Product quality alignment and business unit performance

Neil A. Morgan[a,*], Douglas W. Vorhies[b]

[a]*Kenan-Flagler Business School, University of North Carolina, Chapel Hill, CB # 3490, McColl Building, Chapel Hill, NC 27599-3490, USA*
[b]*College of Business, Illinois State University, Normal, IL 61790-5590, USA*

Abstract

Over the past decade, new strategic approaches to the management of product quality have become prime drivers of product and process innovation and change in many firms. However, many firm's product quality improvement efforts have failed to deliver anticipated business performance benefits. Implementation problems are generally viewed as significant factors in explaining such failures. Further, the literature suggests that firms' views of product quality are often very different from those of their customers. However, to date this issue has received little empirical attention. The objective of this research was to examine the causes and performance outcomes of product quality alignment – differences between firms' views of the product quality they deliver and customer views of the product quality delivered to them. We conducted exploratory interviews with quality and marketing managers aimed at developing a grounded understanding of the nature, antecedents and consequences of product quality alignment. These fieldwork insights were combined with the existing literature to delineate the central product quality alignment construct and develop specific hypotheses concerning the antecedents and performance consequences of product quality alignment at the SBU-level. Using data from a mail survey of multiple key informants (general managers, quality managers and marketing managers), we tested hypothesized relationships using a structural equation model methodology. Our quantitative findings provide empirical evidence that product quality alignment positively affects business unit performance. Our data also suggest that the degree to which quality goals spanning customer-focused and internally-oriented criteria influence decision-making and actions taken is positively associated with product quality alignment. Further, our data indicate that while the use of marketing tools in developing and executing product quality improvement efforts is positively associated with product quality alignment, no such association is observed with more commonly recommended TQM tools. Our results also suggest that effective interfunctional interactions between quality and marketing functions (higher levels of interfunctional connectedness and lower levels of interfunctional conflict) are positively associated with product quality alignment. Overall, our results suggest that product quality alignment is an important concept in understanding product quality improvement-performance linkages at the SBU level and that minimizing mis-alignment may be an appropriate focus for management attention.

1. Introduction

Developing and delivering quality products[1] has become a product management priority [21,42] and an increasingly important focus for product management research [22,32]. While there are many definitions of product quality, the literature generally views product quality as a subjective customer assessment of the total value offering, which is a function of customers' expectations and their perceptions of how well these are met by the product delivered relative to available alternatives [39,44]. Seminal studies using the NewProd and PIMS databases have provided strong evidence that customer perceptions of the relative quality of

firms product offerings drives new product success [9] and business unit performance [8,27]. Prompted by such evidence, the late 1980's and early 1990's saw many firms introduce new Total Quality Management (TQM) approaches. These TQM approaches emphasized the use of customer-based quality goals, cross-functional participation in product quality improvement, and process management techniques in developing and delivering products [10,23]. TQM approaches were also institutionalized in the Baldrige Award, which quickly became a focus of product quality improvement efforts in many firms [19].

However, two decades after the original PIMS and New-Prod evidence, and a decade after TQM and Baldrige were first introduced, product management researchers still have an incomplete understanding of how firms should best direct their efforts to manage product quality in order to enhance business performance [23,25,46]. The importance of this

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* Corresponding author. Tel.: +1-919-962-9835; fax: +1-919-962-7186.

E-mail address: morgann@bschool.unc.edu (N.A. Morgan).

knowledge gap is growing as reports of firm's disappointment in the performance outcomes of their product quality improvement strategies become commonplace [23,25,46]. While empirical evidence is sparse, 'implementation problems' [43] in terms of quality improvement efforts that have an internal process orientation [33], and organizational contexts characterized by departmental 'turf battles' [13] have been the most widely cited causes of such failures.

TQM encourages firms to view product quality from a customer perspective [10]. However, implementation problems, such as an internal process orientation, can cause firms to misunderstand important features and cues that impact customer product quality perceptions [33,39]. This often leads firms and their customers to focus on dissimilar attributes in the assessment of quality [18]. For example, the literature suggests that firms commonly assess product quality in terms of a small number of objective standards [49] that are easily measurable to allow their utilization in quality improvement activities such as statistical process control [38]. Customers, however, often base product quality judgments on more subjective assessments of a broader range of intrinsic product characteristics and extrinsic cues [51], which may be more difficult to measure [20,22]. Even when firms have a deep understanding of the drivers of customer product quality perceptions, implementation problems such as functional 'turf' protection can make it difficult to coordinate external marketing communications with quality improvement efforts [51]. When customers often find it difficult and costly to assess objective product quality, this can make it difficult for firms to effectively communicate product quality to customers [47].

By leading firms to misunderstand customer quality expectations and/or by failing to effectively communicate product quality in ways that affect customer quality perceptions, these implementation barriers can lead to 'product quality alignment' problems. Product quality alignment concerns the degree to which a firm's product quality evaluations match those of their customers [32]. Failure to align firm perceived product quality (FPQ) with customer perceived product quality (CPQ) may adversely affect the outcomes of the firm's quality improvement strategies [18]. For example, when a firm's view of product quality does not match those of its' customers, product quality improvement resources are unlikely to be deployed in ways that effectively or efficiently impact customer quality perceptions. This suggests that product quality alignment may be an important factor in understanding why so many firms are unsuccessful in improving business performance through their product quality improvement efforts.

