

**MASS CUSTOMIZATION AND THE INTRODUCTION OF A QUALITY  
MANAGEMENT SYSTEM IN A SALES AND MARKETING ENVIRONMENT**

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## **PROJECT REPORT SUMMARY**

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The introduction of a vehicle destined for world-wide export brought mass customization to BMW SA. This, together with a 29% headcount reduction, a model range increase, stringent profitability targets and increased customer satisfaction demands, made the previous, un-integrated quality systems used in the Sales & Marketing Division obsolete. A quality management system was required to provide structure to the processes supporting a product which was becoming more and more complex.

The implementation of a quality management system is described. This system for the first time, described some of the procedures used in the mass customization process of the BMW SA Sales & Marketing Division. The quality management system is evaluated based on the principle that customer satisfaction and the failure of internal processes need to be measured. Various are identified and recommendations are made. Some of the recommendations described have already been implemented successfully. An integrated mass customization procedure was established. Recommendations regarding customer satisfaction are in the process of being implemented. The effectiveness of these recommendations will be evaluated by future customer satisfaction survey results.

## **SAMEVATTING VAN SKRIPSIEVERSLAG**

### **HOË VOLUME BOU-NA-BESTELLING EN DIE TOT STANDKOMING VAN ‘N KWALITEITSBESTUURSTELSEL IN A VERKOPE EN BEMARKINGSOMGEWING**

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Met die aanvang van produksie van voertuie wat in hoë volume wêreldwyd uitgevoer word, bou-na-bestelling na BMW SA gebring. Tesame met ‘n 29% vermindering in personeel, ‘n verhoging in die getal beskikbare modelle, streng winsgewendheidsdoelwitte en verhoogde kliënte tevredenheid vereistes, het die vorige, ongeïntegreerde kwaliteitstelsels in onbruik laat verval. ‘n Kwaliteitsbestuurstelsel was nodig om struktuur aan die prosesse wat ‘n produk wat meer en meer kompleks word, te ondersteun.

Die implementering van die kwaliteitsbestuurstelsel word beskryf. Hierdie sisteem het vir die eerste keer van die prosedures wat die bou-na-bestelling prosesse ondersteun beskryf. Gebaseer op die beginsels van kliënte tevredenheid en die meting van die faling ten opsigte van interne prosesse, is sekere tekortkominge in die stelsel geïdentifiseer en voorstelle is gemaak. Sekere van die voorstelle is alreeds in gebruik geneem. ‘n Geïntegreerde bou-na-bestelling prosedure is geskep. Voorstelle ten opsigte van kliënte tevredenheid is besig om geïmplimenter te word. Die effektiwiteit van hierdie voorstelle sal gemeet word aan die resultate van toekomstige kliënte tevredenheids navorsing.



“Vollendet das ewige Werk” - Wotan to Fricka  
Scene two, “Das Rheingold”- Richard Wagner (1869)

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## Abbreviations

BMW AG	BMW Aktien Geschällschaft.
BMW SA	BMW South Africa (Pty.) Ltd.
CCSI	Competitive Customer Satisfaction Index.
CRM	Customer Relationship Management.
CSI	Customer Satisfaction Index.
E46	BMW 3 series launched in 1998.
GATT	General Agreement on Trade and Tariffs.
LTP	Long Term Plan.
Mass customization	The ability to produce in lot sizes of one at high volume. Built to order.
MIDP	Motor Industry Development Programme.
OEM	Original Equipment Manufacturer.
PIC	Product Introduction Council.
QMS	Quality Management System.
S-CSI	Short Customer Satisfaction Index.
SOP	Start Of Production.
VMS	Vehicle Monitoring System.
VDC	Vehicle Distribution Center.
VPC	Vehicle Process Chain.

## 1. Chapter 1: Introduction

This chapter gives a brief background of BMW South Africa (Pty.) Ltd. (BMW SA). The problem, which this thesis addresses, is also described. In short, the problem deals with the requirements of a quality management system used in a sales & marketing environment where mass customization processes are being used.

### 1.1 BMW SA in 2000

BMW SA is one of 14 wholly owned subsidiaries of BMW AG with headquarters based in Munich, Germany. The Head Office and Sales & Marketing Division of BMW SA are in Midrand. Passenger vehicles are produced in the Rosslyn plant, northwest of Pretoria.

BMW AG has a worldwide presence in the luxury performance segment of the automotive industry with the BMW brand achieving worldwide sales of nearly 822 000 units [1] in 2000. BMW SA and BMW of North America are the only Original Equipment Manufacturers (OEM) to manufacture vehicles under the BMW brand outside Germany. BMW SA currently employs 3 950 people, divided amongst various divisions as shown in Figure 1.1. A further 2 850 people are employed in the 59 BMW dealerships in South Africa [2].

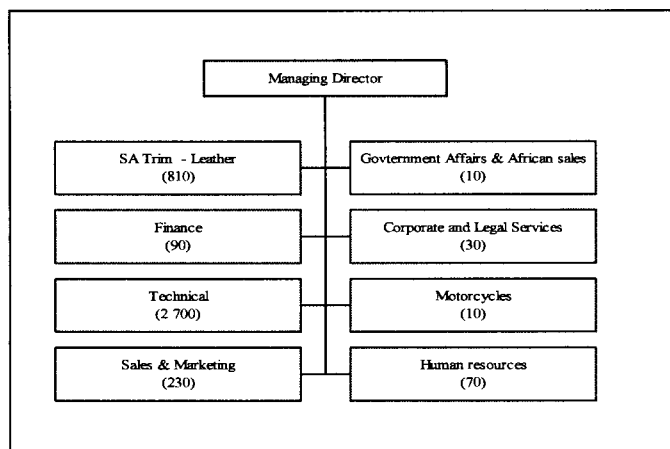


Figure 1.1: Organogram BMW SA (Including the number of employees in each section)

As seen in Table 1.1, BMW SA competes in the sub-segments of the luxury performance segment as in achieving a 2000 market share of 7.1%, the highest BMW market share in the world. BMW SA contributes 1.8% of BMW's annual worldwide sales [2].

SEGMENT	MODEL	ORIGIN	VOLUME 2000	%
Small Executive	3 Series Sedan	South Africa	12 400	79.5%
Medium Executive	5 Series Sedan	Germany	1 800	11.5%
Large executive	7 Series Sedan	Germany	250	1.6%
Coupé/Cabriolet	Z3 Roadster	United States	250	1.6%
	3 Series Coupé	Germany	650	4.2%
	3 Series Cabriolet	Germany	250	1.6%
Total			15 600	
Total Market			220 000	
BMW Market Share			7.1%	

Table 1.1: Models and volumes [2]

As seen in the above table, BMW offers the retail clients the complete range of internationally available body shapes. The vehicles are sourced from Germany, the United States and South Africa.

## 1.2 Problem identification

From 1994 onwards, various driving factors led to the introduction of mass customization at BMW SA. Where previously, the Rosslyn factory produced a standard 3 Series with limited choice of options, a vehicle could now be produced as individual local or overseas customers require.

Mass customization means that a customer can order a specific vehicle to suit his or her specific lifestyle and preferences. This new phenomenon posed a challenge to the quality assurance of a wide variety of products.

This problem started to have a significant impact on the Sales & Marketing Division. Previously, there was no quality management system (QMS) used for the entire Sales & Marketing Division and the introduction of mass customization brought the necessity of a quality management system.

This thesis consequently describes the main driving forces and their effects that made such a QMS necessary. Measured against these drivers, the QMS is evaluated, shortcomings are identified and recommendations made.

### **1.3 Chapter outline**

The structure of this project is graphically explained in Figure 1.2.

Chapter 2 describes the driving forces that lead to the introduction of a QMS based on the principles of ISO 9002 in the Sales and Marketing Division. The chapter also contains definitions on the concept “mass customization”.

Chapter 3 deals with the process that was followed to introduce a QMS in a sales and marketing environment. Problems within the process are identified. The mass customization process is described in chapter 4.

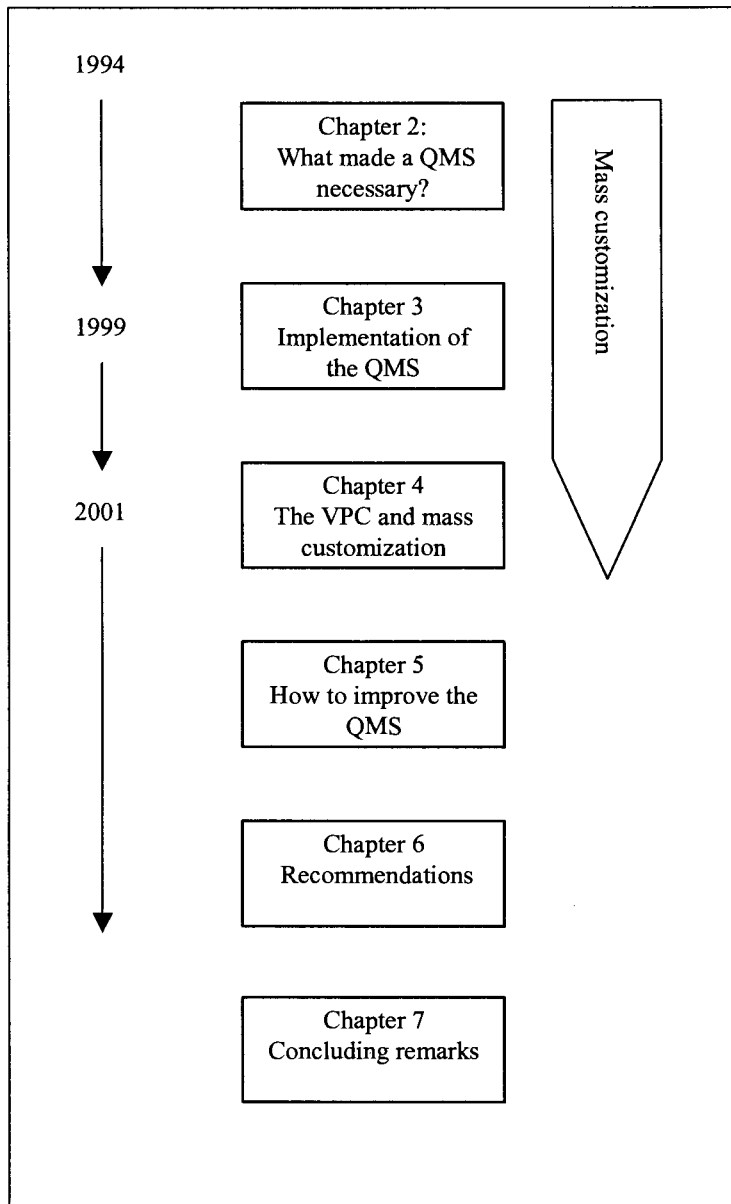


Figure 1.2: Chapter outline

In chapter 5, the requirements that the QMS has to fulfill are described. Chapter 6 describes what changes to the QMS have to be made to fulfill these requirements.

Chapter 7 gives a short overview of the lessons learnt from implementing a QMS in a sales and marketing environment.

## 2. Chapter 2: What made a QMS necessary?

In this chapter, the necessity for a QMS in the Sales & Marketing Division is described in terms of changes in the South African business environment and the business philosophy of BMW SA. The implementation of mass customization is discussed under changes within the business philosophy.

Because this study investigates changes in the Sales & Marketing Division, it is necessary to have a background of the division. The division is divided into six departments. Sales & Marketing is responsible for marketing campaigns as well as supporting the dealer network during the sales process. Parts & Accessories is sourcing components from BMW AG as well as local suppliers for use in the dealer network. Service has to ensure service profitability through effective service quality systems and initiatives. Dealer Development & Training is managing the business strategy for the dealer network and also provides training to the Sales & Marketing Division and dealer network. The Operations department is responsible for volume planning and coordinates the distribution of cars. Business Systems & Processes supplies the information technology support to the Sales & Marketing Division and dealer network.

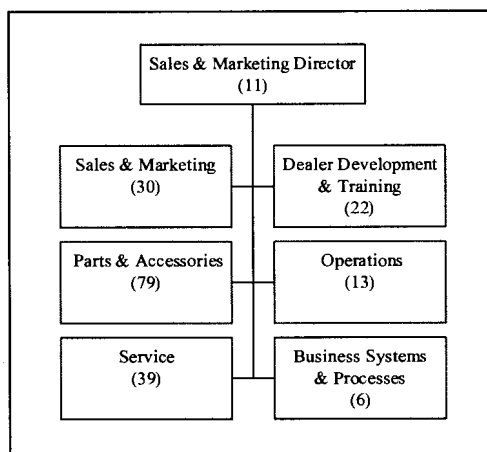


Figure 2.1: Organogram Sales & Marketing Division (including the number of employees in each section)

## 2.1 Changes in the business environment

After the mining and agricultural sectors, the South African automotive and related industries are the third largest sector in the South African economy contributing 5.5% of the GDP in 1999 [3]. It is a regulated industry that has changed substantially since the democratic elections of 1994 and the subsequent opening of the South African market.

The two biggest changes were the introduction of new legislation relating to duties and tariffs as well as the opening of the South African borders, bringing additional international competitors to South Africa.

### 2.1.1 New legislation

After the 1994 democratic elections, the South African government agreed to abide by the guidelines prescribed by the General Agreement on Trade and Tariffs (GATT). In 1994, the import duty on passenger vehicles was 100% of the import value. As can be seen in Figure 2.2, during 1995, a 35% point drop in this duty took place and the duties will further reduce to 40% at the end of 2002. The duties on components will reduce to 30% by the end of 2002.

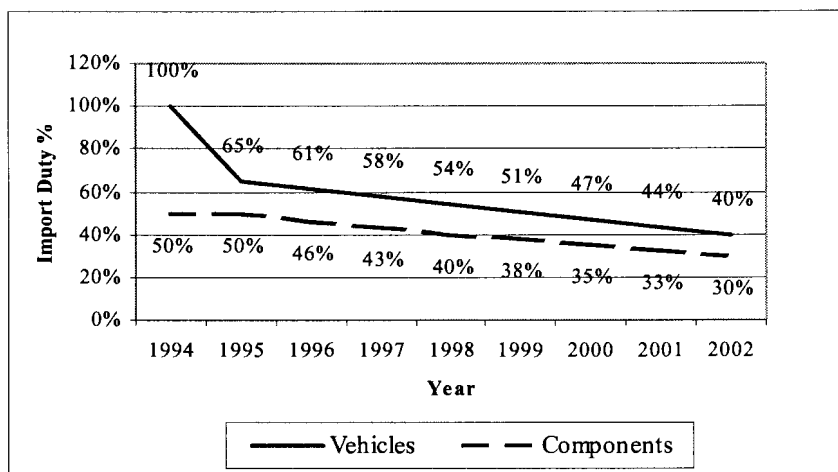


Figure 2.2: The reduction of import duties



The reduction in these duties started to diminish the protection, which the industry enjoyed until 1994. In 1992 a total of 11 brand names were present in the South African market and by the end of 1999, an additional 18 brand names were represented [4].

Because of the low domestic passenger vehicle volumes and pressure on profitability, competition in the market remains fierce - even during the dramatic increases in the prime-lending rate, which started in 1998. The market is easily influenced by new concepts. In this respect, the total South African market for sport utility vehicles grew from 6 000 in 1996, to nearly 12 800 in 1999, an increase of more than 100% [6].

To stay competitive in the luxury performance segment, the OEMs (Volkswagen, BMW, DaimlerChrysler, Land Rover) as well as importers (Alfa Romeo, Honda, Jaguar, Saab) have to differentiate themselves in different ways than previously. The challenge lies in competing in this market, continue to strengthen the brand, maintaining market share, giving the customers what they require, thus increasing customer satisfaction.

