Target Costing and Mass Customization

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ABSTRACT

Mass Customization has become a key issue for many industries with the computer industry leading the most others. In the apparel industry the topic has been discussed extensively, and a few companies like IC3D.com or Made4Me.com have taken on the challenge of implementing it. However, to date most of the intentions and activities origin in areas of technology. Unanswered remains the question of cost efficiency. Target Costing provides the theoretical basis to address this issue. The following paper analyzes the cost of mass customization with the help of the target costing approach.

Keywords: Mass Customization, Target Costing, Strategic Analysis

Introduction

Customer orientation is extremely critical ever since many industries have changed from being a seller's market to being a buyer's market. In spite of this focus on customer trends, the mass market for apparel still shows all the markings of a seller's market. Apparel is planned seasonally, often produced in low-labor-cost countries, stored, and then moved over several intermediates to the retailer who sells it to the consumer. The consumer receives standard products in standard sizes. Confronted with fitting problems or disliking specific minor details on a piece of apparel, the customer has to invest a lot of time and effort in finding the desired product. More often than not the final purchasing decision is a compromise or put off indefinitely. In the latter case, the retailer may not be able to sell the product before the next buying season, and the product is sold at a discount.

The concept of **Mass Customization** is supposed to present a solution for this situation. Mass Customization means offering an individual product to the consumer that exactly matches his or her desires at the price of traditional mass-produced merchandise. A lot has been done on the technology side to make such mass customized supply possible, e.g., single-ply automated cutters, body scanners, interactive communication tools. A major challenge remains the final part of the definition of mass customization: the price. The key question is: In the long run, how can industrially produced, tailored products be offered at prices of mass-produced standard products?

An important tool in answering this question is **Target Costing**. It provides a company with a holistic cost management approach for all aspects of product development and

cost planning under given market conditions. The starting point for target costing is the market price. From it target costs are derived that are to be met throughout the product life cycle.

The purpose of this paper is to describe the concept of target costing within a mass customization environment. There are many more aspects that need to be considered in moving from simple customizing or crafting products to mass customization or manufacturing custom products. A discussion of those aspects including a description of total cost minimization strategies can be found in Anderson (1997 and 2003).

The process of target costing is described in Figure 1. It begins with a market and competitive analysis and it ends with the control of the entire derived target cost activities and goals. To demonstrate how target costing can be used for an apparel company in a mass customized world, the entire process is shown using a fictive and simplified example that is based on literature examples as well as discussions with industry representatives.

Figure 1: The Target Costing Process
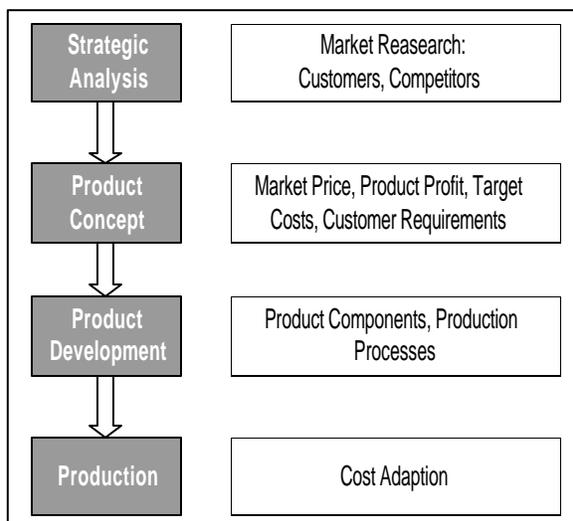
Strategic Analysis

The starting point for the target costing process is a market analysis and a

competitive analysis. There are obvious discrepancies between consumer requirements and their possible fulfillments. This provides the opportunity for a product strategy and subsequent product concepts. The following factors need to be considered:

Consumers:
• What products absolutely require made-to-measure, or in what product groups are the most significant fitting problems?
• What should be the product price or the supply strategy considering the goal of long-term customer relations?

Retail:
• Should the product be sold via retailers, company outlets, and/or directly via catalogs or online?
• What impact do the decisions in this area have on prices and cost?