The objective of this study is to develop and enhance our limited knowledge of product quality alignment and its impact on business performance. We adopt a managerial perspective, seeking insights concerning how firms may enhance the impact of their product quality management efforts on business unit performance. Our unit of analysis is therefore the strategic business unit (SBU) and we focus our attention on factors over which mangers have some control. Our study makes three primary contributions to knowledge in this important area. First, we identify and delineate product quality alignment as an important construct in understanding the relationship between the firm's product quality management efforts and resulting performance outcomes. Second, we provide initial empirical evidence of the relationship between product quality alignment and SBU performance. Third, through analyzing antecedents of product quality alignment, our study provides insights for managers interested in improving links between their product quality management efforts and SBU performance.

2. Conceptual development & hypotheses

While there have been some suggestions that divergence between FPQ and CPQ is common [18,20,51], the literature contains little conceptual development or empirical evidence addressing this issue. We therefore adopted a 'discovery oriented' research approach to gain a better understanding of the nature, antecedents and consequences of product quality alignment. We conducted open-ended interviews with managers and combined these insights with the available literature, prior to empirical testing. Thirty-seven in-depth interviews were conducted in twenty SBU's of different firms that operated in a range of product and service environments. Seven of these firms marketed consumer products, six marketed industrial products, three marketed consumer services and four marketed business-to-business services. Since our intent was to gain insights into product quality alignment, managers with responsibility for quality or marketing were the most appropriate respondents. Of the managers interviewed, 19 held positions with responsibility for quality and 18 held marketing positions.

Our interviews revealed that mis-alignment of firm and customer views of product quality are seen as common. Managers consistently talked about product quality alignment in terms of differences between the firm's view of the product quality they deliver and customer's perceptions of the product quality delivered to them. Following the TQM logic of product quality as a customer-based phenomenon, managers in our interviews viewed customer quality perceptions as the 'benchmark', and firm 'deviations' from the customer benchmark as a product quality alignment 'problem'. Higher levels of product quality alignment were viewed as smaller deviations of a firm's perception of product quality from that of its customers, while lower levels of product quality alignment were viewed as larger deviations. Many managers believed that a failure to align FPQ with CPQ was evident in their own SBU. Most also indicated that they viewed product quality mis-alignment as an important reason that product quality improvement efforts had failed to deliver expected performance outcomes in their SBU.

While the theoretical [3,11], and empirical literature [16, 17,26], suggest that effective quality management strategies

can enhance customer perceived product quality and improve SBU performance, our fieldwork strongly suggested that managers viewed low product quality alignment as diminishing the effectiveness and efficiency of firm's quality improvement efforts. Conceptually, low product quality alignment can be attributed to FPQ being either higher or lower than that of CPQ. Our interviews and literature review suggested three reasons that differences between FPQ and CPQ in either direction negatively impact SBU performance.

First, when firms perceive FPQ as higher than CPQ, managers appear to be less likely to target available resources towards improving either customer quality perceptions or product 'performance' quality. Often, the attribution for such alignment problems in our fieldwork is that customers are either unable or unwilling to observe the 'true' quality of the firm's product. While some managers indicated greater expenditures of time and effort on marketing communications in an attempt to 'educate' customers regarding the 'real' quality of the firm's products, others saw this as an inefficient use of resources. For example, one marketer commented, "*anyone who tells you that customers can be educated in any reasonable timescale and for any reasonable budget is a charlatan.*" The economics literature highlighting the inefficiency of market information mechanisms in spite of high levels of advertising lends some support to this belief [47]. An alternative attribution also observed in our fieldwork is that if customers are unable to assess objective product 'performance' quality, then the focus for quality improvement should be on reducing the 'cost of quality' through efficiency-based conformance quality improvement efforts. However, such approaches, neglect the potential for customer-based performance improvements that the literature suggests may be more substantial [11,38].

Second, while the low quality alignment situations observed in our fieldwork were mainly where FPQ is higher than CPQ, situations where the reverse is true may also negatively impact SBU performance. For example, in many markets, firms are better able to make objective product quality assessments than their customers. When firms view customer quality perceptions as being higher than their own internal product quality assessments, lower investment in product quality improvement initiatives may result. For example, one quality manager in this situation commented, "*In this company resources go to fight the biggest fires. Since our customers don't see that our product quality isn't what it should be, my boss doesn't believe that we have a product quality 'fire' that needs to be tackled.*" Such firms may be vulnerable to attack from competitors who are better able to communicate relative product quality. Such quality alignment problems may also lead firms to be 'overconfident' in new product development, believing that the strength of their quality 'reputation' will ensure that customers will perceive new products as being of high quality. That such overconfidence can lead to inertia and business

performance downturns is well documented in the broader management literature.