The South African Government regulates the reduction of duties in consultation with the Motor Industry Development Program (MIDP). One of the most important aspects of the MIDP is that an OEM that exports vehicles or components can generate import credits that can be used to offset customs duties on imported vehicles and components. The amount of import credits generated by the OEM is dependent on the value adding that takes place in South Africa. This gives exporting OEMs a cost advantage over non-exporting OEMs and importers. BMW SA was the first South African OEM to follow the export route in 1995 (500 units to Australia). It was subsequently followed by Volkswagen (1998) and DaimlerChrysler (2000). By the end of 2000, BMW SA had exported a total number of 49 500 units [5]. The economy of scale makes it increasingly difficult to produce a vehicle destined exclusively for the South Africa market. The export programme of BMW SA was consequently the main drive for introducing mass customization to South Africa.

### 2.1.2 Volatile industry

As seen in Figure 2.3, the total passenger vehicle market is very sensitive to growth or decline in the GDP. A growth of one percentage point in the GDP between 1994 and 1995 brought an increase of nearly 20 000 units and a decrease in GDP of three percentage points between 1996 and 1998 brought along a reduction of nearly 70 000 units. The total annual volume fluctuated between 170 000 in 1986 and 270 000 units in 1999 [2].

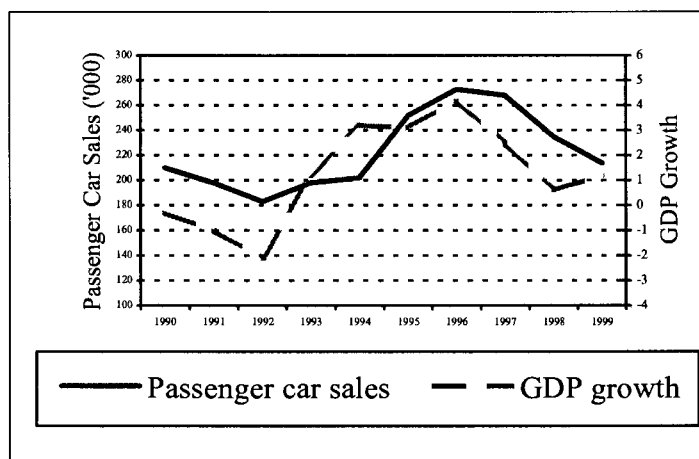


Figure 2.3: Total annual passenger vehicle sales and GDP [1]

Because of the volatile nature of the industry, it became necessary for the OEMs to become more flexible and to have systems in place to support sudden changes in the market.

### 2.2 Changes within the business philosophy of BMW SA

BMW SA became a full member of the BMW Group after the democratic elections of 1994. This meant that BMW SA had to fulfill the stringent quality, volume and financial benchmarks as prescribed by BMW AG.

### 2.2.1 A target commitment process

To stay competitive within BMW as a whole, BMW SA became target orientated. In order to meet the corporate objectives, annual objectives need to be defined for the various company divisions. To achieve the annual objective, various goals are defined. The results of the annual objectives are reviewed in a target commitment process. The results are used to determine the long-term plan (LTP).

The company vision, mission and corporate objectives made it clear that a QMS must be established in the Sales & Marketing Division. The process is schematically shown in Figure 2.4.

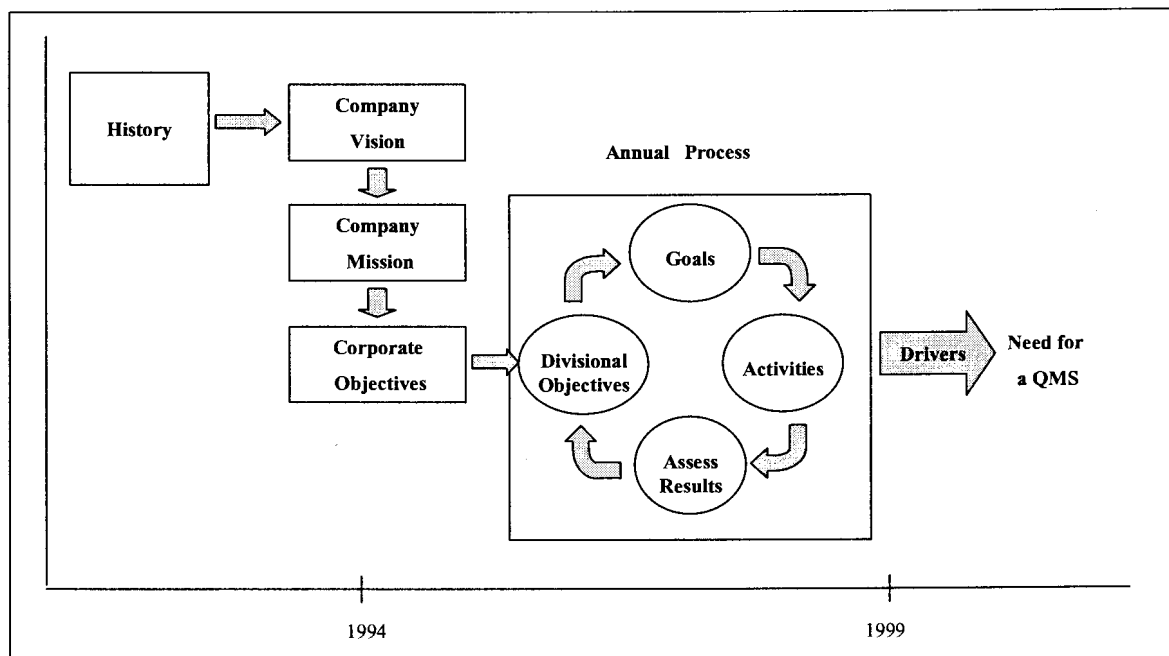


Figure 2.4: Overview of chapter 2

To support this vision, a company mission was formulated:

To be a world-class manufacturer dominating the luxury vehicle market.

BMW SA will lead the automotive industry in:

- Delivering superior quality and profitability.
- Exceeding customer expectations.
- Forging successful partnerships with our dealers and suppliers.
- Caring for the environment.
- Contributing to the growth and prosperity of our communities and the greater Southern Africa.

Figure 2.5: Company mission [8]

To support this mission, the Technical Division had to meet the following objectives:

1. To establish a world-competitive production facility in the southern hemisphere, fully integrated into the BMW Group global network, which produces BMW products both for South Africa and for export.
2. To consistently achieve world-class standards through our products and service-support to the total satisfaction of our customers.
3. To develop our supplier base to achieve cost competitiveness and component export capability [8].

To support this mission, the Sales & Marketing Division had to meet the following objectives:

1. To establish a dynamic, customer orientated partnership with the retail organization in order to dominate the luxury market.
2. To focus all sales activities on enhanced wholesale and retail profitability.
3. A complete range of products and innovative services. To focus on the total satisfaction of our customers. [8].

The successful implementation of these tasks would ensure the future existence of a BMW subsidiary in South Africa.

### **2.2.2 A transformation from a low volume manufacturer to a mass customizing exporter**

The industrial revolution that started in the nineteenth century brought about mass production. Standardized products were manufactured and costs were kept down with economies of scale. The twentieth century brought about a customer revolution. Customers started demanding customized products and services at acceptable prices [9]. Mass customization was made possible by improved computer capacity and interconnectivity. Gordon [10] defines mass customization as the process of providing and supporting profitably individually tailored goods and services, according to each customer's preferences with regard to form, time, place and price. Gordon differentiates between three approaches to mass customization:

1. Standard product, standard service, customized communication. In this case, direct marketers tailor their communications to their audience without changing their product or service offering.
2. Standard product, customized service, customized communication. Companies here provide unique, non-product benefits for their individual customers.
3. Customized product, customized service, customized communication. This implies full implementation of mass customization and comprises all three dimensions of product, service and communications.

### 2.2.2.1 The advantages of mass customization

The successful implementation of a mass customization strategy holds several advantages for a company. Gordon [9] states that mass customization has the potential to deliver competitive advantage for three main reasons:

1. Customers want a solution, which addresses their unique preferences, but suppliers may have been unwilling or unable to provide it.
2. Competitors have yet to segment most markets to ultimate segments – that of the individual.
3. Because full mass customization is hard to do and even harder to do well, an opportunity often exists in specific markets to seize the opening and do what others have not.

Other advantages include the following:

1. In mass customization, lower costs are achieved through economies of scope – the application of a single process to produce a greater variety of products or services more cheaply and quickly [11].
2. Peppers and Rodgers [12] states that the mass customization process allows customers to participate in the actual design of his/her own product. As a result, the customer is much more likely to be satisfied with the overall performance of the product.
3. It can offer a progression of “new” products. Flexibility in design and manufacturing can enable a company to launch a continuous stream of product improvements that are new to customers [13].
4. It is possible to add price premiums on products since they meet customers’ needs better because they are worth more. A customized product, in the form that the customer wants, may have little or no competition ensuing pricing advantages [13].

5. Mass customizers can adjust quicker to changes in markets, technology, standards and trends because of operational flexibility. [13].

#### **2.2.2.2 Requirements for a successful mass customization strategy**

A successful mass customization strategy requires the following:

1. Redesigning of business processes, particularly to personalize the flow of products and services and accelerate the cycle time of each process. The redesigning of processes can break down the vertical compartments by examining the value chain of the company in a horizontal, logical customer-focused manner.
2. Just-in-time delivery and processing of materials and components eliminate process flaws and reduces inventory-carrying costs.
3. Reduction of setup and changeover times. This directly lowers run sizes and the cost of variety.
4. Compressing cycle times through all processes in the value chain, thus eliminating waste to increase flexibility and responsiveness.
5. Be able to produce upon receipt of an order instead of a forecast. This lowers inventory costs, eliminates write-offs and provides the information necessary for individual customization [11].

6. Mass customization also results in a challenging production environment, possible changes to products or services, structural arrangements as well as to organizational orientation. Regarding organizational orientation and mass customization, Radder and Louw [9] mentions the organization requires the following to achieve the benefits of mass customization:

- A flexible and less hierarchical structure, functional teams and positive feedback loops.
- The reengineering of processes to provide the required flexibility and quick response.
- The commitment and involvement of employees, suppliers, distributors and customers.

A shift to mass customization thus requires and organizational culture of dynamic change.

### **2.2.2.3 How mass customization was implemented at BMW SA**

After BMW SA became a full member of the BMW Group, a new company vision was created. BMW SA was to undergo a focused transformation from a local manufacturer to that of a globally competitive exporter offering mass customized products.

The focus changed from having market presence to that of delivering a product of similar quality standards as achieved in Germany (Figure 2.6). Before the transformation, the Rosslyn plant manufactured vehicles for South African needs only. The annual volume was 12 000 units. Single units were being exported [7].

The target was to produce vehicles with German levels of quality, and productivity. Cost targets had to be comparable with those of German and American BMW plants. To improve quality, the local manufacturing of the 5 Series was discontinued and in 1997, the export of the 3 Series started to achieve significant volumes. By the end of 2001, an annual production volume of 50 000 units were planned.



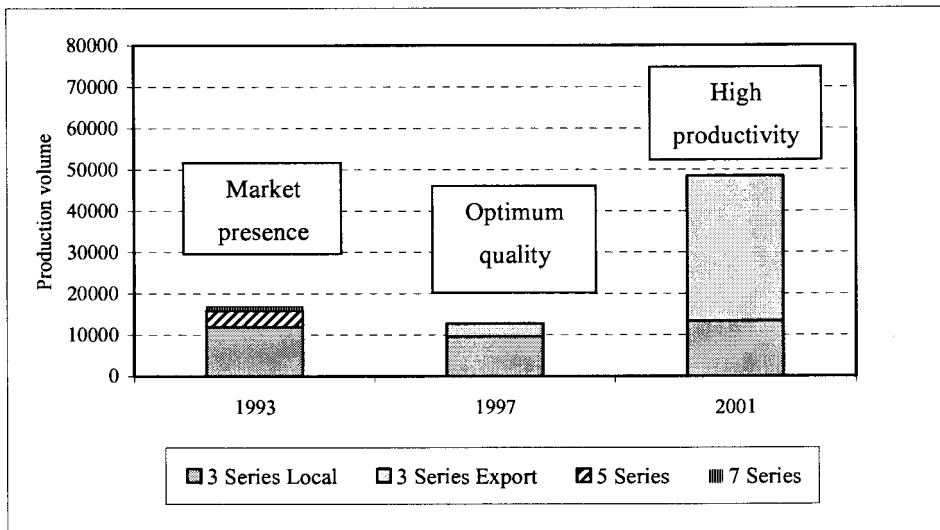


Figure 2.6: Focused transformation [7]

To support the mass customization process at BMW SA, BMW AG in 1996 announced that an investment of R1 billion would be made in South Africa thus further integrating BMW SA into the company’s global manufacturing and sales network.

This meant that BMW would continue to manufacture vehicles in South Africa with the production of the new BMW 3 Series, code named E46, which was started in April 1998. Production of the 5 and 7 Series was discontinued in 1995 and 1997 respectively.

Because of the increased complexity and production volume of the E46 in comparison to its predecessor, the Rosslyn plant underwent a transformation. Working environments were upgraded, new systems implemented (relating to vehicle distribution, information technology, just-in-time supply, ISO 9001, ISO 140001, BS 8800) together with investment in education and training [7].

With the introduction of E46, a new paint application facility was built and the body shop and assembly plant was substantially upgraded.

With sufficient training, the improvement of quality allowed the E46 to be exported to Australia, Germany, Great Britain, Japan, New Zealand, Taiwan, and the United States of America.

The new production facility and ordering and distribution systems had the following effects on the Sales & Marketing Division:

1. The Sales & Marketing Division could now fulfill customer demand by offering any client a new, high tech 3 Series BMW – each individual vehicle build to order. In Table 2.1 the increase in options available to a retail client can be seen.

	1993	1994	1995	1996	1997	1998	1999	2000
3 Series	7	8	10	8	6	14	56	58
5 Series	6	5	20	22	22	40	43	61
7 Series	4	8	9	20	22	20	41	36

Table 2.1: Increase in options [14]

The increase in production volume and complexity of the E46 put severe strain on the systems used by the Sales & Marketing Division. As described previously in this chapter, mass customization requires that vehicles are build to order and not to forecast. It is also mentioned that mass customization requires a redesign of processes. To address some of this problems, Ordering and Distribution department introduced a QMS based on ISO 9002 in 1997. This QMS was closely related to the Rosslyn production and volume planning processes and did not cover interaction between other departments within the Sales & Marketing Division.

Mass customization brought other problems such as more complex pricing. The variety of new options brought along change management problems. The ordering system had to substantially changed to accommodate the availability of options.

2. Better economies of scale (12 000 to 50 000 units per year), and the credits generated by the export program, enabled the Sales & Marketing Division to keep the vehicle pricing competitive in comparison with Mercedes Benz and Audi.
  
3. Regular customer satisfaction surveys [15] show that the most important item in customer satisfaction is that the customer's vehicle must be free of mechanical defects. Consequently, the improvement of quality had a positive effect on the Customer Satisfaction Index (CSI).

### 2.2.3 Increase in model derivatives

The LTP of the Sales & Marketing Division planned included the South African market introduction of more model derivatives. In 1996 BMW had a high market share with few models making it difficult to maintain exclusivity. To counter this, the product range was broadened to enter niche segments such as cabriolets, roadsters, station wagons and sport activity vehicles. The number of variants available to the market increased from 10 in 1996 to 24 in 2001 (Figure 2.7) [16].

