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PreScan Process at VivaCadena B.V.

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Preface

The internship is the last phase of the Master program of the study Business Mathematics and Informatics. The objective of this internship is to apply the theoretical knowledge of the study in a business context.
My internship took place at VivaCadena B.V. VivaCadena B.V. originated from Emrys B.V. as a consultancy company in the field of supply chain management. This thesis is the result of my internship at VivaCadena B.V.

I want to thank many people who helped me with this internship. First I would like to thank my colleagues at VivaCadena. They have been very supportive and I learned a lot from them during my internship.

My gratitude goes to Ilja Heitlager who was my main supervisor at VivaCadena. I really do appreciate his encouragement and guidance during my internship. I also want to thank Peter Stretton for joining as supervisor and guiding me through the last phase of my internship. Special thanks goes to Hans Duijn who always made time to provide me with the necessary data and additional information.

I would like to thank my two supervisors from the VU University Amsterdam, drs. Marco Bijvank and prof. dr. Ger Koole. Special thanks goes to my main supervisor drs. Marco Bijvank for his critical comments and constant support on my thesis.

Executive summary

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1 Introduction

A supply chain is a network of suppliers, factories, warehouses, distribution centers and retailers through which raw materials are acquired, transformed and delivered to the customer. Wikipedia [20] defines supply chain management as: "*Supply chain management (SCM) is the process of planning, implementing, and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible. Supply chain management spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point-of-origin to point-of-consumption*". In today's competitive business environment industry is recognizing the importance of efficient supply chain management.

In Section 1.1 supply chain management is illustrated by means of an example which we use throughout the thesis. Relevant definitions used in supply chain management are introduced. A short description of the company is given in Section 1.2. The objectives of this thesis are discussed in Section 1.3. The structure of the report is outlined in Section 1.4.

1.1 Example of supply chain management

Hans computers is a retailer of computer components which we consider in this thesis and has different stores in separate regions of The Netherlands. In order to replenish these stores the company uses a distribution centre (DC). The distribution of products from the DC to the local stores is illustrated in Figure 1.1.

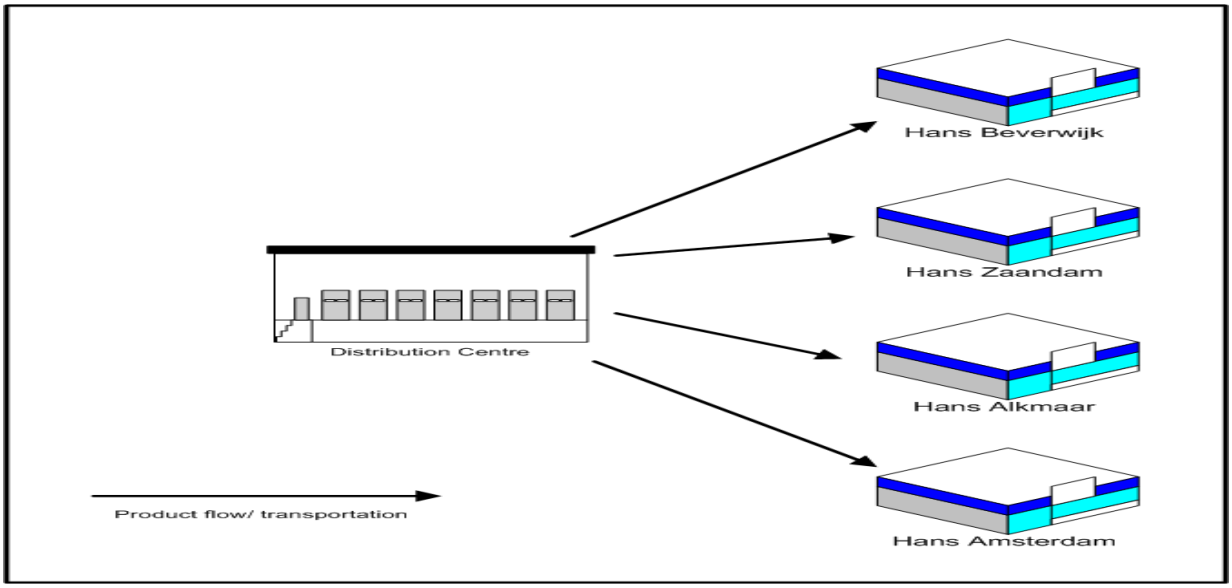

Figure 1.1: Supply chain of Hans computers, products are distributed from DC into the stores.