Finally, our fieldwork suggested that deviations of FPQ from the CPQ benchmark in either direction were indicative of firm's lack of understanding regarding the 'real' drivers of customer quality perceptions. When the criteria used by managers in making product quality judgments are different from those of customers, our fieldwork suggested that product quality management resources were not as effectively or efficiently deployed. One marketing manager commented "*We spend way too much time and effort here improving things that are easy to measure but have very little effect on our customers views of our product's quality.*" The effectiveness and efficiency with which quality management resource deployments translate into customer-based performance outcomes is therefore lower under conditions of low product quality alignment. Conversely, where managers reported high product quality alignment, firms were viewed as being more successful in focusing their quality management efforts on improving the product attributes and cues important to customers and in communicating product quality to customers. Our interviews, with support from the literature, therefore suggest that:

> *H1:* High Product Quality Alignment is associated with superior SBU performance while low Product Quality Alignment is associated with inferior SBU performance.

In examining the potential causes of low product quality alignment, our fieldwork suggested issues related to two broad drivers. First, a lack of customer-orientation in formulating product quality improvement strategies. For example, many managers indicated that low product quality alignment was the result of firm quality improvement efforts focusing on product attributes that were not important determinants of customer perceived quality. Second, implementation failures concerning inappropriate or unsuccessful quality improvement program execution were identified as a cause of low product quality alignment. For example, one manager suggested that while his firm used Quality Function Deployment (QFD) to instill a customer focus in their product quality improvement efforts, there was no attempt to link this with the firm's marketing communications, limiting it's impact on customer's perceptions. Below, we synthesize our fieldwork with the existing literature to identify major antecedents that affect product quality alignment by impacting both the customer orientation and execution effectiveness of firm's quality management efforts and detail the expected relationships below.

2.1. Product quality goal influence

Drawing on the general management literature [36], the quality management literature posits that setting appropriate quality goals that influence decision-making and actions within the firm is critical in improving product quality [19,29]. Product quality goals concern the criteria on which

product quality objectives are established and the desired performance levels set [11]. Our fieldwork revealed that most firms set multiple product-related quality goals, typically including both customer-focused and internally-oriented criteria. Our interviews supported the literature in highlighting that managers viewed quality goals as being useful to the extent that they were influential in impacting decision-making and behavior within the SBU. Influential product quality goals, spanning both customer-focused and internally-oriented criteria, were viewed as particularly important in focusing decision-making and behaviors on measurable customer-focused outcomes, and linking these with the monitoring of internal quality targets. As a result of establishing this linkage in a way that permeates the actions of the firm, our fieldwork indicated that firms with such influential quality goals viewed themselves as having higher product quality alignment. This suggests that:

> *H2:* The degree to which explicit quality goals set on customer-focused and internally-oriented criteria influence decision-making and actions within the SBU is positively related to product quality alignment.

2.2. TQM tools and marketing tools

Our fieldwork suggested that the tools and techniques used in firm's quality improvement efforts were of two types, those advocated by TQM, and those more traditionally associated with marketing [15]. Since these two types of tools were generally discussed and considered as distinct and separate in our fieldwork, and are anchored in different disciplines in the literature, we hypothesize about TQM tools and marketing tools separately. Much of the quality management literature is concerned with the development and use of different quality management tools and techniques [29,38]. TQM tools, such as QFD, benchmarking and statistical problem solving techniques, are frequently advocated as effective methods for ensuring that customer requirements are translated into product specifications and in consistently delivering required product quality to customers [21,42]. In our interviews, a number of quality managers suggested that TQM tools provide a practical mechanism for institutionalizing a customer focus and ensures that quality products are consistently delivered. By enhancing customer focus in product quality strategy formulation and execution, the effective use of TQM tools should ensure that internal product quality assessments closely match customer product quality perceptions [10].

The marketing literature posits a strong role for marketing tools in product quality improvement efforts in terms of gathering broad market intelligence, performing specific quality-related market research, communicating quality to customers, and monitoring customer satisfaction [11,38]. In particular, the literature suggests that using such marketing tools ensures that quality improvement strategies reflect customer needs, expectations and perceptions [35] and, helps to effectively communicate product quality to custom-

ers [52]. Both quality managers and marketing managers interviewed viewed using market research and monitoring customer complaints as important tools in ensuring that firms' quality improvement efforts focused on product attributes that were important to customers. Further, the use of customer satisfaction tracking and marketing communications tools were believed to be important in enhancing quality strategy execution and ensuring that customers recognized product quality improvements achieved. Using marketing tools in product quality improvement efforts should, therefore, help to ensure that managers and customers views of product quality are well aligned. We therefore propose that:

> *H3:* The use of (a) TQM tools and (b) marketing tools in firm's product quality improvement strategies is positively related to product quality alignment.