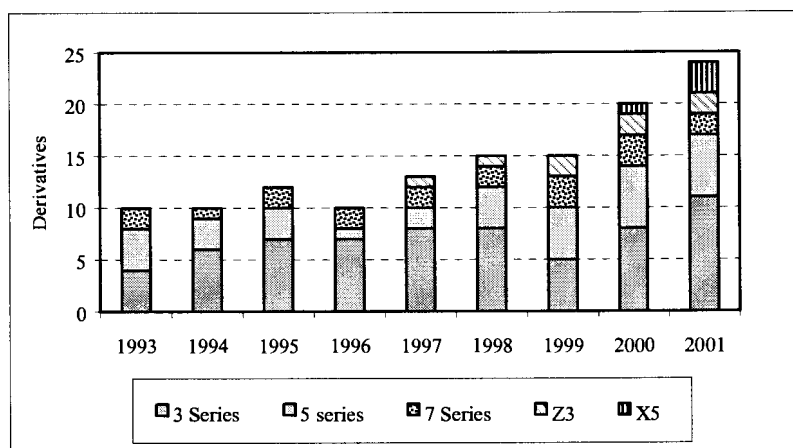


Figure 2.7: Increase in model derivatives

The complexity of the E46 as well as the expanding model range had a significant impact on the Sales & Marketing Division. The complexity of all internal and external communication increased substantially because of the increase in the number of bulletins to the dealer network and the increase in the number of price lists and option descriptions. The amount of options increased the complexity of pricing.

The increase in model derivatives, together with a rationalization programme, brought an increase in training expenditure (Figure 2.8). Employees had to be trained on the characteristics of the new options. Proper systems for the controlling of training records, training programmes and training schedules had to be established.

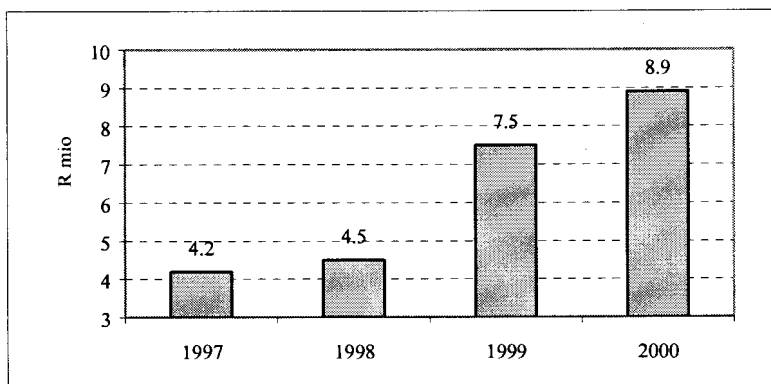


Figure 2.8: Increase in training expenditure [17]

#### 2.2.4 Rationalization

To meet profitability targets and internationally accepted benchmarks relating to cost of wholesale and cost of retail, rationalization took place within BMW SA itself and the Dealer Network. Stringent headcount targets were imposed and headcount reduction took place. The headcount in the Sales & Marketing Division declined by 29% between 1997 and 2000 (Figure 2.9).

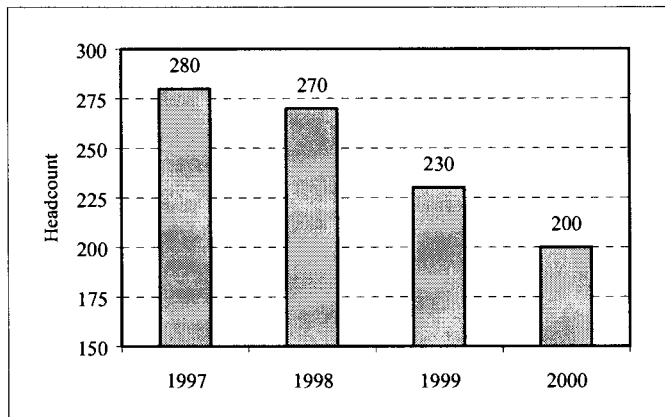


Figure 2.9: Headcount reduction in the Sales & Marketing Division [18]

The rationalization program affected not only the Sales & Marketing Division. Between 1996 and 2000, 20 BMW dealerships had their franchise agreements suspended [18] (Figure 2.10).

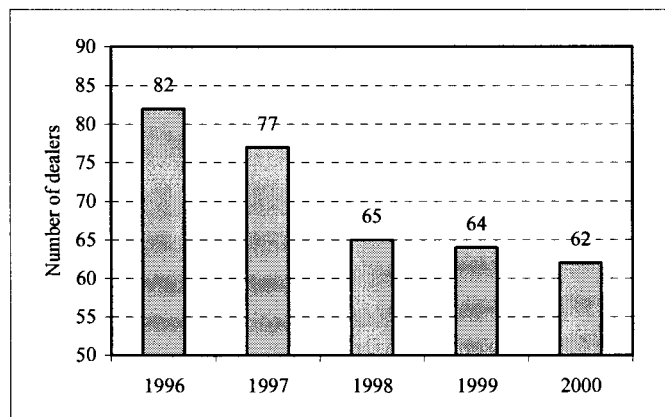


Figure 2.10: Reduction of dealerships

The reduction in dealerships had three important effects:

1. The overhead costs relating to the maintenance of computer systems and product launches within the Sales & Marketing Division to maintain dealerships was reduced.
2. The reduction in headcount required multi skilled employees. The total training expenditure increased (Figure 2.8) substantially.

3. The net dealer profitability as a % of turnover increased substantially (Figure 2.11). This can be attributed to a higher volume being distributed over fewer dealers as well as the introduction of the E46. The increased dealer profitability had a positive effect on customer satisfaction because the dealers could spend more money on upgrading facilities, maintaining loan vehicle fleets and training.
4. The reduction in dealerships highlighted the importance of inter departmental communication. Expensive equipment was lost during the closure of dealerships.

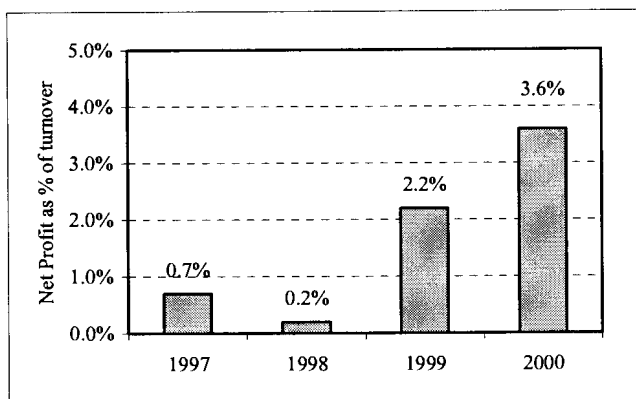


Figure 2.11: Increase in dealer profitability [18]

### 2.2.5 Breakthrough service

Breakthrough service was started in 1995 with the objective to raise customer service by increasing awareness in the Dealer Network so as to improve culture, processes and customer orientation. Consulting teams were created and they investigated employee satisfaction, customer satisfaction and processes as dealers with high retail volume and poor customer satisfaction.

The internal organization was made aware of the importance of customer satisfaction. Feedback loops were put into place to improve the wholesale processes in terms of training, communication, service and warranty problems. The overall effect can be seen in Figure 2.12.

Notwithstanding the improvement in vehicle quality, the change from to mass customization had a negative effect on the overall customer satisfaction. The new product was more expensive and because of the high demand and limited supply, all customer needs could not be fulfilled.

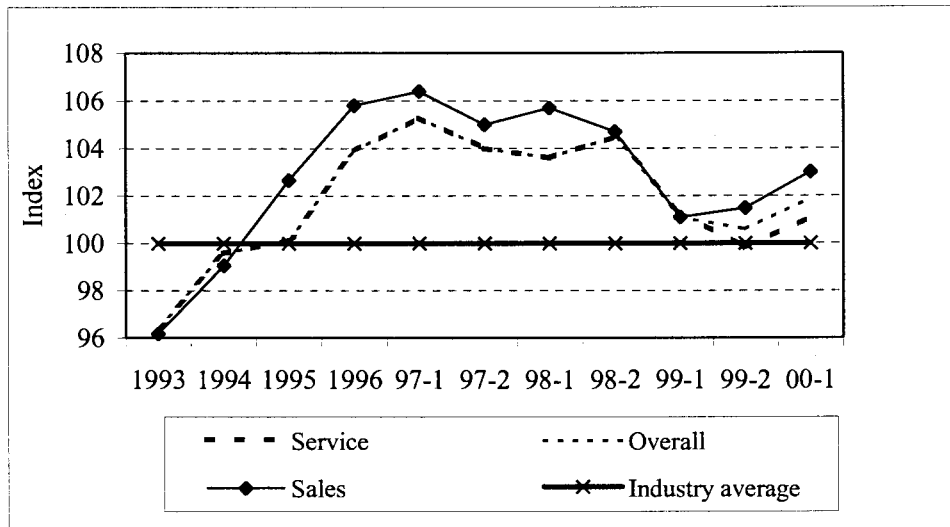


Figure 2.12: Development of the Competitive Customer Satisfaction Index [19]

### 2.3 Chapter summary

The introduction of the E46 brought mass customization to BMW SA. With mass customization as the main driver, a 29% headcount reduction, a model range increase, tougher profitability targets and increased customer satisfaction demands, the previous, un-integrated systems used in the Sales & Marketing Division became obsolete.

The following table is a summary of the changes which mass customization brought to the Sales & Marketing Division.

	Before mass customization	After mass customization
Number of options	74	140
Number of models	10	15
QMS	In one department only	Need of a division wide QMS
Pricing	Simple, few models and options	Complex, more models and options
Ordering system	Based on forecast	Based on order

Table 2.2: The influence of mass customization on the Sales & Marketing Division

A QMS was required to supply structure to the processes supporting a product that was becoming more and more complex. The QMS also needed to define the interdepartmental relationships and responsibilities within the Sales & Marketing Division. A proper system dealing with corrective action and process measurement was also required.



### **3. Chapter 3: The implementation of the QMS**

This chapter gives a short overview of the process that was followed during the implementation of a QMS in the Sales & Marketing Division of BMW SA. To conclude the chapter, some problems relating to the mass customization process are identified.

#### **3.1 Decision to install a QMS based on ISO 9000**

To meet the 1999 Sales & Marketing Division objectives, a project to install a QMS based on the ISO 9000 standards, was initiated in April 1999. Since neither the Sales & Marketing Division of BMW AG, nor any of the 12 BMW subsidiaries had implemented quality systems based on ISO 9000 or any other sets of quality standards, it was decided to use ISO 9000 because its standards are generic and applicable to any industry [21]. Implementing a quality management system in a non-production environment is problematic, due mainly to the requirements associated with a quality management system. It was also decided to have the QMS audited by an accredited auditing organization.

As described in ISO 9000, the quality objectives of:

1. Achieving consistent customer satisfaction,
2. Giving management the confidence that quality is being produced and
3. To give the customer confidence that quality is being delivered

supported the objectives of the Sales & Marketing Division [21].

### 3.2 The creation of the QMS

To start the project, an ISO project manager was appointed by the Sales & Marketing Director. The ISO project manager reported directly to the Sales & Marketing Director and had the important function of establishing the project plan and project team. He was responsible for the coordination of the project activities, auditing structure, writing of the quality manual and monitoring of all quality activities.

Each department in turn appointed an ISO representative. The ISO representatives were responsible for the co-ordination of all the tasks relating to the creation of the QMS. This task was additional to the existing workload of the ISO representatives. The most important of these were the development of documentation and the conducting of interdepartmental system and process audits. An organogram of the structure is shown in Figure 3.1.

As a group, the ISO project manager and the departmental ISO representatives were called the Quality Management Circle (QMC). A project plan was created and weekly meetings were held to monitor the progress with the various tasks.

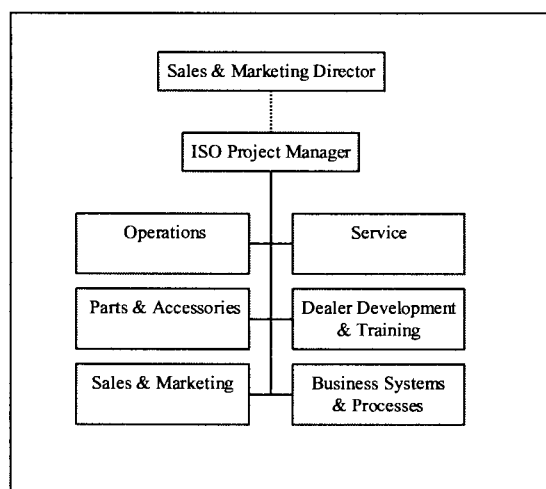


Figure 3.1: ISO project structure [22]

### **3.3 The tasks of the project plan**

To ensure that the QMS was certified by March 2000, a project plan was created. The project plan was broken down into eight tasks. On the next pages, each one of the tasks is described in terms of a task description, the people responsible and the duration of the task. There were some problems with management involvement during this phase of the project. This caused delays in the tasks of the project plan being completed on time.

#### **3.3.1 Quality policy, organizational structure and quality awareness**

The ISO representatives, together with their managers, were responsible for creating departmental organograms and job descriptions. The format of the organograms and job descriptions were agreed upon in the QMC. The departmental managers, together with the Sales & Marketing Director and the ISO project manager were responsible for laying down the quality policy, determining the division's objectives and mission statements.

In addition to extensive training on quality management systems, the ISO representatives were also trained to audit quality management systems. To create adhesion between the ISO project team members, an off-site teambuilding exercise was conducted.

An extensive awareness program was launched. The ISO project was officially launched with a team-building event to which all employees of the Sales & Marketing Division were invited. Awareness was enhanced by distributing the Sales & Marketing quality objectives to all the employees as well as having it framed and distributed throughout the building.

The quality policy states the following:

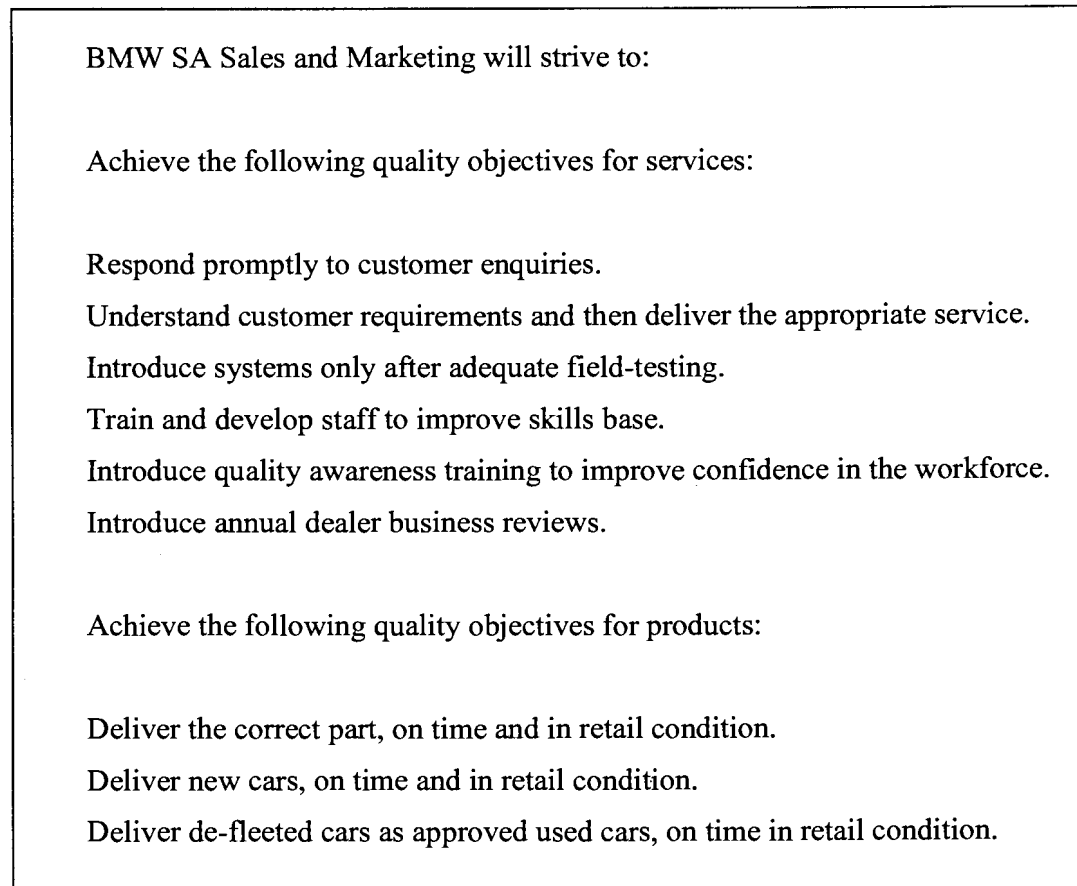


Figure 3.2: Quality policy

A quality awareness-training program was created and all employees were required to attend. The training program used examples from the Sales & Marketing Division environment to (i) describe what ISO 9000 entails, (ii) how the continuous improvement cycle works, (iii) what documentation is required as well as (iv) how a properly implemented QMS can improve the quality of work delivered and increase the company's profitability by reducing non-value adding tasks. The motto of "work smarter, not harder" was used.