Competitors:
• After several companies have entered the market successfully, large companies with stronger financial backing are expected to enter the market also. What impact will this have on prices?
• A certain chain reaction is to be expected: When offering customized merchandize has become generally accepted, consumers will start to consider customization a prerequisite for any purchase.

Suppliers:
• What effects will small individual order quantities in high numbers have on purchase sizes, purchase conditions, and prices?
• Will just-in-time deliveries be possible or useful?

Technology:
• What technologies are available and which technologies are prerequisites?
• What cost is associated with these technologies?

Assuming that the above questions have been answered, the subsequent steps of

target costing are shown using the example of the fictive apparel producer "The Fitting Suit Corporation".
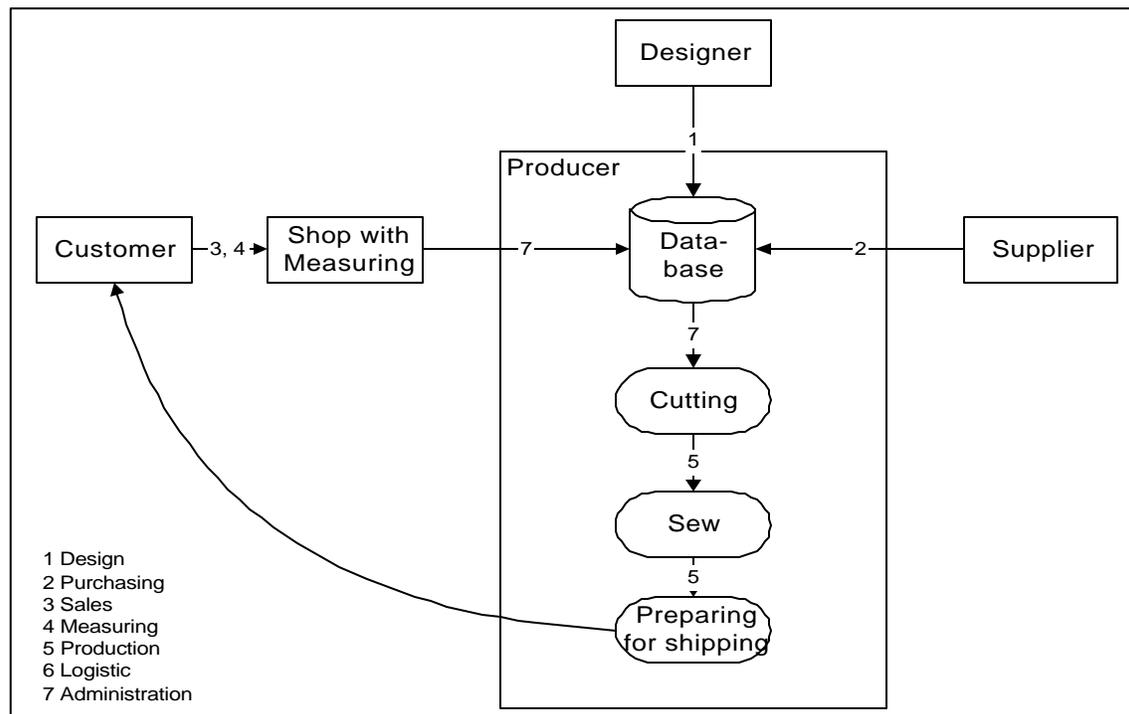
The Fitting Suit Corporation

"The Fitting Suit Corporation" is a young company that wants to offer customized, made-to-measure apparel to a mass market. At this time, the company consists of a handful of enthusiastic associates in a planning office. Following a thorough market analysis they determine that highest likelihood for success exists for the product group men's suits, mostly because of significant dissatisfaction with fit.

The Fitting Suit Corporation (TFSC) plans to offer customers a selection of fabrics in different colors with accessories, as well as several different cuts. Key problem, however, remains providing correct fit. Additionally, TFSC believes that service, e.g., advising the customer properly, is an important part of the product. Thus, TFSC considers the following product components: cut, fabric and accessories, fit, and service.