2.3. Quality and marketing connectedness

Effective interfunctional collaboration and co-ordination within the firm is widely posited as essential in developing and delivering quality products [3,30]. Given the role of marketing in the formulation and effective implementation of customer-focused quality improvement efforts highlighted in the literature, interactions between quality and marketing functions are particularly important [33]. Our fieldwork suggested that interfunctional interactions between quality and marketing vary widely across firms. Managers emphasized that effective interactions between the two functions required the accessibility of staff in each area, motivation of each party to communicate, and a 'common language' that facilitated the sharing of ideas. This supports the literature highlighting interfunctional connectedness as the degree of formal and informal direct contact among employees across departments [28,30]. Our fieldwork indicated that connectedness between quality and marketing functions ensured that customer quality perceptions and their drivers were incorporated in firm's product quality strategies, with one marketing manager suggesting that "*if you leave quality strategy to the quality specialists you will never truly reflect the perceptions of our customer set –the quality guys are too rational to believe that our customers can be as subjective in their purchase and evaluation decisions as they really are.*" A number of managers suggested that marketing is the 'customer advocate' within most firms, and that connectedness with those responsible for product quality helps ensure that firms have a good understanding of customer quality perceptions – enhancing their product quality alignment. This suggests that:

> *H4:* The level of connectedness between quality and marketing functions is positively related to product quality alignment.

2.4. Quality and marketing conflict

Implementation problems in product quality improvement efforts are often attributed to 'turf battles' that reflect interfunctional conflict [13,23,25]. Conflict between functional areas concerns incompatibilities in sub-unit goals and activities leading to dysfunctional task-based tension [50]. In our fieldwork, conflict between quality and marketing was commonly attributed to the two functions having different views about product quality improvement priorities and activities. While the ways in which such conflict is resolved may moderate it's negative impact, the literature indicates that effective resolution is difficult and relatively uncommon [28,33]. Indeed, there is evidence in the literature that such conflict decreases market orientation [28] and lowers product quality [37]. Our fieldwork supported the literature in suggesting that interfunctional conflict between quality and marketing negatively impacts both the customer-focus and implementation effectiveness of firm's quality improvement efforts [33]. For example, one manager stated that "*the quality specialists leading our improvement efforts are all process maniacs who wouldn't recognize a customer if they ran over one. We tried very hard to get them to adopt a customer focus but they don't understand anything that isn't an internal process metric. We argued with them a lot in our quality action teams but largely gave up in the end –it wasn't worth the aggravation.*" By making communication and understanding between marketing and quality personnel more difficult, managers also viewed interfunctional conflict as inhibiting the dissemination of the 'voice of the customer' outside of the marketing function—increasing the likelihood of divergence of FPQ from CPQ. The literature and our fieldwork therefore suggest that:

> H5: The level of conflict between quality and marketing functions is negatively related to product quality alignment.

3. Method

3.1. Data collection

Data to test the hypotheses were collected by a mail survey. Our fieldwork and the variety of data required for hypothesis testing indicated that multiple key informants were required. The key informants selected were SBU general managers (providing data on Product Quality Alignment, Product Quality Goal Influence, Business Unit Performance and Competitive Intensity), marketing managers (providing data on Marketing and Quality Connectedness and Marketing and Quality Conflict), and quality managers (providing data on TQM and Marketing Tools).

We used a cross-industry sampling approach to obtain more generalizable insights. An initial sample of 1000 SBU's was randomly drawn from two directories. Each SBU was contacted to establish that required key informants

were identifiable, and to verify contact details. This reduced the sample to 748 SBU's, and 2,244 managers were subsequently sent the questionnaire package. A total of 1,018 individual usable questionnaires were returned, an overall response rate of 45%. For 204 SBU's we received complete units of data with responses from all three managers, a response rate of 27%. Non-response bias was assessed using an extrapolation approach [4]. Tests revealed no significant differences between early and late responders on any of the constructs, suggesting that non-response bias is unlikely to be present in the data. In addition, for a number of the constructs on which we collected data, we also collected data from some secondary informants in order to allow us to make some assessment of the reliability of our chosen key informants. Analyzing mean score differences using paired t-tests revealed no significant differences, suggesting that the key informant data is reliable [37].

3.2. Measures

All measures were developed using insights from both the literature and interviews and were refined following face-to-face pre-tests with twelve managers who were representative of the sample. The individual items, scale points and scale anchors used in the operationalization of each of the constructs are shown in the appendix. The means, standard deviations and construct inter-correlations are exhibited in Table 1.

3.2.1. Product quality alignment

Integrating various multi-dimensional product quality conceptualizations in the literature, we operationalized product quality alignment using managers judgments of firm and customer perceptions of the core 'product,' surrounding 'service' and intangible 'image/reputation' quality of the product offering delivered [7]. Product quality alignment was calculated as the deviation between the manager's assessment of customer ratings of relative product quality, and their assessment of the firm's ratings of relative product quality on each of the three items. The larger the FPQ deviation from the CPQ benchmark, the lower the alignment of FPQ with CPQ. While some researchers have argued against the use of such deviation scores in particular situations,[2] their use is common in the literature [40]. Our operationalization directly reflected how managers described product quality alignment in our interviews. In addition, our pre-tests suggested that we were more likely to get a valid indicator of product quality alignment asking two indirect questions than using a single direct comparison operationalization. The key informant for this construct was the SBU's general manager, who is well placed to make such assessments concerning internal firm views and external customer perceptions.[3] In using general manager assessments as indicators of customer product quality perceptions, our measurement approach is consistent with that used in the PIMS database [8].