The audit process, which included all the various types of audits, was also included. To conclude the training session, a video that was taken at the ISO project launch was shown. A total of 240 people were trained. The training program subsequently became part of the divisional induction program.

This entire task took four months to complete. A total of eight organograms, 240 job descriptions and nearly 250 procedures were developed.

### **3.3.2 Document development**

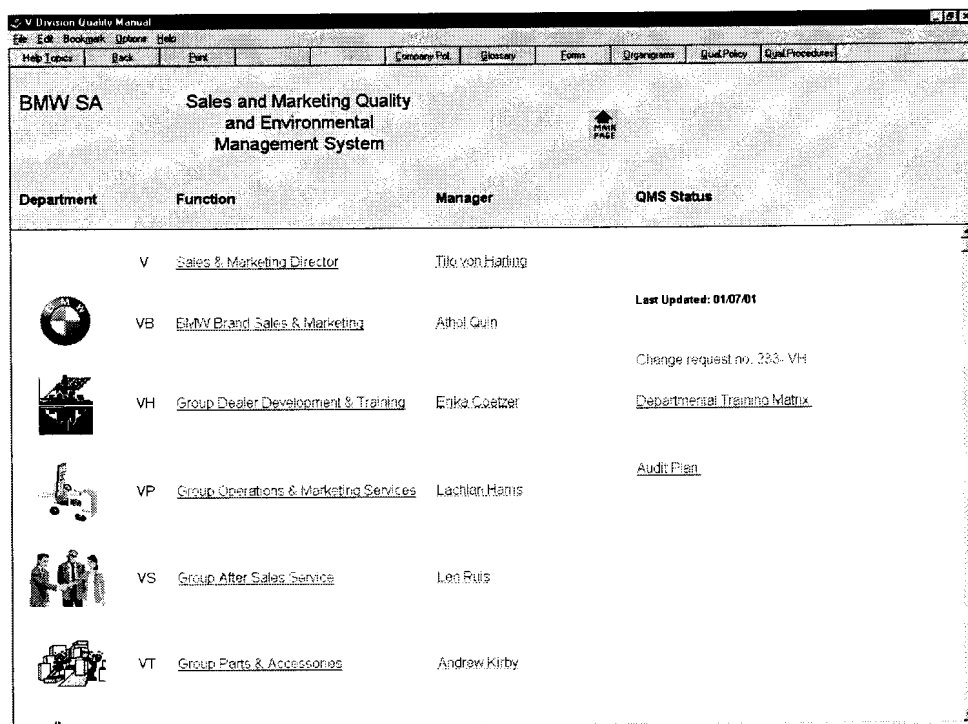
Document development proved to be the most difficult part of the implementation of a QMS. It was decided that the documentation should be broken down to departmental level and not to process level. There were delays in completing this task, mainly due to lack of experience of how to identify key processes and how to recognize the most important steps within procedures. The ISO representatives also concentrated on their own departments and the impact of interdepartmental procedures was not attended to. The main steps in document development were (i) the identification of key processes, (ii) analysis of these processes, (iii) formulation of procedures and work instructions and (iv) approval of procedures.

Based on observations and discussions with the Rosslyn plant it was decided to introduce a QMS that was on-line. It had the following advantages:

1. Document control is easier in comparison with paper-based system because changes are immediately available to all users. The problem of retrieving previous versions of procedures is also eliminated by having only the latest version available on-line.
2. Easy access to all users with personal computers. Because the computer based system is user friendly, it encourages the use of the QMS.
3. Search and navigation facilities enable the user to locate and read related procedures without effort.
4. Enhanced transparency – business objectives, performance standards and job descriptions are available to everybody.

Software called “Robohelp” was used in creating an on-line QMS. The quality manual, organograms, job descriptions, procedures and forms are all available on-line. QMS is currently available on 200 personal computers throughout the Sales & Marketing Division.

The QMS was structured around the various departments. The first screen that a user would see when entering the QMS can be seen in Figure 3.3.



Department	Function	Manager	QMS Status
V	<a href="#">Sales &amp; Marketing Director</a>	Tilo von Harburg	
VB	<a href="#">BMW Brand Sales &amp; Marketing</a>	Ashol Guin	<b>Last Updated: 01/07/01</b>
VH	<a href="#">Group Dealer Development &amp; Training</a>	Enka Coetzer	Change request no. 233- VH <a href="#">Departmental Training Matrix</a>
VP	<a href="#">Group Operations &amp; Marketing Services</a>	Lachlan Harris	<a href="#">Audit Plan</a>
VS	<a href="#">Group After Sales Service</a>	Lea Ruis	
VT	<a href="#">Group Parts &amp; Accessories</a>	Andrew Kirby	

Figure 3.3: The first page of the QMS [24]

The user can then select a department and go to the department’s home page and view the department’s organogram, job descriptions, business objectives, procedures and forms. An example of this can be seen in Figure 3.4.

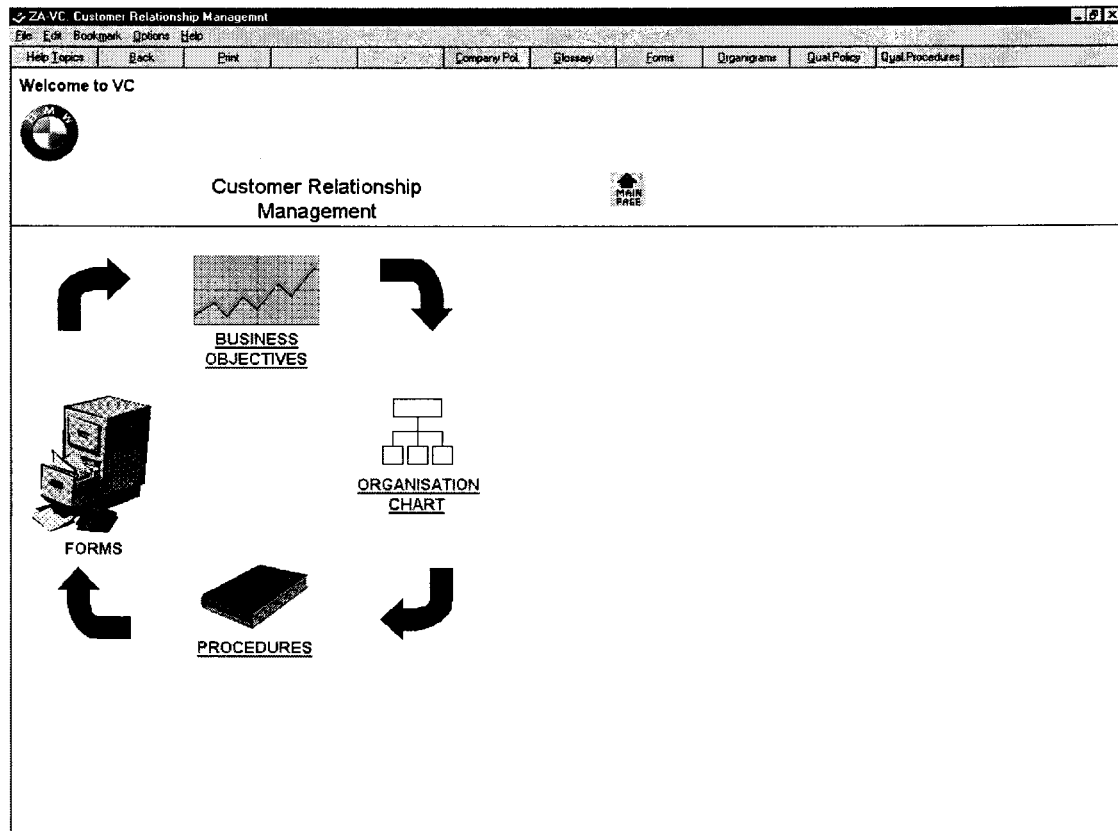


Figure 3.4: A department's home page in the QMS [24]

This task took approximately six months to complete.

### 3.3.3 Audits

It was decided to use the ISO representatives to conduct the internal audits in preparation for the certification audit. To support the process of continuous improvement, the ISO representatives were also tasked to conduct internal process and system audits in their own and other departments. As prescribed by the ISO standards, these audits are part of an annual audit plan. All the ISO representatives were therefore sent on auditor techniques training courses.

After the auditor techniques training was completed, internal audits took place in all the departments. Audit reports were issued and corrective action was monitored. As part of management review, management was informed of the audit results and of the corrective actions which were implemented.

A pre-audit was conducted three months before the certification audit. The audit report was presented to management and contained fourteen findings which were resolved before the certification audit. The certification audit took place in June 2000. The company TÜV South Africa certified the QMS and the follow-up audit was planned for July 2001.

It was the first time a Sales & Marketing Division within the BMW Group received ISO 9002 certification. Not one of the Sales & Marketing Divisions of the other South African OEMs has to date obtained this qualification.

#### **3.3.4 Maintenance of the system – continuous improvement**

The QMC continues to operate and co-ordinate quality activities such as the implementation of ISO 14001, process improvement, corrective action and the setting of quality goals.



### **3.4 Problems within the QMS**

Ålström and Westbrook [25] identified several problems that can be found during mass customization processes:

- Poorer on-time deliveries
- Supplier delivery performance
- Increase order response time, delays in model introduction
- Reduction in product quality
- Supply chain management
- Distribution channels
- Information technology, availability of information

Since the introduction and certification of the QMS, certain problems and incidents occurred which highlight problems within the current processes. There were problems with on-time deliveries, information technology, supplier delivery performance and delays in model introduction. The following paragraphs describe some of the problems that occurred.

#### **3.4.1 Incident 1: The X5 and all terrain tyres**

The X5 was introduced to the South African market in March 2001. The vehicle was released by BMW AG with 17” rims and normal 17” tyres. The option of being able to choose between normal and all-terrain tyres was new to BMW SA.

The South African vehicle profile had 18” rims and all-terrain tyres released as a 100% Option – meaning all vehicles had to have 18” rims fitted with all-terrain tyres. As an option, 19” rims, again with all-terrain tyres were also released and a large number of vehicles with this option were ordered.

When placing the orders for the launch vehicles, the Distribution Specialist was under the impression that all terrain tyres were a type of rim and removed the 18” and 19” all terrain tyres from the profile. This resulted in units being ordered without tyres but with rims. The BMW Central Ordering System automatically changed the order to 17” rims with normal tyres.

This was only noticed when the first vehicles arrived in South Africa. A total number of 38 vehicles were affected and 190 rims and tyres had to be air freighted to South Africa at a total cost of nearly R600 000.

#### **3.4.2 Incident 2: The X5 and spare wheels**

The availability of option number 926 (full size spare wheel) was not included in any of the Status Reports from BMW AG until 22 February 2001. At that time, all the vehicles for the product launch were already built and equipped with a space saver spare wheel. Because of the road conditions in South Africa, this is not considered to be a viable alternative. A total number of 312 vehicles were refitted with the correct rims and tyres.

#### **3.4.3 Incident 3: The 325i touring without roof rails**

The 325i touring was introduced to the South African market in September 2000. It was initially released with the roof rails as an option. After one month of production, this was changed to a 100% Option. The 42 units had to be reworked. The parts used for this rework were 20% more expensive in comparison to factory fitted parts.

#### **3.4.4 Limitations within in ordering system**

The updating of orders between the local ordering system (VMS) and the BMW AG central ordering system is not on-line. Updates in South Africa are uploaded to the BMW AG central ordering system only once a day.

If a vehicle passes a certain status point, no further changes to the vehicle can be made. This means that a customer can request a change that is accepted by a dealer in South Africa.

However, when his request is uploaded to the BMW AG central ordering system, the order is rejected because the vehicle has already passed a certain point in the production process.

Another serious shortcoming is that the complex nature of the compilation of vehicle profiles.

#### **3.4.5 Non-availability of information from BMW AG**

The non-availability or the late distribution of information from BMW AG causes delays in the entire process. This is especially the case when new options become available. With the E46 M3 there were two examples of this. The new technology sequential gearboxes were delayed without informing the subsidiaries. The vehicles were ordered and the orders were rejected. Only after this happened, the subsidiaries were informed of the delay. The vehicles were originally released with aluminum inserts on the dashboard. This option was also delayed and the same happened as with the sequential gearbox.

#### **3.4.6 How the QMS is structured and how procedures were compiled**

As part of the exercise of writing up a combined process supporting the processes involved in mass customization, a number of problems were identified within the QMS.

The structure within the QMS is broken down to department level. As Pine [11] states, one of the requirements of mass customization is a redesigning of business processes that break down the vertical compartments that exist between departments. If the procedures were broken down to process level, problems like procedures not being complete and not conforming to the guidelines for documents as described in the QMS might have been avoided. Examples of these shortcomings are missing reference to quality records and missing descriptions of terminology used. Omissions like these contribute to the lack of transparency in some procedures [28].

Processes were viewed in isolation and the entire mass customization process, as set out in this chapter was not described in detail. Some duplication of procedures also took place. No evidence of troubleshooting was found in any of the procedures and even more important, no reference was made to any type of process measurement.

There were no procedures found describing how to deal and document the actions that took place when non-conforming vehicles were received.

The question of “How does management know that quality is being produced in the mass customization process” was also not addressed in the procedures. There were employees who could not answer the question “How do I know that the work I do is quality?”

And perhaps most importantly, the Deming cycle of Plan, Do, Check and Act is not always complete.

### **3.5 Chapter summary**

The problems that occur within the mass customization process seem few in number but high in cost and occurring in both in product planning and ordering. Although the procedures in the QMS have brought a certain degree of transparency on these processes, the latter still needs to be improved upon to achieve the quality. No integrated mass customization procedure exists and to evaluate and improve the procedure, the entire mass customization process needs to be evaluated.

In conclusion, the procedures have to answer the question: “How does management know that quality is being produced in the mass customization process?”

#### **4. The VPC and mass customization**

To understand the processes relating to mass customization on the QMS, it is necessary to review the entire vehicle process chain (VPC). The VPC encompasses all processes involved in the vehicle lifecycle and is the same for all the worldwide BMW subsidiaries. Procedures available in the QMS were used as the basis for describing the relationship between the VPC and the Sales & Marketing Division. Where information was not available from the procedures, individuals supporting the procedures were interviewed. The goal of this was to establish an integrated mass customization procedure, something that did not previously exist.

The main purpose of this procedure is to support customer satisfaction and profitability by ensuring that:

1. Enhancing customer satisfaction by having desirable products available.
2. The vehicle, which is delivered to the customer, must be exactly to the order that the customer placed at the dealer.

This supports the main reason for implementing a mass customization strategy, as described in chapter 2.

Figure 4.1 shows the major role players within the Sales & Marketing Division supporting this process. The Manager Product Planning & Pricing is responsible for the formulation of product and pricing strategies. The Product Managers report to the Manager Product Planning & Pricing and are responsible for optimizing the product offering by evaluating various models with regards to product, pricing, market position and market performance.