Figure 2 shows the basic processes as envisioned by TFSC: The designer develops a collection of fabrics, cuts, and accessories considering current trends and experiences with preferences of existing clientele. Purchasing informs the suppliers about the selection of materials and orders them with appropriate time allowances. The customer selects a suit in the company-owned store based on provided selections. He then is measured and his data is transmitted via the Internet directly to the databank of the production site. The fabric is cut, sewn, etc., and prepared for shipping. The completed suit is directly shipped to the customer's address.

Typically, a company's goal is to ensure that their product or service meets the customers' demands. Consequently the corporate processes here are also targeted to guarantee cost efficient work. Additionally, at this time TFSC has no equipment and is therefore facing a couple of investment decisions, e.g., a body-scanner and some automation in the marker and cutting areas. Target costing is used to assist in these decisions.

Figure 2: Processes in The Fitting Suit Corporation

Target Costing for The Fitting Suit Corporation

After identifying the target market and a product (in this case a tailor-made suit with a limited selection of materials and cuts) the actual target costing process can start. Goal is to determine how much money should be spent for each specific process to meet the customers' needs. This way the company receives some essential data to support investment decisions as well as for further cost planning.

The first step requires determining the price for the product under development and setting the required profit margin. In this respect it is very important to distinguish between existing and new products. In this case the suit may be considered a new product, because it is targeted at the mass market, and so far similar products were only offered in niche markets. Starting point for the price is a standard sized suit. At the retail level there are a number of different price categories, and for TFSC's target market this price point is US $300.00.

It now must be determined how much more a consumer is willing to spend for tailor fit and for free choices among specified characteristics. This additional amount needs to be determined independently of any related manufacturing costs. For this, indirect questioning techniques like the Conjoint Measurement Analysis are well suited. Comparing sets of select products with specific product characteristics allows deducting a price-volume function and preferential ranking of product characteristics, which is important in further stages of the target costing process. Listing product characteristics can for example be performed through brainstorming techniques with a group of potential customers. Since this paper considers a new product type, it is appropriate to focus on lead-users, i.e., those consumers who adopt new product developments rather early.

Using the Conjoint Measurement Analysis is quite elaborate, but it allows considering psychological aspects that direct questioning neglects. Inquiring about how much more a potential consumer would pay for a non-existing or not yet established product will rarely produce useful results because consumers do not have concrete ideas about the product. When asked directly, most consumers would not differentiate much between increases of, e.g., 10% versus 12%, while such a distinction is relevant for the analysis.

For this case, the analysis is said to indicate that consumers are willing to pay 20% more for an industrially tailor-made suite, leading to a sales price of $360.00. It is important to note that long-term consumers are not willing to pay more for one product over competitive products, so that surcharge will move towards zero. This is a function of novelty of the product and perceived differentiation. Depending on the activities of competitors, after some time new features will become basic purchase requirements. To simplify this case, price changes are ignored. For TFSC, a realistic long-term goal is a profit margin of 10% (or $36.00 for each suit), so that the target cost becomes

Target Price – Target Profit = Target Cost
$360 - $36.00 = $324.00

The target profit is usually derived from a combination of corporate profit planning and from industry averages.

The next step deals with setting the product design. Here the preference ranking from the conjoint measurement analysis is utilized. It provides relative importance of product characteristics as perceived by consumers. To provide a manageable amount of information it is useful to concentrate on only about ten of the primary product characteristics. Figure 3 shows the results of the conjoint measurement analysis for TFSC.

Figure 3: Customer Requirements

Product features	Customer Ranking	Relative Customer Ranking
Great fit	30%	0.30
Large selection	15%	0.15
High product quality	15%	0.15
Trendy appearance	10%	0.10
Reduced shopping time	15%	0.15
Advising, Consulting	5%	0.05
Delivery time	10%	0.10
Sum:	= 100%	= 1.00

Relative customer ranking only serves as a simplification for further calculations.

After determining customer requirements that need to be considered, a cross-functional team (CF-Team) needs to link these requirements to functional product components (e.g., fabric quality, accessories, etc.). This is typically done internally within the company using representatives of all involved functional areas, but external representatives from the supplier side or the distribution side often provide additional input to these discussions. In this step it is determined how much each of the functional product components contributes to each of the customer requirements. Goal of this step is to determine the relative value of each component. This will then aid in distributing the allowable target costs for the product. One of the instruments is a Quality Function Deployment (QFD) table that was developed to translate customer requirements of a new (or existing) product into product components and production processes. For TFSC, the CF-Team finds the results shown in Figure 4.