A category of products with a unique combination of form, fit, and function (i.e. unique components held in stock) is defined as stock keeping unit (SKU) according to Forbes [13]. To satisfy customer demand it is necessary to have sufficient inventory of every SKU. Managing inventory means finding a replenishment policy, such that costs are minimized and the customers are satisfied.

When a store manager places an order, this order will be processed in the DC. The ordered products will then be transported to the concerning store. The total time that elapses between the placement of an order and its delivery is the lead time of an order. Besides the order moment, the size of the order is of relevance as well. Therefore, determining the right order moment and right order size are key components of supply chain management.

In real world cases the number of SKU's can be very large. This makes it very difficult to determine the order moments and order sizes manually for every SKU. Therefore software applications are often used to support decisions for supply chain management.

1.2 VivaCadena

The research project is carried out at behalf of VivaCadena B.V. This company originated from Emrys B.V. as a consultancy company in the field of supply chain management. VivaCadena is also the name of their distribution software, which is based on the theory of constraints (TOC). Eliyahu M. Goldratt is the founder of TOC and he is also a commissioner at VivaCadena [12]. There is much to read about TOC, but the TOC approach comes down to the following five steps:

1. identify the constraint
2. exploit the constraint
3. subordinate all other processes to the constraint
4. elevate the constraint
5. rinse and repeat

The goal of VivaCadena is to increase the profitability of customers by leveraging the responsiveness of their supply chain. This is done by increasing the availability of SKU's, which reduces lost sales, and by reducing inventory levels to decrease costs.

The software of VivaCadena is used as a tool to achieve the above. It manages stocks and optimizes replenishments of finished goods in many different industries, for instance, fashion, food or computers. VivaCadena creates a link between its application and its customers' IT system. In this way VivaCadena has detailed information of its customers' individual SKU and their daily sales transactions. The output of the program helps to allocate the inventory among the stores and among the Distribution Centers.

1.3 Research scope

The thesis is related to the PreScan process at VivaCadena. The PreScan process is part of the selling process of VivaCadena. During the PreScan process the logistic performance of the client is measured by means of some analyses. These measurements give VivaCadena insights in the possible areas to improve. This is called the estimation of the potential. The objective of the PreScan process is to estimate the potential of the client based on the results of the measurements.

The estimation of the potential is based on analyses of the logistic performance. The data and measurements used for this analysis lack mathematical validation. The objective of the thesis is therefore to analyze the validity of the used data and measurements during the PreScan process, in order to have an efficient and accurate estimation of the potential.

1.4 Report structure

The PreScan process is described in more detail in Chapter 2. An overview of the activities performed by VivaCadena during this process is provided. It also contains all relevant definitions used in the remainder of this thesis. The current methods for analyzing the performance of a company will be discussed in Chapter 3. This chapter includes the assumptions that are made for the analyses. This chapter also contains examples to illustrate the analyses. Chapter 4 gives a detailed description of the research assignment. Relevant research questions for this thesis are specified in this chapter. Chapter 5 gives an overview of the relevant literature. The analyses performed during the internship are divided in the analyses of the input data (Chapter 6) and the analyses and validation of the performance indicators (Chapter 7). Based on the results and the analyses performed, conclusions and recommendations are made in Chapter 8.