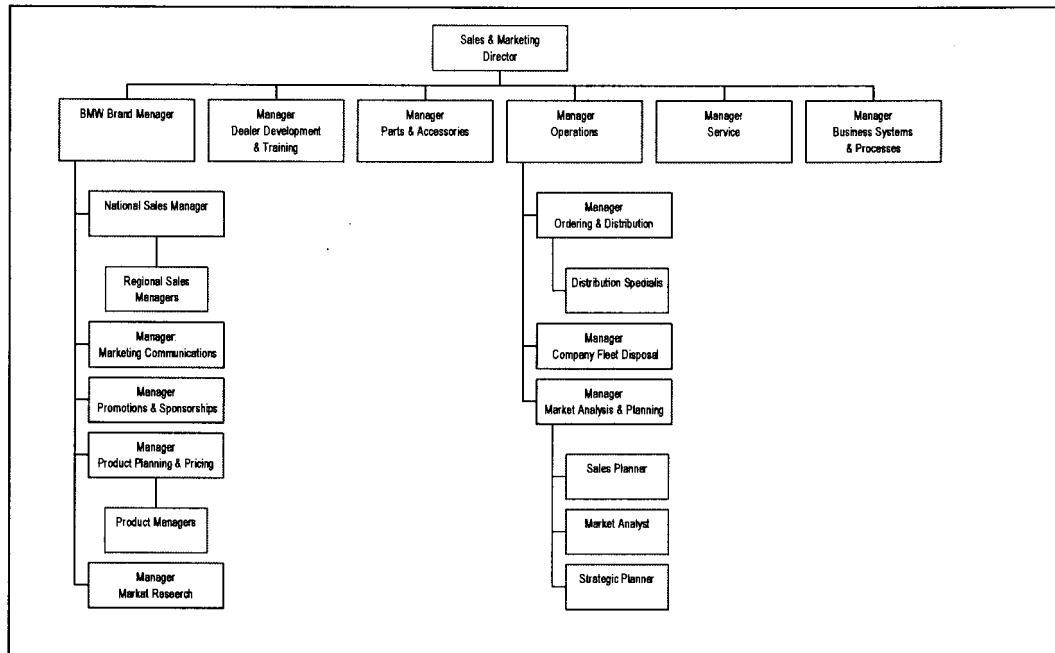


Figure 4.1: Important players in the VPC

The Manager Ordering & Distribution is responsible for developing and managing the ordering systems in line with the approved BMW Business processes. Other responsibilities include the management of on-time deliveries as well as stock management. The Distribution Specialists report to the Manager Ordering & Distribution and have tasks relating to the planning and ordering of local and imported vehicles, dealer allocations, master data creation and maintenance of vehicle profiles on Vehicle Monitoring System (VMS).

The Manager Market Analysis & Planning is responsible for the preparation of long-term market forecasts and market analysis. The Sales Planner is responsible for the preparation of a detailed retail, wholesale, production and stock forecast and Budget. The Strategic Planner supports the Manager Market Analysis & Planning by investigating pricing strategies, budget planning, long-term planning, competitive intelligence, as well as providing economic and market research.

## 4.1 The Vehicle Process Chain

All the elements in this process chain are described on the following pages. The process (see Figure 4.2) is supported by a mainframe-based system called the VMS and is used by both the Sales & Marketing Division and the Dealer Network.

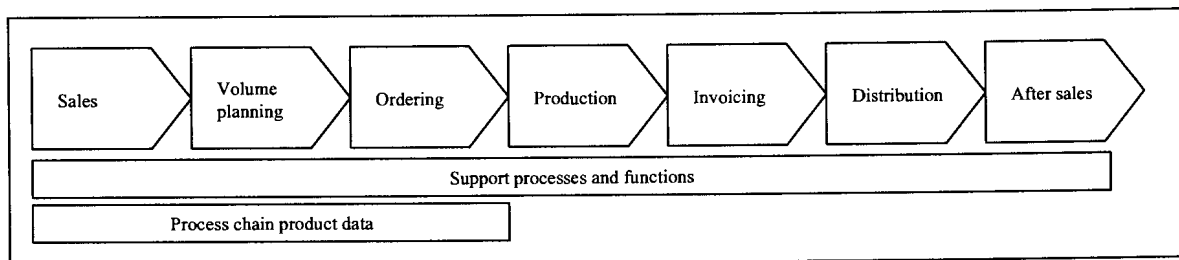


Figure 4.2: Vehicle process chain [20]

To aid understanding of the processes, the market introduction of a new model – the E46 M3 in May 2001 – is used as an example.

### 4.1.1 Process chain product data

The sales, volume planning and ordering processes are supported by process chain product data. The processes are described in procedures belonging to Product Planning and are shown in Figure 4.3.

- Step 1: The Long Term Plan (LTP)

This is a strategy document that contains all the model introductions and sales volumes for the entire product range for the next seven years. Volume Planning annually compiles the LTP based on economic data, pricing, the passenger vehicle market and product information.

This is then discussed between the Finance and Sales & Marketing directors before it is presented to the board of directors of BMW SA. After the board of directors has approved the LTP, it is sent to BMW AG for approval.

The LTP compiled in 1996 first indicated that the right hand drive E46 M3 will have Start Of Production (SOP) in November 2000.

- Step 2: Opportunity identified

The Product Planner uses the information from LTP to identify opportunities within the South African market. The Product Planner decided to support the South African introduction of the E46 M3 because it is a desirable niche product; which enhances the brand image of BMW. The high profit of the E46 M3 was also important.

- Step 3: Product information issued

BMW AG continuously issues product information to the Planning Department. BMW AG issues twice a year a product library that is distributed throughout the BMW Group and provides the most important information available to the Product Manager.

The product library contains the following information:

- Lists and descriptions of base models and engine variants available.
- Lists and descriptions of base options as prescribed by BMW AG.
- Lists and descriptions of available options which can be added to the base model.
- List of prices of the available options.
- Marketing information on competitor products.

The E46 M3 first appeared in the 2001 product library. Status Reports are issued continuously. These contain detail information on exact introduction and deletion dates of models, colors and options.



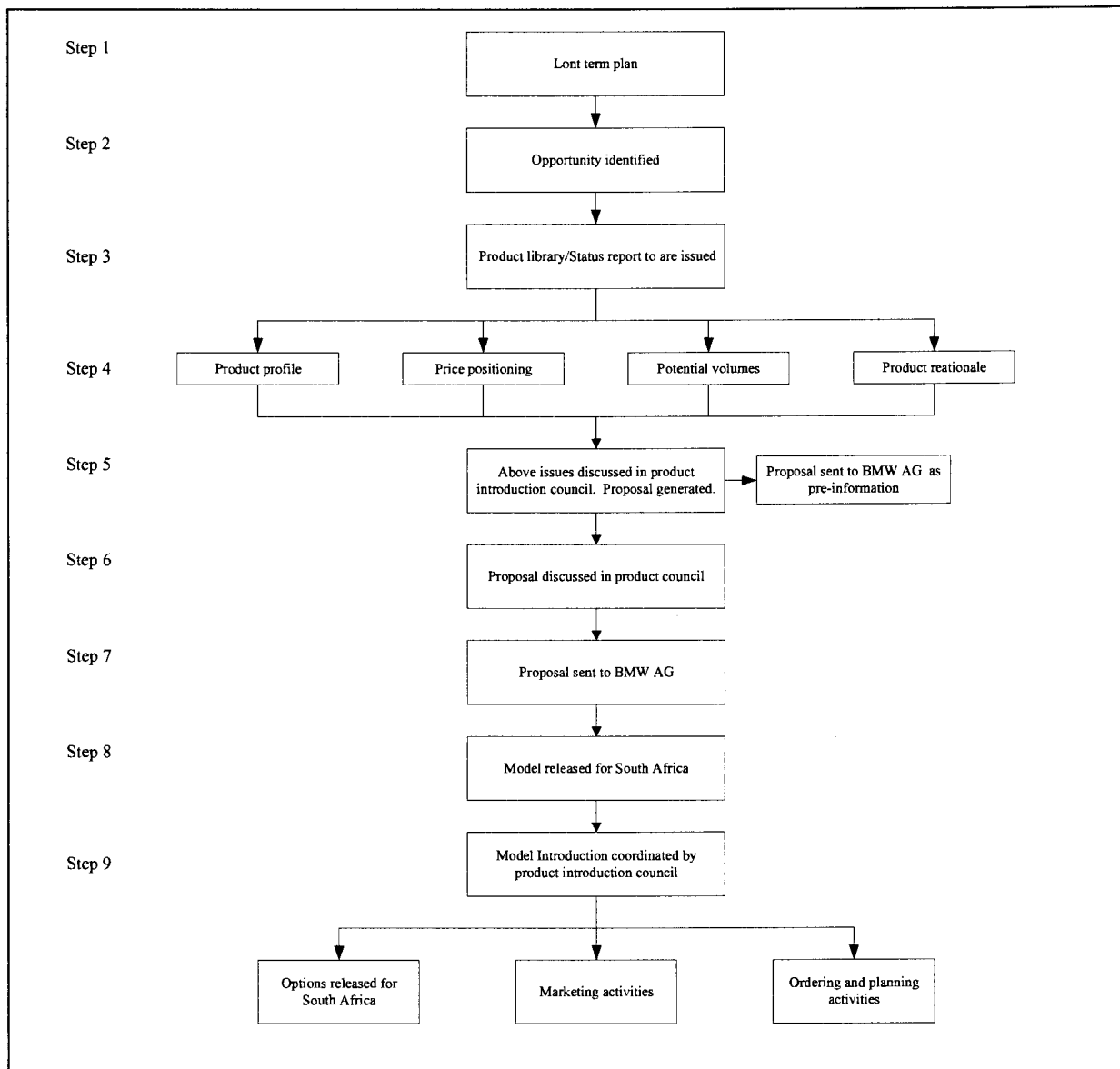


Figure 4.3: Process chain product data [23]

- Step 4: Creation of documentation

Based on the opportunity identified, the Product Library and Status Reports are used to compile a vehicle profile. The vehicle profile describes the entire vehicle in terms of the following:

- Model description based on engine capacity and performance.
- Base options as prescribed by BMW AG.
- Available exterior colors.
- Available materials (leather/cloth) and interior trim colors.
- The country specific options that are built into every vehicle. These are known as 100% options and are included in the published price of the vehicle.
- Options available for selection by individual customers for their specific vehicles.  
The availability of these options forms the basis of mass customization at BMW.

For the E46 M3 launch vehicles, there were 18 BMW AG prescribed options, 26 100% Options, 10 exterior colors, six interior colors, and 20 other customer selection options. The E46 M3 is a vehicle with a high BMW AG specification but with a lower than normal number of customer selection options.

Other documents regarding the pricing of the vehicle, together with the price positioning within the market are also created. A product rationale provides the marketing arguments for the new product introduction and summarizes the price, volume and contribution effects. All these documents are normally completed within a minimum of one year before SOP.

- Step 5: The Product Introduction Council

The documents created in Step 4 are discussed in the Product Introduction Council (PIC). This council is controlled by Product Planning and is attended by representatives of Sales, Marketing Communications, Operations, Training and Service. After the PIC has agreed to the proposal, the proposal is sent to the members of the Product Council. A copy of the proposal is also sent to BMW AG.

The E46 M3 was first discussed in the PIC of May 2001.

- Step 6: The Product Council

Proposals for the PIC are discussed in the Product Council. The directors of BMW SA attend this meeting. The Product Council of November 2000 approved the E46 M3 vehicle profile and the Product Council of February 2001 the pricing.

- Step 7: The proposal sent to BMW AG

After the Product Council has approved the proposal, Product Planning notifies BMW AG. They evaluate the proposal and make a decision based on production volume and contribution.

- Step 8: BMW AG releases model for South Africa

BMW AG evaluates the proposal from BMW SA and if satisfied, releases the model for the South African market. They inform Product Planning of their decision.

- Step 9: Coordination of model introduction

The PIC coordinates the following important actions:

- BMW AG releases the options required for the South African market.
- Planning and Ordering activities:
  - The master data and profile of the vehicle is loaded onto VMS. This enables the Dealer Network to order the vehicle and its related options.
  - Volume Planning ensures availability of product.
- Marketing activities which include the following:
  - Product launches.
  - Advertising campaigns.
  - Information on product and pricing is distributed within the Dealer Network [26].

#### **4.1.2 Sales**

Vehicles are first produced, then wholesaled to the Dealer Network and then retailed to an end customer. Sales are measured against a fixed budget and a monthly rolling forecast.

### 4.1.3 Volume Planning

The main task for Volume Planning is to ensure the profitability of the Sales & Marketing Division as well as the Dealer Network by ensuring that the right product is available for wholesale and retail at the correct time. Volume Planning must also ensure that the prescribed levels of wholesale and retail stock are maintained. This process is described diagrammatically in Figure 4.4 and step-by-step in the succeeding paragraphs.

All the steps in the volume planning and ordering processes are regulated by an annual calendar issued by BMW AG. This calendar indicates the due-dates for all Volume Planning and Ordering steps in the VPC.

- Step 1: The Long Term Plan

This is a strategy document which contains all the model introductions and sales volumes for the entire product range for the next seven years. Volume Planning annually compiles the LTP based on economic data, pricing, the passenger vehicle market and product information. It is then discussed between the Finance and Sales & Marketing director before it is presented to the board of directors of BMW SA. After the board of directors has approved the LTP, it is sent to BMW AG for approval.

The LTP compiled in 1996 first indicated that the right hand drive E46 M3 will have its start of production (SOP) in November 2000.

- Step 2: The annual production, wholesale & retail budget

The annual production, wholesale and retail budget is a January to December cycle, broken down to production, wholesale and retail volumes per model derivative, per month. It also contains an outlook for the volumes for the next budget cycle.

The budget is compiled by consultation between Volume Planning, the Sales & Marketing Director and Finance. It is sent to BMW AG for approval. It forms the basis of all sales performance measurement.

Because of technical reasons, the SOP of the E46 M3 was delayed to March 2001 and therefore first appeared in the 2001 production budget (March), wholesale budget (May) and retail budget (June).

- Step 3: Actual monthly production, wholesale and retail

As the monthly wholesale and retail sales progress, the actual volumes are reported on a daily basis.

- Step 4: The production request

A production request meeting is held three months before the actual production month and is attended by representatives from Volume Planning and Sales. During this meeting it is decided what production volume must be requested to support the annual production, wholesale and retail budget as well as the current annual wholesale and retail forecast.

The fundamental principle during this meeting is that no product can be retailed unless it was produced and then wholesaled, i.e. you cannot plan for selling a vehicle if you do not plan its production.

From the production request meeting, a detailed production request is prepared by Volume Planning. It contains the required production volume broken down to model derivative. Only models that have been released by BMW AG for South Africa can be included in the production request.

