevant aspects (like process owner and data source) to the user. Furthermore, also a "main screen" has been developed that was based on the Purchasing Management Information Structure. This screen acts as a "portal" by means of which a user can access the information of his choice by clicking on any of the shown variables. Together with the provided

information and the ten created "front sheets", this main screen constitutes the Purchasing Management Information System, which is shown in Figure 0.1 and is the second main deliverable of this research.

Main screen:
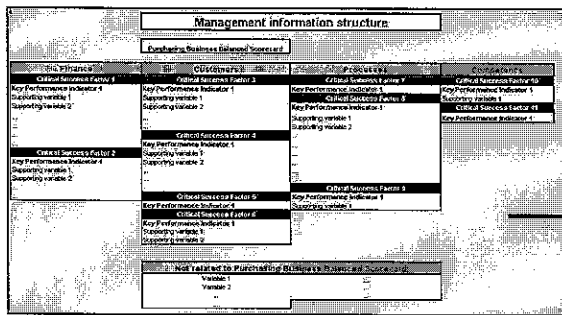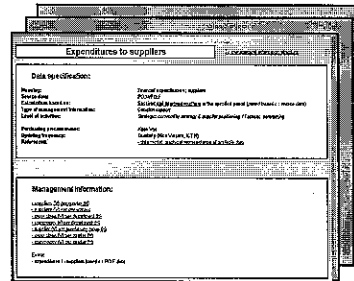
Figure 0 1. Structure of the Purchasing Management Information System.

Embodiment of Achieved Results into the Purchasing Organisation

The Systems & Procedures Manager has been appointed as process owner of the Purchasing Management Information System: the responsible person for maintenance, adaptation and extension of the system and its information in the future. On the basis of the developed implementation plan, it is recommended to implement the remaining 26 variables in order of descending priority. The distinguished steps then can be used as a framework. In this respect it is advised to attach an implementation owner and time frame to each distinguished implementation process.

All managers were visited in their offices and introduced to the system. They furthermore were requested to take care of the further communication within their purchasing groups A few weeks later, the initial use of the system and its users' first impressions have been evaluated by means of a short questionnaire It appeared that 41% of all purchasing employees had already used the system as a support in performing their jobs, although this mainly concerned the first implemented variable "expenditures to suppliers". The definitive extra value of the other implemented variables still remains to be investigated in the future.

Furthermore have the distinguished management information variables been used as input to develop standard reports in SAP. By means of so-called variants can these reports be adapted to include certain site-specific reporting requirements. In this respect can 37% of the needed information (derived from the Purchasing Management Information Structure) be based on these standard reports, while for another 23% the information can be either partially based on the standard reports or completely on some new customised reports.

On the basis of the gained research knowledge and some relevant theory, have the contents of the Purchasing Business Balanced Scorecard been reviewed. This last activity of the in-depth research has led to a concrete set of recommendations with regard to the determined Critical Success Factors, Key Performance Indicators and derived additional supporting information

Conclusions and Recommendations

Generally can be stated that the assignment has been met during the research. The two stated deliverables have been developed and some new information has been provided to the organisation. After an analysis of the extent to which the expectations of the management have been met, have the practical recommendations that come forth of this been presented along the three distinguished motives to start up this research.

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