Table 1
Construct means, alphas and intercorrelations

	Construct	Mean	SD	x1	x2	x3	x4	x5	x6	x7	x8	x9
x1	Marketing Tools	3.52[a]	1.62	.73								
x2	TQM Tools	3.41[a]	1.48	0.33**	.70							
x3	Product Quality Goal Influence	5.50[a]	1.12	0.17**	0.29**	.70						
x4	Quality/Marketing Connectedness	5.19[a]	1.18	0.11*	0.14**	0.11*	.72					
x5	Quality/Marketing Conflict	2.70[a]	1.24	−0.06	−0.10*	−0.06	−0.52**	.79				
x6	Competitive Intensity	3.53[b]	0.82	0.06	−0.01	0.23**	−0.02	−0.03	.74			
x7	Firm Size	702	1693	0.11*	0.17**	0.10*	−0.03	−0.04	0.08	N/A		
x8	Product Quality Alignment	−0.14[c]	0.78	−0.08	−0.11	−0.23**	−0.27**	0.12*	−0.10*	0.02	.73	
x9	Business Performance	4.85[a]	1.08	−0.02	−0.07	0.14**	0.17**	−0.16**	−0.20**	0.07	−0.17**	.81

* Pearson Correlations significant at the $p < .05$ level.
** Pearson Correlations significant at the $p < .01$ level.
[a] seven point scale.
[b] five point scale.
[c] difference score.
Alphas are shown on the diagonal in bold.

3.2.2. Business unit performance

Performance was assessed using a self-report measure designed to tap manager's perceptions of their SBU's performance relative to competitors.

3.2.3. Product quality goal influence

This is a new scale developed from our interviews which taps manager's perceptions of the extent to which quality goals set on four common criteria spanning customer-focused and internally-oriented approaches were influential in affecting activities and decisions within their business unit.

3.2.4. TQM and marketing tools

Following discussions with several quality managers, the TQM tools scale was based on a representative set of tools suggested in the quality management literature and the items representing the marketing tools were indicators of those marketing tools highlighted in both the quality and marketing literature and the exploratory interviews.

3.2.5. Quality and marketing connectedness

This measure is an adaptation of the Jaworski and Kohli (1993) scale.

3.2.6. Quality and marketing conflict

This scale used items from previously developed measures of interdepartmental conflict [28,45] combined with items suggested in the interviews.

4. Results

We examined the psychometric properties of the constructs using confirmatory factor analysis (CFA). The results of the CFA suggested a good fit for the measurement model with a $\chi^2 = 542.97$, 429 d.f., $p = .001$, comparative fit index (CFI) = .92, and a root mean square error of approximation (RMSEA) of 0.036 (90% confidence interval of .026 to .045). Convergent validity was confirmed for this model with all loadings exhibiting significant t-values [2]. Discriminant validity was suggested by the lack of any significant cross loadings, and was confirmed by a series of analyses in which the inter-factor correlations were tested for unity in a pair-wise manner [2,5]. All inter-factor correlations proved significantly different than one as measured by chi-square difference tests, supporting the discriminant validity of the measurement model.

Additional analyses were performed on constructs demonstrating relatively high construct inter-correlations. These analyses involved combining the two correlated constructs in a single latent variable and re-running the CFA. In all cases, the models including combined constructs fit the data significantly less well than the original measurement model, further suggesting discriminant validity for these constructs. The reliability of our measures is indicated by the coefficient alpha of each construct, which ranged from .70 to .83 (Table 1). We also conducted a post-hoc test for common method variance effects. If common method bias accounts for the relationships observed between variables then a single factor model should produce a good fit with the data. In fact a single factor measurement model did not produce a good fit ($\chi^2 = 1859.55$, 465 d.f., $p = .0001$, CFI = .002, and RMSEA = .122). These results suggest that common method bias is not a significant factor in explaining our results.

We used a structural equation model to simultaneously represent the relationships between the seven endogenous and two exogenous constructs. Analysis of the hypothesized model resulted in a model with the following fit statistics: $\chi^2 = 552.44$, 436 d.f., $p < .001$, CFI = .92, and RMSEA = .036 (see Table 2). Although the χ^2 is significant at the .05 level, this test of fit is sensitive to sample size and can lead to an inappropriate rejection of a model differing in a trivial way to the data for larger sample sizes [24]. Less sample size sensitive indicators of approximate (RMSEA) and rel-

Table 2
Hypothesis testing results

	Hypothesized relationships	Standardized coefficient	t-value	p-value
H1	Quality alignment → business performance	−.25	−2.94	.0018
H2	Quality goal influence → quality alignment	−.28	−3.18	.0001
H3a	TQM tools → quality alignment	.09	0.81	.2094
H3b	Marketing tools → quality alignment	−.23	−2.15	.0164
H4	Connectedness → quality alignment	−.40	−3.69	.0001
H5	Conflict → quality alignment	.27	2.55	.0058
Control variables:				
	Size → quality alignment	.06	.97	.1666
	Competitive intensity − business performance	−.26	−3.92	.0001
Fit Indices:				
χ^2	552.44, 436 d.f., p < .001			
Comparative fit index (CFI)	.92			
RMSEA with 90% C.I.	0.036 (0.026 to 0.045)			

ative model fit (CFI) [6] suggest that the hypothesized model is a good fit with the data.