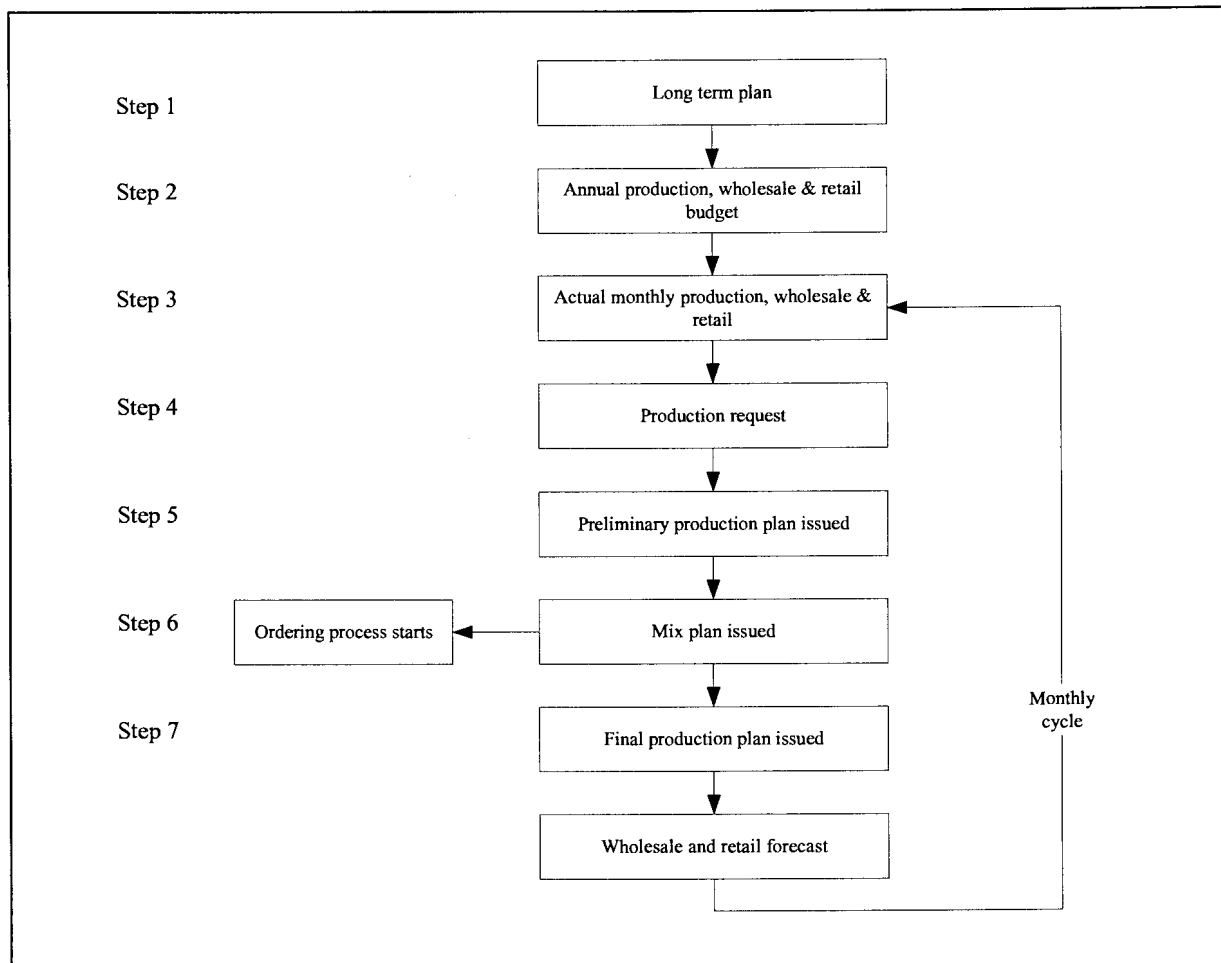


Figure 4.4: Production request and allocation [23]

A dedicated planning system is used to communicate the production request to BMG AG. The production request meeting normally takes place after the retail and wholesale month-end.

A total of 64 E46 M3 was first requested for production in March 2001. This requirement could not be met and the production was delayed by one month. A total of 100 units were built in April 2001, making up for the shortfall in March 2001.

- Step 5: Preliminary production plan issued

Based on the worldwide production requirement and production capacity, BMW AG issues a preliminary production plan to Volume Planning. This plan is broken down to model level with totals for 3, 5 and 7 series.

The preliminary production plan is normally issued six working days after the production request meeting.

- Step 6: Mix plan issued

Based on the preliminary production plan, Volume Planning can change the number of any model derivative within a series as long as the series total stays the same.

For example: plus 25 of 318i, minus 20 of 320i and minus five of 330i. The issuing of the mix plan starts the ordering process.

This plan has to be completed two days after the preliminary production plan has been issued.



- Step 7: Final production plan issued

Based on the mix plan submitted by Volume Planning, BMW AG issues the final production plan. This plan includes the actual production of the previous months and is normally issued seven working days after the submission of the mix plan.

- Step 8: Wholesale and retail forecast

Based on the final production plan, the actual wholesale and retail, Volume Planning compiles a wholesale and retail forecast. The wholesale and retail forecast is made up from two components. The first is the actual year-to-date wholesale and retail and the second is a projection of the wholesale and retail for the rest of the year, based on the confirmed production plan [24].

#### **4.1.4 Ordering**

The main task for ordering is to ensure that the production allocation issued by BMW AG is converted into actual orders. Various processes documented in the QMS support this process. The entire process is described diagrammatically in Figure 4.5 and step-by-step in the succeeding paragraphs. On average, a total of 1 400 vehicles to the value of R280 million are currently ordered per month.

- Step 1: Mix plan issued

Based on the preliminary production plan, Volume Planning can change the number of any model derivative within a series, as long as the series total stays the same.

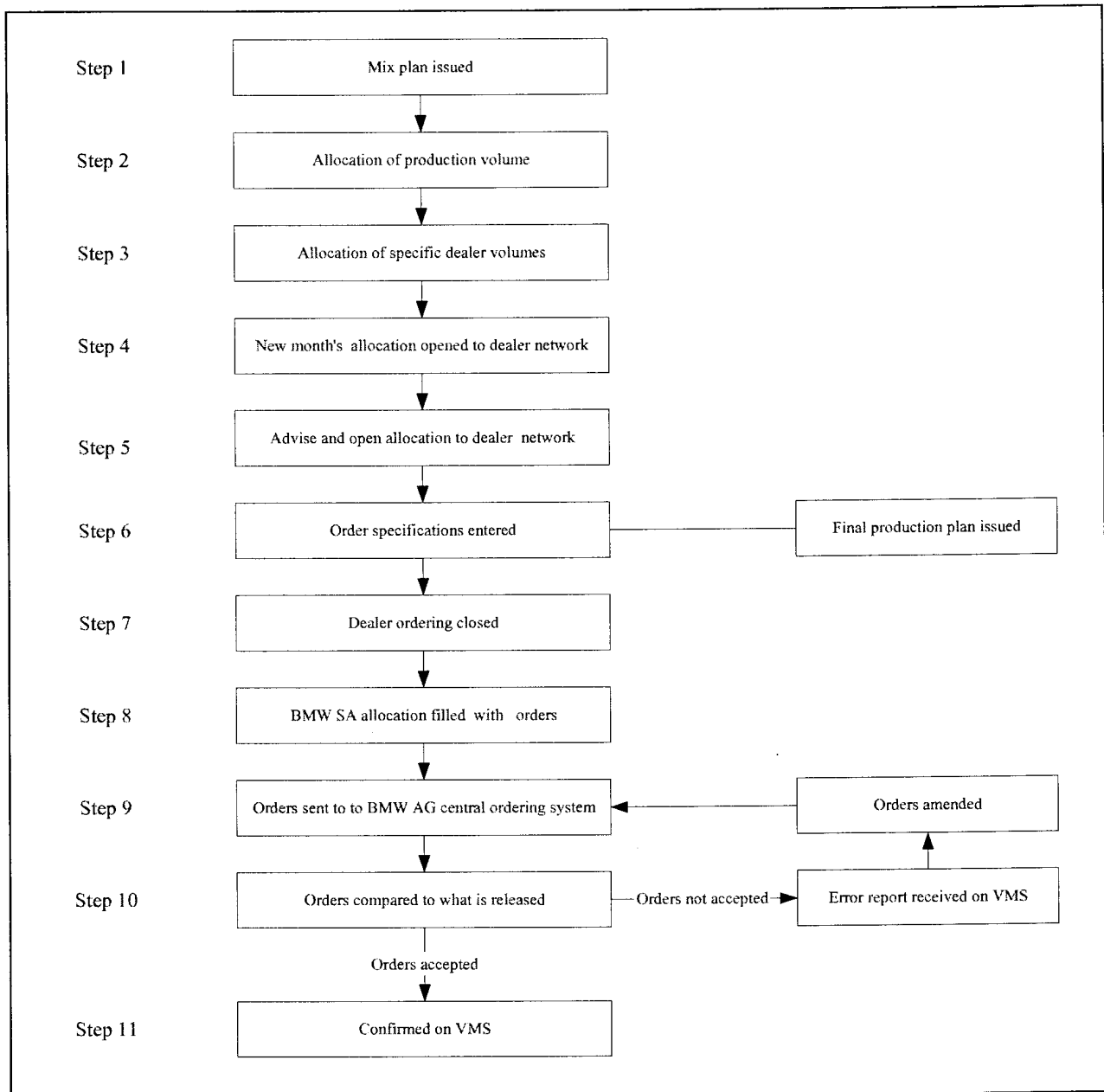


Figure 4.5: The ordering process [23]

- Step 2: Allocation of production volume

Based on the mix plan, the subsidiary then needs to fill 80% of the entire production allocation with orders. Ordering and Distribution divides the production allocation between the dealer allocation and allocation for internal use vehicles.

Internal use vehicles are used for the company fleet as well as product launches and demonstration vehicles. The dealer allocation is then forwarded to Sales.

For the first production month of the E46 M3, a total of 100 units were allocated to BMW SA. Of these, 85 were allocated to the Dealer Network and 15 for internal use.

This task happens is complete at the latest one day after the mix plan has been received.

- Step 3: Allocation of specific dealer volumes

Sales use the dealer allocation to allocate production volume to individual dealers, based on the dealer's historical performance and special requirements. Sales normally have two days to complete this task before giving the individual dealer allocation back to Ordering & Distribution. The 85 E46 M3 from April production were divided among 56 dealers.

- Step 4: New month's allocation is opened to Dealer Network

Ordering & Distribution normally has one day to load the individual dealer allocations onto VMS.

- Step 5: Advise and open allocation to the Dealer Network

The dealers are advised on VMS that new vehicles are available for specification. This normally happens on the same day as that the orders have been loaded.

- Step 6: Order specifications entered

The individual dealer can now specify the options that must appear on the vehicles which have been allocated. The order can only be based on the vehicle profile available on VMS and typically contains the following information, e.g.:

- Model: E46 M3
- Colors and trim: Exterior color white with black leather seats.
- Optional extras: Electrically operated sunroof and xenon headlights.

If a model, color or option is not available on VMS, a dealer cannot order the specific model, color or option. All the 100% Options are automatically ordered.

Just after the dealer allocation has been opened, the final production plan is issued by BMW AG. Because only 80% of the allocation has been allocated, the additional 20% is only allocated now.

The dealers normally have two to three days to complete the order specifications.

- Step 7: Dealer ordering closed

After the time allocated to the order specification period has expired, Ordering and Distribution closes dealer ordering and informs the Dealer Network on VMS that ordering has closed.

- Step 8: BMW SA allocations filled with orders

Based on the orders received from the Dealer Network and internal users, Ordering & Distribution makes sure that the entire production allocation has been filled with orders. If the total number of orders is less than the production allocation, units are ordered for wholesale stock.

- Step 9: Orders sent to BMW AG central ordering system

Ordering & Distribution creates a file containing all the orders for BMW SA and transmits this file to the BMW AG central ordering system.

- Step 10: Orders compared to what is released

BMW AG then compares the South African orders with what has been released for BMW SA. If the subsidiary's orders contain models, colors and options that are not released for the specific subsidiary, the orders are returned to the subsidiary for correction. This process is continued until the order is accepted.

BMW AG then places orders on the factories. To fulfill the requirements of BMW AG, the factories then order components from the BMW supplier network.

- Step 11: Confirmed on VMS

The Dealer Network is informed of the status of their individual orders on VMS. For a period up to three weeks from production, the dealer can still change the specification of the orders on VMS [27].

#### **4.1.5 Production**

Based on the orders and components received, the factories produce the vehicles in the allocated production months. The production status of vehicles is available on VMS.

#### **4.1.6 Invoicing**

After a vehicle has been produced the vehicle is sold to BMW AG who in turn sells the vehicle to a subsidiary.

#### **4.1.7 Distribution**

After the vehicle has been invoiced, it is distributed to one of the worldwide BMW Vehicle Distribution Centers (VDC). At these facilities, the vehicles are prepared for sale and distributed to the Dealer Network.

This function is controlled by a service level agreement between Ordering & Distribution and the Vehicle Distribution Center.

After the vehicles have been distributed to the Dealer Network, the vehicles that were ordered by specific customers are given a pre-delivery service before hand-over to the retail customers.

#### **4.1.8 After sales**

This includes the servicing of vehicles as well as the sale of original parts, accessories and lifestyle products. There are various programmes in place to ensure that the service which the Dealer Network provides to the retail customers is of a high standard and continuously improving.

## 4.2 Chapter summary

To provide a basis for the evaluation of these problems, an integrated mass customization process is described for the first time in this chapter. In chapter 3, several problems that were found within the mass customization process were identified. It is identified that the departments mainly responsible for the mass customization process are Product Planning, Volume Planning as well as Ordering & Distribution. The integrated mass customization as well as these problems serves as a basis for ways to improve the QMS as described in the next chapter.

## **5. Chapter 5: How to improve the QMS**

In chapter 3 several problems relating to the QMS were identified. These relate to procedures not fulfilling the requirements as prescribed by the QMS. The question of “How does management know that quality is being produced in the mass customization process?” could not be answered. This chapter provides a possible answer how to solve the problem by investigating the various quality theories and applying them to the mass customization process, as described in chapter 4.

### **5.1 Process measurement**

As mentioned in the previous chapter, problems relating to the measurement of processes exist within the QMS. Measurement is needed to improve quality environment because it helps to ensure that customer requirements have been met [29]. It also provides standards for creating comparisons; it creates visibility within processes so that the users can measure their own performance as well as giving an indication of the costs of poor quality. The guidelines for quality management and quality system elements published by the South African Bureau of Standards [21] also requires that processes directly affecting quality, should be carried out under controlled conditions. These controlled conditions include the monitoring and control of suitable process parameters and product characteristics.

In the next paragraphs, the decision to concentrate on the measurement of customer satisfaction and the failure of internal processes is explained.



### 5.1.1 Customer satisfaction reflects quality

As Schönberger and Knod [30] points out, the concepts of quality continue to evolve but the pioneering works of W.E. Deming, A.V. Feigenbaum and P.B. Crosby still have a profound influence on the management of quality. Because the improvement of customer satisfaction was seen as one of the major reasons for implementing a quality management system, it is worthwhile noting what the above-mentioned quality experts had to say about the importance of customer satisfaction.

Feigenbaum [30] concluded that control over a process must start with identification of customer quality requirements and end only when the product has been placed in the hands of a customer who remains satisfied. This was concurred by Crosby [30] in his definition that quality is the conformance to requirements the first time and every time. In the first of his 14 Points, Deming [30] states that constancy of purpose must be created towards the improvement of product and service with a plan to become competitive and to stay in business [30].

The guidelines for quality management and quality system elements published by the South African Bureau of Standards supports this by stating that in order to be successful, an organization should offer products that meet the demands of customers. The same publication also states that a quality system should be developed and implemented to achieve the objectives as described in the organization's quality policy. The quality policy of the Sales & Marketing Division supports this by stating that "In keeping with the BMW Quality System Principles of quality being the first priority, customer orientation and continuous improvement, the BMW SA Sales & Marketing Division commits to efficiently deliver best in class services and products to dealers, customers and internal staff".

### **5.1.2 Quality is a measure of internal processes**

Juran [29] states that the unit of measurement of quality is the cost of quality, including the cost of inspection and the cost of non-conformance. Feigenbaum [29] supports this, by distinguishing between appraisal, prevention and failure costs. As seen in chapter 4, the cost of non-conformance can be significant. Feigenbaum's quality improvement program's goal is the reduction of the cost of quality. To achieve this, the inclusion and the tracking of cost-of quality have to be included in a QMS [29].

It must also be ensured that the targets as prescribed in the annual target commitment process are being reflected within the processes that support the mass customization process.

## **5.2 Customer satisfaction**

BMW SA conducts various customer satisfaction surveys to enable our customers to give feedback on their experience with BMW, enabling BMW to implement corrective action where necessary.