Product:	RCR	Suit			Service	CR
		Cut	Fabric and Access.	Measurements		
Customer:						
Great fit	0.30	1 = 0.25		3 = 0.75		D
Big choice	0.15		3 = 0.75		1 = 0.25	C
High product quality	0.15		3 = 0.75		1 = 0.25	B
Trendy appearance	0.10	3 = 0.60	2 = 0.40			B
Reduced shopping time	0.15				3 = 1.00	D
Consulting	0.05				3 = 1.00	B
Delivery time	0.10	1 = 0.20	1 = 0.20		3 = 0.60	A
Sum:	1.00					

RCR = relative customer ranking
CR = competitive ranking
Access. = Accessories
3 = strong correlation, 2= moderate correlation, 1 = weak correlation
degree of performance: A = excellent, B = good, C = moderate, D = low

Figure 4: QFD-Matrix for Customer Requirements and Product Components

"Great Fit" shows a relative weight in consumer ranking of 30% (0.30) and thus constitutes the most important requirement a customer has for a suit. This requirement is fulfilled 75% by taking the correct measurements and 25% by the use of the correct cut. The sum of functions needed to fulfill each requirement is always 100% (1.00). The relative importance of a product component for any customer requirement is found by relating the individual correlation value to the sum of correlation values for this requirement. E.g., measurements contribute 3 out of (3+1) points to "Great Fit", thus $3/(3+1) = 0.75$. This means that 75% of the value that a great fit provides to the customer is due to measurements. The remaining 25% are attributed to the cut of the suit. Figure 5 shows how the addition of individual values in each column over all customer requirements derives the values of the individual product components. Product component "Service" thus provides a total contribution to customer satisfaction of

$0.25*0.15+0.25*0.15+1.00*0.15+1.00*0.05 +0.60*0.10 = 0.34$ (or 34%).

Product:	RCR	Suit			Service
		Cut	Fabric and Access.	Measurements	
Customer:					
Great fit	0.30	0.25* 0.30 *0.08*		0.75*0.30 *0.22*	
Big choice	0.15		0.75*0.15 *0.11*		0.25*0.15 *0.04*
High product quality	0.15		0.75*0.15 *0.11*		0.25*0.15 *0.04*
Trendy appearance	0.10	0.60*0.10 *0.06*	0.40*0.10 *0.04*		
Reduced shopping time	0.15				0.15*1.00 *0.15*
Consulting	0.05				0.05*1.00 *0.05*
Delivery time	0.10	0.20*0.10 *0.02*	0.20*0.10 *0.02*		0.60*0.10 *0.06*
Total:	**1.00**	*0.16*	*0.28*	*0.22*	*0.34*

RCR = relative customer ranking

Access. = Accessories

Figure 5: QFD – Computing the Component Values

With 34% "Service" is the product component with the highest value, and it should therefore be granted most consideration in designing the product. The sum of all product component values always adds up to 1 (100%).

When comparing the competitor ranking (in this case standard size suits) in the category "great fit", it becomes obvious that this is an area that should be of great importance to TFSC. It should be noted that it is important to use external, objective people to perform such a competitive ranking. Internal evaluations may often reflect a biased view of the competitive landscape.

Compared to other examples describing the target costing process (e.g., personal computers, coffeemakers, etc.) for The Fitting Suit Company there is no separation of "hard product components" such as trousers, jackets, or similar. In this case process components or process steps are contributing more to the customer requirements. Assuming that the four

product components represent 100% of the cost of the product, Figure 6 shows the resulting target costs portions (allowable costs) for these four components.

Figure 6: Allowable Cost for Product Components

Product Components:	Value:	Allowable Costs per item:
Cut	0.16	0.16 * $ 324 = $51.24
Fabric and accessories	0.28	0.28 * $ 324 = $90.27
Measurement	0.22	0.22 * $ 324 = $71.28
Service	0.34	0.34 * $ 324 = $110.16
Total:	1.00	$324

This means for TFSC that the consumer is ready to spend $110.16 (plus profit) for all service-related activities. For the company, however, it is important to know the allowable cost for individual processes necessary to provide this product. This requires a second QFD table linking the processes needed for providing the product with the product components (see Figure 7).