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Appendix A: Table for t-values

df	P 0.25	0.2	0.15	0.1	0.05	0.025	0.02	0.01	0.005	0.0025	0.001	0.0005
1	1	1.376	1.963	3.078	6.314	12.706	15.895	31.821	63.657	127.321	318.309	636.619
2	0.817	1.061	1.386	1.886	2.92	4.303	4.849	6.965	9.925	14.089	22.327	31.599
3	0.765	0.979	1.25	1.638	2.353	3.182	3.482	4.541	5.841	7.453	10.215	12.924
4	0.741	0.941	1.19	1.533	2.132	2.776	2.999	3.747	4.604	5.598	7.173	8.61
5	0.727	0.92	1.156	1.476	2.015	2.571	2.757	3.365	4.032	4.773	5.893	6.869
6	0.718	0.906	1.134	1.44	1.943	2.447	2.612	3.143	3.707	4.317	5.208	5.959
7	0.711	0.896	1.119	1.415	1.895	2.365	2.517	2.998	3.499	4.029	4.785	5.408
8	0.706	0.889	1.108	1.397	1.86	2.306	2.449	2.896	3.355	3.833	4.501	5.041
9	0.703	0.883	1.1	1.383	1.833	2.262	2.398	2.821	3.25	3.69	4.297	4.781
10	0.7	0.879	1.093	1.372	1.812	2.228	2.359	2.764	3.169	3.581	4.144	4.587
11	0.697	0.876	1.088	1.363	1.796	2.201	2.328	2.718	3.106	3.497	4.025	4.437
12	0.696	0.873	1.083	1.356	1.782	2.179	2.303	2.681	3.055	3.428	3.93	4.318
13	0.694	0.87	1.079	1.35	1.771	2.16	2.282	2.65	3.012	3.372	3.852	4.221
14	0.692	0.868	1.076	1.345	1.761	2.145	2.264	2.624	2.977	3.326	3.787	4.14
15	0.691	0.866	1.074	1.341	1.753	2.131	2.249	2.602	2.947	3.286	3.733	4.073
16	0.69	0.865	1.071	1.337	1.746	2.12	2.235	2.583	2.921	3.252	3.686	4.015
17	0.689	0.863	1.069	1.333	1.74	2.11	2.224	2.567	2.898	3.222	3.646	3.965
18	0.688	0.862	1.067	1.33	1.734	2.101	2.214	2.552	2.878	3.197	3.61	3.922
19	0.688	0.861	1.066	1.328	1.729	2.093	2.205	2.539	2.861	3.174	3.579	3.883
20	0.687	0.86	1.064	1.325	1.725	2.086	2.197	2.528	2.845	3.153	3.552	3.85
21	0.686	0.859	1.063	1.323	1.721	2.08	2.189	2.518	2.831	3.135	3.527	3.819
22	0.686	0.858	1.061	1.321	1.717	2.074	2.183	2.508	2.819	3.119	3.505	3.792
23	0.685	0.858	1.06	1.319	1.714	2.069	2.177	2.5	2.807	3.104	3.485	3.768
24	0.685	0.857	1.059	1.318	1.711	2.064	2.172	2.492	2.797	3.091	3.467	3.745
25	0.684	0.856	1.058	1.316	1.708	2.06	2.167	2.485	2.787	3.078	3.45	3.725
28	0.683	0.855	1.056	1.313	1.701	2.048	2.154	2.467	2.763	3.047	3.408	3.674
29	0.683	0.854	1.055	1.311	1.699	2.045	2.15	2.462	2.756	3.038	3.396	3.659
30	0.683	0.854	1.055	1.31	1.697	2.042	2.147	2.457	2.75	3.03	3.385	3.646
40	0.681	0.851	1.05	1.303	1.684	2.021	2.123	2.423	2.704	2.971	3.307	3.551
50	0.679	0.849	1.047	1.299	1.676	2.009	2.109	2.403	2.678	2.937	3.261	3.496
60	0.679	0.848	1.045	1.296	1.671	2	2.099	2.39	2.66	2.915	3.232	3.46
80	0.678	0.846	1.043	1.292	1.664	1.99	2.088	2.374	2.639	2.887	3.195	3.416
100	0.677	0.845	1.042	1.29	1.66	1.984	2.081	2.364	2.626	2.871	3.174	3.39
1000	0.675	0.842	1.037	1.282	1.646	1.962	2.056	2.33	2.581	2.813	3.098	3.3
z*	0.674	0.841	1.036	1.282	1.645	1.96	2.054	2.326	2.576	2.807	3.09	3.291
	50%	60%	70%	80%	90%	95%	96%	98%	99%	99.50%	99.80%	99.90%
	Confidence level C											