The Competitive Customer Satisfaction Index (CCSI) was launched in 1991 by the Centre for Proactive Marketing and is one of the tools BMW SA uses to measure customer satisfaction. Customer satisfaction is measured to ensure that BMW Dealers' service levels and product quality continuously satisfy our customers' needs and expectations.

Some customer satisfaction studies are syndicated and as such provide information about BMW customers' experiences at BMW dealers as well as experiences of other manufacturers' customers at their respective dealers. All participating manufacturers share this information. Issues being measured are mostly industry related and not BMW customer specific. BMW therefore also has its own proprietary customer satisfaction studies to ensure BMW SA is not only meeting industry, but also BMW customer specific expectations.

BMW SA currently uses four different customer satisfaction surveys, each relating to a different time in a vehicle's lifecycle.

It is also important to make sure that changing customer requirements are regularly evaluated to ensure that the organization can align itself to the latest customer requirements [30].

### **5.2.1 Competitive Customer Satisfaction Index (CCSI)**

This ongoing syndicated research project reports on customers' perceptions of their satisfaction levels regarding their relevant sales or service experience with a particular dealer. It sets the benchmark for customer care quality in the South African motor industry. The study is extensively used to analyze the BMW brand's strengths and weaknesses relating to customer satisfaction issues.

The research is based on telephonic interviews conducted with representative samples of various manufacturers' new vehicle sales, as well as service customers. The overall CCSI consists of the sales CCSI (40%) and the service CCSI (60%). There are 17 sales and 17 service questions.

Data is collected using telephonic interviews. The questions are periodically revised to cover the most important issues to vehicle buyers and service center customers. The CCSI report is issued every March and September and the top-line results are distributed to senior management within the Sales & Marketing Division. The March results cover the period July to December and the September results, the period January to June.

The questionnaire is broken down in two sections: sales and service. The questions relating to the sales index are again grouped into the following measuring groups: (i) general impression, (ii) the salesperson, (iii) pricing, (iv) availability, (v) hand-over, (vi) post sale, (v) recommendation and retention. The service index is grouped to (i) appearance, (ii) telephone and reception staff, (iii) quality of service staff and attitude, (iv) pricing and invoicing, (v) collection of the vehicle, (vi) post service, (vii) recommendation and retention.

Each question carries an individual weight relative to customer's perceived importance. This means that the question relating to "The helpfulness and courtesy of the salesperson" contributes 6.1% in comparison to the 7.1% of the question "The competence of the salesperson in his/her work". Customer satisfaction (as a %) is determined in each of the questions.

The owners of both passenger and light commercial vehicles are included in the survey. Only vehicles less than a year old are included in the sales sample. New vehicle buyers are interviewed when their new vehicle is between two and four weeks old. The service sample includes a sample from each of the following age categories: vehicles under 1 year old; vehicles between one and four years old and vehicles over four years old.

### **5.2.2 Customer Satisfaction Index (CSI)**

The CSI forms part of BMW's proprietary customer contact program and consists of the mailing of questionnaires to drivers of new and used BMWs at various intervals during their ownership cycle.

The survey measures customer perceptions regarding sales and service experiences at BMW dealerships and is used to analyze the strengths and weaknesses of BMW dealers with regard to customer satisfaction issues. The total CSI consists of the sales CSI (40%) and the service CSI (60%). There are 56 sales and 48 service questions. All the questions from the CCSI are included in the CSI. The questions are weighted differently according to research that was conducted on the requirements of BMW customers only.

Results are reported every February and August and cover the periods January to June and July to December respectively. Top-line reports are distributed electronically to the Dealer Network and to senior management. The Dealer Network receives detailed reports and the detailed reports are available to senior management on request.

### 5.2.3 Short Customer Satisfaction Index (S-CSI)

The S-CSI also forms part of BMW's customer contact programme, but is conducted telephonically with customers at various intervals during their ownership cycle. Customers having bought new vehicles or have had their vehicles serviced, trigger the sales or service S-CSI interview respectively.

This tool also measures customer perceptions of sales and service experiences at BMW dealerships, but is a diagnostic tool used to support the CSI survey. It is also an ongoing tracking type of survey whereby 40% of new sales, used sales and service customers are questioned telephonically regarding their respective experiences. Any product or customer care related problems are quickly detected and are resolved via a complaint management system.

The total S-CSI consists of the sales S-CSI (40%) and the service S-CSI (60%). There are seven sales and seven service questions. Internal distribution of the top-line results is done electronically prior to full reporting.

This provides snapshot reports on customer satisfaction perceptions regarding sales and service experiences at respective BMW dealerships and are reported on monthly. Reports are distributed electronically to the Dealer Network, Sales & Technical/After-Sales Regional Managers and Senior Management.

#### **5.2.4 BMW dealer survey**

The BMW dealer survey reflects how satisfied the BMW Dealer Network is with the service level provided to them by BMW SA. The dealer survey is conducted annually by BMW AG and is based on a questionnaire that contains questions relating to satisfaction levels with the following: (i) BMW SA in general during the last twelve months, (ii) BMW model range, (iii) new car sales, (iv) used car sales, (v) after-sales service, (vi) parts and accessories, (vii) BMW Financial Services, (viii) information systems, (ix) training and development, (x) marketing, (xi) field service staff, (xii) internal staff, (xiii) BMW SA specific questions, (xiv) general, (xv) business environment and (xvi) future outlook.

A total of 322 questions are asked and the questionnaire is sent to each dealer principal.

#### **5.2.5 The influence of mass customization on the customer satisfaction surveys**

When investigating the questions that are being asked in the CCSI questionnaire, it becomes clear that some questions are influenced by mass customization. Questions like these are:

1. “Did the salesperson provide info on various optional extras for the car?”
2. “Did the salesperson have enough product knowledge?”
3. “Was the salesperson able to clearly explain technical features?”
4. “Did the salesperson provide information on the safety and security features of the vehicle?”

Because mass customization brings variety, questions can have negative answers too them if the salesperson was not trained properly to handle the questions that relate to all the various options available. Mass customization will therefore highlight any shortcomings in training.

### 5.2.6 Departments investigated and methodology

As referred in chapter 4, the departments mainly responsible for the mass customization process are Product Planning, Volume Planning as well as Ordering & Distribution. Because the Dealer Network has to be trained on new models and options, the Dealer Development & Training department must also be included in the investigation.

Process methodology:

1. Investigate all questions asked in the various questionnaires and determine actions that can be influenced by the departments under investigation.
2. Determine if these questions are being measured within the various departments.
3. If questions are being measured, is it part of the QMS and is it being reported regularly?
4. If questions are not being measured, the procedures should be updated to include measurement and reporting on these questions.

The following criteria were used in identifying the questions which should be answered within the QMS:

1. Is the question objective? Questions like “Is the salesperson helpful and courteous” and “Is the product value for money” were therefore ignored.
2. Can the question be measured within the mass customization process?

The results of the investigation are given in Table 5.1 and Table 5.2.

MEASUREMENT GROUP	QUESTION	DEPARTMENT	MEASURED	PART OF QMS	REPORTED
Salesperson	The extent to which the salespeople are familiar with the product they are selling.	Dealer Development & Training.	Yes	Yes	Yes
		Sales.	Yes	Yes	No
Availability	Was your vehicle delivered on the promised date?	Ordering & Distribution.	Yes	Yes	No
Hand-over	Was your vehicle clean on delivery?	Ordering & Distribution.	Yes	Yes	No
	Was your vehicle free of mechanical or functional faults on delivery?	Service	Yes	Yes	No
Post-sale	To determine your satisfaction, did you receive a telephone call, a letter or card; a fax or e-mail?	No department identified.	Yes	No	No

Table 5.1: Questions from the sales index of the CCSI questionnaire



MEASUREMENT GROUP	QUESTION	DEPARTMENT	MEASURED	PART OF QMS	REPORTED
Quality of Service Staff and Attitude	Was the work completed correctly the first time? If not, how often did you take your vehicle back to the dealership before the work was completed correctly?	Service.	Yes	Yes	Yes
Post service	To determine customer satisfaction: did the dealer make a telephone call, send a letter, fax or e-mail?	No department identified.	Yes	No	No

Table 5.2: Questions from the service index of the CCSI questionnaire

## **5.2.7 Conclusion drawn from customer satisfaction**

From the chapter on customer satisfaction, two major issues are identified. The first is that all processes influencing customer satisfaction are not measured and managed while the second relates to shortcomings within the customer satisfaction survey process. These need to be addressed.

### **5.2.7.1 All processes influencing customer satisfaction not measured and managed**

From Tables 5.1 and 5.2, it is evident that there are various departments which influence the overall customer satisfaction results and that all the issues relating to customer satisfaction are not being addressed.

To ensure continuous improvement and increased customer satisfaction, these issues need to be addressed within the QMS. These issues mainly relate to issues that are important to customers but that are not being measured and/or reported within the QMS.

### **5.2.7.2 Shortcomings within the customer satisfaction survey process**

A summary of all the surveys can be found in Table 5.3. From this summary, it is evident that should customers not be satisfied with a certain issue, it can take up to one year for the feedback to reach BMW SA. From the QMS it was also evident that there was no one taking responsibility for quality management relating to customer satisfaction.

NAME	WHAT IS BEING MEASURED	METHOD	FREQUENCY	TIME DIFFERENCE BETWEEN THE EVENT AND REPORT
CCSI	Six monthly brand performance on sales and service.	Telephonic interview, 34 questions.	Sales: After first year of ownership. Service: Various intervals with the provision that the customer had a vehicle serviced.	Up to one year.
CSI	Six monthly dealer performance on sales and service.	Mailed questionnaire, 104 questions.	Sales: Three months after purchase. Service: After one and two years of ownership with the provision that the customer had a vehicle serviced.	Up to six months.
S-CSI	Monthly dealer performance on sales and service.	Telephonic interview, 14 questions.	Sales: Three months after purchase. Service: After the customer had a vehicle serviced.	Up to one month.
Dealer Survey	How the dealers experience the Sales and Marketing Division.	Written questionnaire.	Annually.	Up to one year.

Table 5.3: Summary on customer satisfaction surveys

### **5.3 Measurement of internal processes**

In the next chapters, the mass customization process is examined to identify the criteria that need to be measured and reported on.

#### **5.3.1 Departments investigated and methodology**

As is evident from chapter 4, the departments mainly responsible for the mass customization process are Product Planning, Volume Planning as well as Ordering & Distribution. Only the processes belonging to these departments were investigated. The persons using the procedures were interviewed using the following set of questions:

1. What in the process costs BMW SA money?
2. When something is going wrong in the process, how do you know it?
3. When something went wrong, what corrective action was implemented?
4. How do you know that there is quality in the work you do?
5. Do you measure the process? Are there any reports? Are they part of the QMS?

The results to these interviews can be found in Table 5.4.

	DEPARTMENT		
QUESTION	VOLUME PLANNING	PRODUCT PLANNING	ORDERING AND DISTRIBUTION
What in the process costs BMW SA money?	Wrong mix of product being sold (higher contribution on expensive models).	Wrong profiles causing rework of vehicles in the VDC.	Wrong profiles causing rework of vehicles in the VDC.
	Too much or too little stock.	Having the wrong product available.	Vehicles not delivered on time.
When something is going wrong in the process, how do you know it?	Actual wholesale, retail and stock volumes deviating from budget and forecast.	Rework of vehicles in the VDC.	Dealers complaining about delayed vehicles.
		Models and options not selling.	Orders being rejected by BMW AG.
When something goes wrong, what corrective action is implemented?	Production request changed, forecast amended.	Vehicles are reworked in the VDC.	Procedure in place to handle feedback to dealers regarding delayed units.
		Vehicle profile changed.	
How do you know that there is quality in the work you do?	Meeting budget and forecast on wholesale, retail and stock.	Meeting the retail budget and forecast.	Customer satisfaction increases.
Do you measure the process? Are there any reports? Are they part of the QMS?	Yes, reports are issued regularly. But it is not mentioned in the QMS.	No.	On time delivery measured but not reported.
			Condition of cars on delivery measured but not reported.
Influence of mass customization	Not significant. Production volume of a certain model is planned for. Options are not considered in the process.	Significant. Department decides on which options and models become available, when and at what price.	Significant. Systems must be able to order the released options. Options that are not released should not be allowed to be ordered.
Comments	Well-controlled process.	Condition of cars on delivery measured but not reported.	

Table 5.4: Internal process measurement

### **5.3.2 Conclusion regarding the measurement of internal processes**

From Table 5.4, the most important measures identified by the users of the procedures were the following:

1. Management of production, wholesale, retail and stock volumes.
2. The condition of the delivered cars.
3. On-time delivery.
4. The lack of a procedure controlling non-conforming product being delivered to the VDC.

The management of production, wholesale, retail and stock volumes is an established process which is controlled by BMW AG. The other issues regarding the condition of delivered cars and on time delivery needs to be addressed.

The quality policy states that: “We will deliver new cars, on time and in retail condition” and the absence of a procedure describing the processes dealing with non-conforming product in the mass customization process remains a serious problem within the QMS.

During the interviews it was clear that some of the responsibilities within the procedures were not clearly identified. To ensure process ownership, the employees that are responsible for the processes also to be identified.

### **5.4 Chapter summary**

Based on the principle that processes need to be measured and that customer satisfaction and the measurement of the failure of internal processes are critical factors in the process towards continuous improvement, various shortcomings of the QMS were identified. How the QMS needs to be improved in order to solve these problems are identified in chapter 6.

## **6. Chapter 6: Recommendations**

Based on the findings in chapter 5, this chapter contains recommendations to improve the QMS in resolving the problems that relate to customer satisfaction and the failure of internal processes. The recommendations relate to changing the structure of the procedures within the QMS as well as changes to the procedures themselves. As the work on the thesis progressed, some of the recommendations were implemented.

### **6.1 Changes to the QMS**

One of the reasons for implementing a QMS was to supply structure to the processes within the Sales & Marketing Division. From the problems that were identified, it became clear that the structure of the QMS needed some revision. Problems regarding responsibility and measurement of procedures also need to be addressed.

#### **6.1.1 New structure of QMS**

The QMS was originally built around the tasks conducted by various departments. The problems surrounding this have already been described in previous chapters. The QMS was consequently reorganized around the processes as described in the VPC. As can be seen in Figure 6.1, the QMS was divided into two sections, “key activities” and “support functions and activities”. This immediately tells the user of the QMS what the most important processes within the mass customization process are and which department is responsible for these processes. The user can then view these procedures immediately have an understanding of how these procedures function. Changes as described in the next paragraph further enhance the user’s understanding of the QMS.