Testing the hypothesized paths in the structural model produced the results summarized in Table 2 and represented in Figure 1. Since our operationalization of product quality alignment uses the divergence of FPQ from CPQ, a higher number indicates greater divergence of FPQ and CPQ. Therefore, Hypotheses 1 through 4 require significant negative path coefficients to be supported, while Hypothesis 5 requires a significant positive path coefficient to receive support. In an effort to gain additional insights to help us better interpret our findings, we adopted a triangulation approach involving presenting the results of our analysis to individual managers in qualitative interviews. Six post-analysis interviews were conducted with a mixture of quality, marketing and general managers using a convenience sample of managers known to the researchers who were not included in the original exploratory interviews. The results discussed below include insights from these interviews.

Hypothesis one, predicting that product quality alignment would be associated with business unit performance (Path Coefficient = -.25, t = −2.94, p = .0018), was supported by our results. This supports our fieldwork and indicates that product quality mis-alignment may be a significant factor in explaining the widely cited 'failure' of firm's attempts to improve business performance through quality management efforts. Both our fieldwork and empirical results therefore suggest that minimizing mis-alignment between a firm's quality perceptions and that of its customers may be a good mechanism for improving the business unit performance outcomes of quality improvement efforts.

Our study also lends support to normative propositions concerning the importance of quality goals in the quality management literature by finding a positive relationship between product quality goal influence and product quality alignment (Path Coefficient = -.28, t = −3.18, p < .0001). Reflecting views expressed in our fieldwork, our findings indicate that the influence that quality goals set on a range

of customer focused and more internally-oriented criteria have on decision-making and behavior within the firm is an important factor affecting product quality alignment.

In terms of product quality management tools, hypothesis three received mixed support. Our results suggest that the use of TQM tools (Path Coefficient = .09, t = 0.81, p = .2094) in quality improvement efforts is unrelated to product quality alignment. However, our results also indicate that the use of marketing tools in formulating and implementing product quality strategy is related to firm's product quality alignment (Path Coefficient = -.23, t = −2.15, p = .0164). These findings suggest that using marketing research to uncover drivers of customer quality perceptions, promotional tools to effectively communicate relative quality improvements to customers, and customer satisfaction tracking to monitor outcomes may be more important in minimizing product quality mis-alignment than using more widely advocated TQM tools.

Our results also indicate that interfunctional interactions between quality and marketing are important factors affecting product quality alignment. As hypothesized, higher levels of interfunctional connectedness between quality and marketing are associated with increased product quality alignment (Path Coefficient = -.40, t = −3.69, p < .0001). Additionally, hypothesis five predicting that greater conflict between marketing and quality functions would be associated with lower product quality alignment, is also supported (Path Coefficient = .27, t = 2.55, p = .0058). These findings support fieldwork suggestions that effective interactions between quality and marketing help to ensure that knowledge of customer product quality perceptions and their drivers are known and understood by managers within the firm.

SBU size was included in the analysis as a control variable that may influence the firm's ability to develop and implement effective quality management programs [48]. Size was measured as the natural logarithm of the number of SBU employees in order to correct for non-linear relation-