Figure 7: QFD-Matrix Product Components and Processes

Process:	RPR	Design	Purchasing	Sales	Measuring	Production	Logistic	Administration
Component:								
Cut	0.16	3 0.12				1 0.04		
Fabric and Accessories	0.28	1 0.05	3 0.14			2 0.09		
Measure-ments	0.22				3 0.11	2 0.07		1 0.04
Service	0.34			2 0.1			2 0.1	3 0.14
Total:	1.00	0.17	0.14	0.10	0.11	0.20	0.10	0.18

RPR = relative product ranking

Access. = Accessories

3 = strong correlation, 2= moderate correlation, 1 = weak correlation

Using the results from Figure 7 in determining the cost targets for individual processes, the allowable costs are shown in Figure 8.

Figure 8: Allowable Cost for Processes at TFSC

Process:	Value:	Allowable Costs per Item:
Design	0.17	0.17 * $324 = $55.08
Purchasing	0.14	0.14 * $324 = $45.36
Sales	0.10	0.10 * $324 = $32.40
Measuring	0.11	0.11 * $324 = $35.64
Production	0.20	0.20 * $324 = $64.80
Logistic	0.10	0.10 * $324 = $32.40
Administration	0.18	0.18 * $324 = $58.32
total:	1.00	$ 324

The table in Figure 8 provides exact values for each of the processes that are needed to make and provide a mass customized suit. These costs include not only manufacturing costs, but also service and logistics costs. Focusing on the measuring process, it provides a specific cost that now allows deciding on investing, e.g., into a body scanner, depending on the potential sales volume. Of course additional factors like capacity, expected economic life of the scanner, interest rates, etc., have to remain part of the investment decision. However, using target cost analysis with two correlation steps provides much needed information for the investment decisions as well as further cost planning.

Once the production process at TFSC has been completely planned following the guidelines of target costs for each process, actual costs can be tracked during actual production. The target costs then become targets for cost control exercises by determining a target cost control index as follows:

Actual Cost / Target Cost = Target Cost Control Index

If the index is > 1 it means that allowable cost has been exceeded and that a cost reduction is necessary. An index of < 1 indicates that the component or process may not have received sufficient attention and should be enhanced.

Conclusions

It is important to consider Target Costing not as a onetime tool for investment and cost planning. Rather it is a process that is performed on a regular basis, and long-term a company profits greatly from realizing learning effects, e.g., because of continuous adaptation of QFD tables. The basis of target costing analysis and the target costing process is that the market price and market requirements determine the cost structure of a company.

It should be pointed out that applying target costing can be considerably more difficult than shown in the simplified example of TFSC. Product components and processes may have to be much more detailed to serve as a basis for investment decisions. Transforming customer requirements to product components assumes no interdependence among the product components or among the processes. Thus it is assumed that cost reduction measures in one process have no influence on another process, what in reality is rarely the case. It is also to be expected that customer replies in the initial investigation do not consider relevant and important aspects of cost. When including these factors in performing target costing, the process becomes considerably more involved, but also much more realistic.

Furthermore, certain sine qua non conditions (e.g., if the suit does not fit, there is no sale) and minimum conditions (e.g., if the fabric quality is reduced below a below a minimum standard, independent of the other conditions, the customer will not buy) are not considered in the QFD tables. They will have to be considered in a separate analysis. It is also to be expected that TFSC does not simply offer at a unit price to the consumer but rather provides certain modules with prices that allow for price ranges. Data for the price elasticity of different modules can be found in the results of the conjoint measurement analysis.

Even though target costing may appear as a very involved process, it is extremely useful for companies in the apparel industry. Especially under considerations of mass customization, where companies do not orient themselves by a market segment but by individual customers, target costing is the appropriate tool to ensure that consumers receive the exact product with preferred characteristics at a price they are willing to pay. If this can be done in on a large scale, it follows the exact definition of mass customization.

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