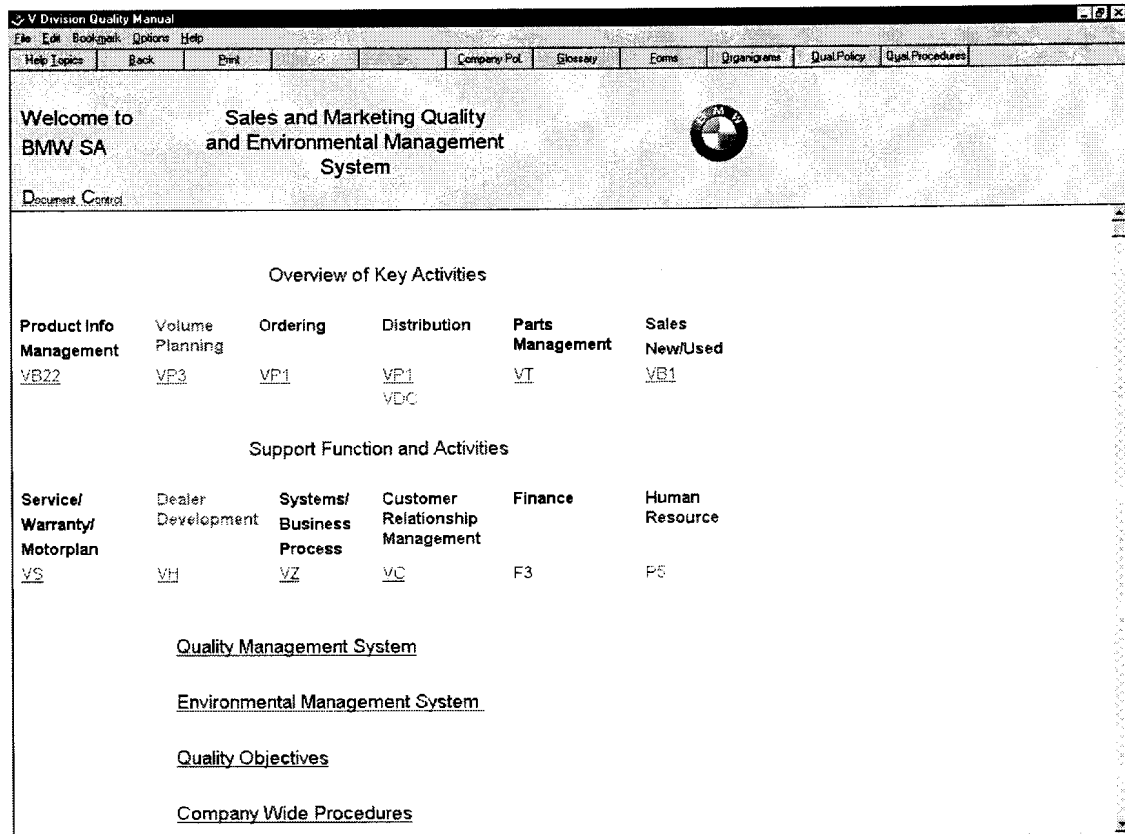


Figure 6.1: New layout of the QMS

If one compares the new view to the old (as in Figure 3.3), the change is significant. The user can still view the functions of various departments. This change has already been introduced.

### 6.1.2 New procedure layout

To solve the problems regarding measurement and responsibilities, all the procedures were re-written to include the following sections:



	SECTION	CONTENTS
1.	Contents	This is a brief description of what the procedure is about.
2.	Responsibility	A list of department and functions responsible for the management of the procedure.
3.	Terminology	All the terms used in the procedure.
4.	Procedure	This contains flow diagrams and descriptions of various steps of the procedure.
5.	Records	This was previously called “Quality records”. It was changed to “Records” because it was found that the employees had problems with the term “Quality records”. It contains all the records supporting the process as well as all process results.
6.	Measures	This section will solve the problem of how the process is being measured.
7.	Forms	This contains a list of all the forms associated with the procedure.
8.	Document Control	Information regarding the origin of the procedure, including originator, revision date, version.

Table 6.1: New layout of procedures

The sections “Responsibility” and ”Measures” were new in comparison to the old template. This change has already been introduced. These changes were implemented on the new, integrated mass customization procedure.

## 6.2 Changes to procedures

Two major new procedures need to be implemented. They deal with the quality management of issues relating to customer satisfaction and non-conforming product respectively.

### 6.2.1 Procedure on the management of customer satisfaction results

Because mass customization can provide a great advantage in regards to customer satisfaction, it is even more important to manage the customer satisfaction survey results. Traditionally, customer satisfaction was seen as to be the responsibility of the service department. From Tables 5.1 and 5.2 it is evident that this is not correct. Other departments play important roles.

In June 2001 a new department called Customer Relationship Management (CRM) was created. The tasks of this department include the co-ordination of all contact points between BMW SA, the BMW SA Dealer Network and the customers. Because customer satisfaction is such an important issue, the department was tasked to solve the problems that have bearing on the quality management of the processes relating to the customer satisfaction surveys. The process is graphically described in Figure 6.2.

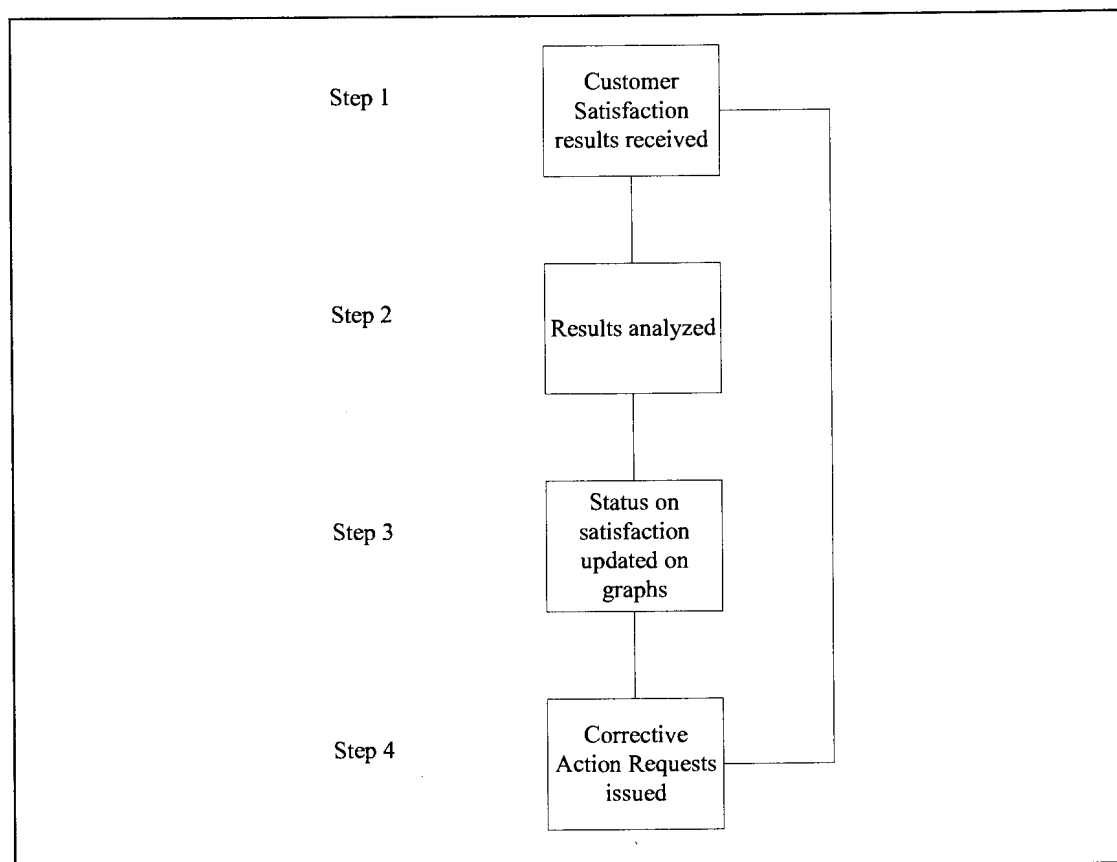


Figure 6.2: Management of the results from customer satisfaction surveys

- Step 1: Customer satisfaction results received

The marketing research department receives the results of the various customer satisfaction surveys.

- Step 2: Results analyzed

The marketing research department receives the results of the various customer satisfaction surveys. They identify weak areas, weaknesses within specific dealers as well as weak areas within the entire dealer network.

- Step 3: Status on satisfaction updated on graphs

After a discussion between the CRM and Marketing Research Departments, the priority issues are identified and updated on publicly displayed graphs. The responsible departments are also identified. Currently, only the sales results are displayed in public.

- Step 4: Corrective action requests issued

The CRM department issues corrective action requests and manages the reporting on the status of the implemented corrective actions. The results are displayed in public. The process is cyclic and results are reported every month.

To support the process described above, a new process giving the Dealer Network and the CRM department feedback on the effectiveness of corrective action, has to be implemented. The process is outlined in Figure 6.3.

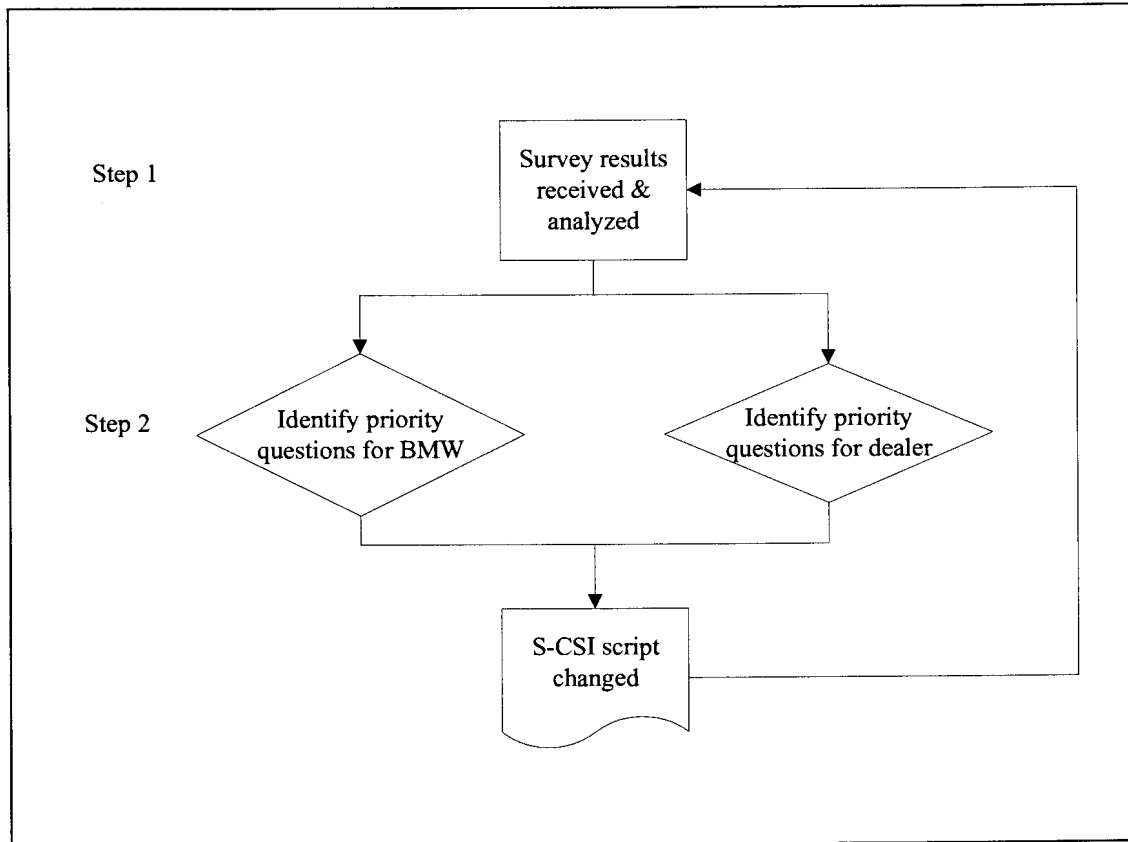


Figure 6.3: New questions for S-CSI

- Step 1: Customer satisfaction results received

The Marketing Research Department receives the results of the various customer satisfaction surveys.

- Step 2: Identification of priority issues and the creation of customized S-CSI questionnaires

Here important distinction is made between two subjects:

- Priority issues for the combined Sales & Marketing Division and the Dealer Network. Should these issues be new, they will be included in the S-CSI questionnaire.
- Priority issues identified for each individual dealer.

These issues are based on the two weakest areas of each individual dealer. This means that if on time delivery was identified as a problem for a specific dealership, a question similar to “Was your vehicle delivered on time” will be asked to the customers during the telephonic interview. Results are based on the three-month rolling average scores for the identified areas. The questions are changed as more important issues are identified. The advantages of the process described above include month-to-month feedback to BMW SA and the Dealer Network as well as bringing a faster implementation of corrective action.

The process is cyclic and results are reported every month. Results are analyzed and corrective action is requested where necessary.

## **6.2.2 Procedure dealing with non-conforming product**

Previously, there was no procedure for the management of non-conforming product. Because the Ordering & Distribution department has the biggest involvement in the process, as well as a service agreement with the VDC, it is recommended that this department is the process owner. It should include the following:

1. Identify the Ordering & Distribution department as the process owner.
2. A detailed process description with a checklist to support the process.
3. Keep a register of occurrences of non-conforming product and the cost involved.
4. Use the standard procedure on corrective action to document what the cause and solution to the problem.
5. Identify the process that should be followed during the rework of vehicles.

The advantages of using this procedure are the following:

1. Central control on non-conforming product
2. Proper documentation on corrective action.
3. A checklist to ensure that all the necessary steps is taken.

The procedure was implemented in August 2001.

## **6.3 Chapter summary**

Some of the recommendations described in this chapter have already been successfully implemented within the QMS. The recommendations regarding customer satisfaction are in the process of being implemented. The effectiveness of this will be evaluated against the results of this, will be seen in future CCSI and CSI results.

It is also important to note that the responsibility of this process now lies with a central department that has the proper management of customer satisfaction survey results as a core objective.

Table 6.2 contains a summary of the changes that were implemented as a result of the work completed for this thesis.

	Before investigation	After investigation
1.	No integrated procedure for the mass customization process.	Integrated process implemented. QMS structured around mass customization process.
2.	Incomplete mass customization procedures: no measures cross-departmental responsibilities not defined.	Measures and cross-departmental responsibilities defined.
3.	No procedure describing the control of non-conforming product.	Procedure implemented and controlled by Ordering and Distribution.
4.	No procedure controlling the management of customer satisfaction results.	Procedure implemented and controlled by Customer Relationship Management department.

Table 6.2: Summary of changes within the QMS

## **7. Chapter 7: Concluding remarks**

As a supporter of ISO and personal experience with investigations on the mass customization process, and the belief that a QMS can contribute to the success of an organization, the following recommendations are submitted for consideration:

1. Build the QMS around processes and not around departments. This gives structure to the QMS and helps to break down interdepartmental barriers, thus bringing the entire QMS into focus (Chapter 3.4.6).
2. Make sure that management is committed to the process of installing as well as maintaining a QMS. Regular management review is mandatory (Chapter 3.3).
3. The value of a competent and dedicated project leader cannot be overestimated. The project leader must be empowered to introduce changes within the organization (Chapter 3.2).
4. Make sure that customer satisfaction is built into the procedures from the beginning. It is important to confirm that all the employees understand the importance of customer satisfaction and how their day-do-day performance influences customer satisfaction. In a wholesale organization, sight should never be lost of the fact that the dealer network actually constitutes the customers (Chapter 5.1.1).
5. If customer satisfaction surveys are conducted, ensure that customer requirements are part of the QMS, i.e. if customers want on time delivery, measure it (Chapter 5.5.2).
6. Be careful when selecting the team, which is to implement the QMS. Try to choose people with a thorough understanding of process flow and structure. Make sure that the team implementing the system has all the resources they require (Chapter 3.2).
7. Avoid a paper-based system and put the QMS on-line. It give everybody access to the system. Software is available and not expensive. Document control becomes very much easier and changes are instantaneous (Chapter 3.3.2).
8. Make sure that all the employees can answer the question “How do I know that the work I do, is quality?” (Chapter 3.4.6).
9. Measure or quantify processes wherever possible. In time, unimportant measures will become redundant while important ones will prove to be invaluable (Chapter 5.1).



10. Ensure that “all the loops are closed”, i.e. that the Deming PDCA cycle is complete in all the processes (Chapter 3.4.6).
11. Confirm that audits are regularly conducted and that the auditors are properly trained (Chapter 3.3.3).
12. Ensure that the procedure on corrective action is being used to document process failures and that the corrective action is properly implemented (Chapter 6.2.1).
13. Never underestimate the value of exchanging ideas. Some of the most valuable solutions to the problems which were identified in the processes relating to customer satisfaction, came from informal brainstorming sessions.
14. Question outdated concepts. This can sometimes provide invaluable solutions to unmanageable processes.

To conclude it is important to state that although the QMS has changed as a result of this investigation, it is by no means infallible and it will continue to evolve as the requirements of the organization changes.

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