Hypothesized Path Model Results*
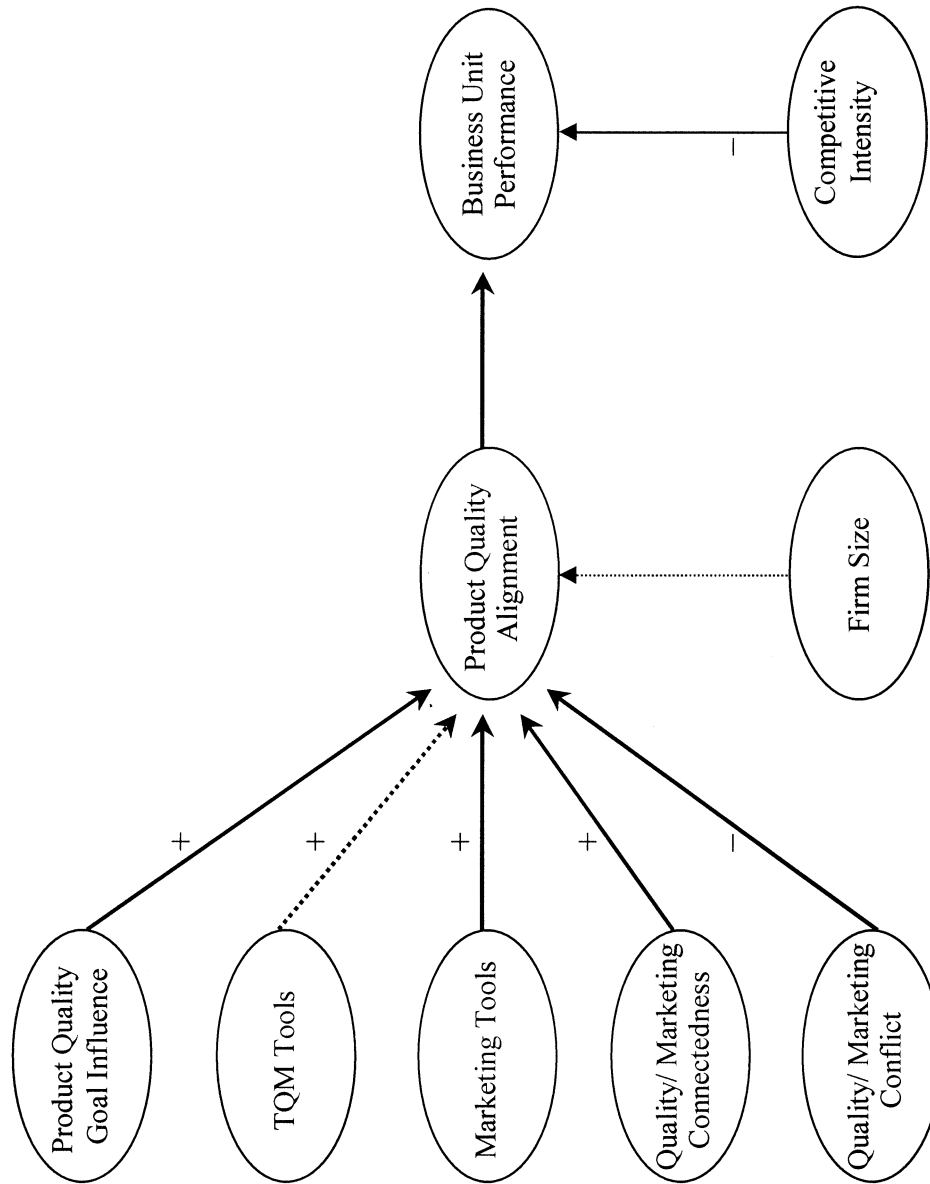
Fig. 1. All solid paths significant at $p < .05$ level, dotted line paths are not significant.

* All solid paths significant at p<.05 level, dotted line paths are not significant.

ships with constructs of interest. As shown in Table 2, size was found to be unrelated to quality alignment (Path Coefficient = .06, t = .97, p = .1666). Competitive Intensity, measured using a previously developed scale, [28] was also included in our model as a control variable to account for differences between industries in our multi-industry sample. As expected competitive intensity was found to be significantly and negatively related to business performance (Path Coefficient = −.26, t = −3.92, p < .0001) but unrelated to all other variables of interest in our model. These results support the generalizability of our findings.

5. Discussion and conclusions

This study's primary contribution lies in the delineation and empirical assessment of product quality alignment as an important driver of business unit performance. The strength of this relationship in our results supports our fieldwork in suggesting that product quality alignment may have an important role in understanding the widely perceived 'failure' of TQM in many firms. The process by which firms attempt to uncover customers' perceptual drivers, translate them into operational product specifications, ensure conformance to specifications, and effectively communicate product quality outcomes to customers is 'noisy' and imperfect [21,31]. However, our findings of the positive performance effects of managing this difficult process effectively, suggests that product quality alignment is a valuable and difficult to imitate resource.

A surprising finding is the lack of any relationship between the use of TQM tools and product quality alignment. This is consistent with the widely reported failure of TQM tools to improve business performance in many firms [41]. However, our triangulation interviews suggested that this may be a result of the way in which TQM tools are implemented. When TQM tools are implemented in an internally-oriented manner, as often seems to be the case, then resulting product quality improvements may not be valued by customers [33]. This is consistent with recent suggestions that using TQM tools without implementing a supporting quality philosophy and a strong customer orientation may limit their positive impact on firm performance [12]. Recent empirical evidence using the Baldrige Award criteria to operationalize TQM also suggests that using such customer oriented approaches may link more strongly with firm performance over time [14].

Consistent with this logic, our results indicate that the use of marketing tools in firm's quality improvement efforts can enhance product quality alignment. Our fieldwork suggested that using marketing research tools can enhance firm's knowledge of customer quality perceptions and their drivers, and that this knowledge can help to focus product quality improvement resources on the product attributes and wider cues that most directly affect customer quality perceptions. In addition our triangulation interviews suggested

that tying product quality improvement actions to ongoing customer satisfaction outcomes is an effective way ensuring product quality alignment. One manager suggested that this '*keeps managers feet to the fire of customer perceptions.*' This is consistent with the literature in suggesting that firms should incorporate the 'voice of the customer' in developing their product quality improvement strategies [21] and use marketing communication [52] and customer satisfaction tracking [22] tools in the implementation process.

In terms of practical managerial implications, our results suggest three areas in which managers may wish to focus some attention in efforts to enhance SBU performance through improved product quality alignment. First, our data suggest that it may be helpful to establish formal product quality goals, linking customer quality perceptions with internal product quality metrics, and make these influential decision inputs for managers and employees. Our interviews suggested that monitoring progress towards quality goals and linking progress with formal and informal rewards can be helpful mechanisms in ensuring that product quality goals are effective in influencing management and employee behaviors. One of our interviewees observed, "*The old truism of 'what get measured gets done' doesn't always hold – but what gets measured and rewarded, now that's a different story.*"

Second, our findings suggest that encouraging and facilitating the use of marketing tools in formulating and executing product quality improvement strategies may aid efforts to achieve product quality alignment. While the quality management literature does mention the use of some of these marketing tools, quality management training typically provides little practical guidance. Firms may therefore wish to incorporate marketing-based tools in their quality management training. Conversely, our data suggests that in any efforts to align product quality, managers should be careful in relying solely on traditional TQM tools. In using such quality tools, our fieldwork and the recent empirical literature suggests that managers should be particularly aware of the dangers of implementing them in an internally oriented rather than customer focused way.

Third, we find that quality managers often rely on input and support from the marketing function in their SBU and our data suggest that improving relationships between quality and marketing personnel may help in efforts to achieve product quality alignment. While focusing on 'cross-functional business processes' and removing 'functional silos' are common management prescriptions, our fieldwork suggests that such thinking has not significantly affected relationships between marketing and quality personnel in many firms. Under these circumstances, suggestions from our fieldwork as to how communication and understanding between quality and marketing functions may be enhanced include representation of personnel from each function in producing marketing and quality plans, requirements to make linkages between quality and marketing plans ex-

plicit, and monitoring customer satisfaction as a superordinate goal on which both functions can be jointly rewarded.

6. Limitations and future research

Two limitations of the present study result from the trade-off decisions required in designing research studies of this type. First, given the managerial objective of gaining insights into how to better direct firms product quality improvement efforts, we focus only on variables that may be directly amenable to management control. This excluded consideration of customer-based variables such as customer expertise and preference heterogeneity that may also influence product quality alignment. Second, in an effort to develop generalizable insights, we adopted a multi-industry sampling approach. However, it is possible that some industry or market characteristics may also affect product quality alignment. For example, in highly competitive markets with low switching costs, product quality alignment may have a bigger impact on performance as customers have a greater choice of alternatives [16,17].

Our study may be usefully extended to further develop knowledge concerning product quality alignment in three areas in particular. First, examining product quality alignment at the product rather then the SBU level would provide the opportunity to decompose the performance effects of product quality alignment into its impact on new product success and existing product performance. Second, we conceptualize product quality alignment from the firm perspective and our measure involves managers making judgments about differences between the firm's and its customer's product quality perceptions. A useful next step would be to examine differences between internal managers views of product quality and directly measured external customer perceptions of product quality. Finally, our results suggest that the rich stream of research considering interfunctional interactions involving marketing, R&D and engineering in new product development may benefit from also considering the quality function.

Notes

1. We use the generic term 'product' to describe the combinations of physical, service and intangible elements that make up firm's value offerings to customers.
2. The specific issues of reliability, discriminant validity and range restriction highlighted do not appear to be problematic in our product quality alignment measure.
3. For the product quality alignment variable, data from multiple respondents (the general manager and marketing manager) was available. These data were assessed for inter-rater congruence via examination of mean differences and standard deviations. This analysis indicates no systematic differences in the dispersion of responses between respondents and no systemic bias in the direction between respondents. Together, these results indicate adequate inter-rater reliability This degree of congruence compares favorably with that reported in similar multiple informant studies [26].

Appendix

Measurement Items

Quality/Marketing Connectedness (7-point scale with "strongly disagree/agree" anchors)

Members of one department feel comfortable 'phoning members of the other *

Members of one department are easily accessible to the other

The marketing and quality people here talk 'different languages' which makes it difficult to communicate

Both departments volunteer information and ideas which they feel affect the other

Individuals in one department will only contact someone in the other when it is strictly necessary

Quality/marketing conflict (7-point scale with "strongly disagree/agree" anchors)

Tensions frequently run high when members of the two departments work together

People from either of these departments dislike having to work with those in the other

There is often tension over the specific terms of the working relationship between the two departments

Members of both departments feel the goals of their respective departments are in harmony with one another *

The objectives pursued by the quality department are often incompatible with those of the marketing department

Product quality goal influence (7-point scale with "of no importance/extremely important" anchors and separate "not used" end-point)

"How important in influencing actions and decisions taken are current explicit quality goals that concern. . .

Customer Perceptions of our Product/Service relative to Competitors (for example, perceived quality, customer satisfaction)

Product/Service Price to our Customers Relative to Competitors (for example, selling price, installed cost)

Controlling Internal Costs Relative to Competitors (for example, scrap and defect rates)

Objective Product/Service Performance Relative to

Competitors (for example, % on time delivery, performance specs)

TQM tools (7-point scale with "not used/frequently used" end-points)

"Please evaluate your business unit's use of the following tools and techniques in achieving your quality strategy goals. . . . .

Statistical and problem solving techniques

Quality training of staff and employees

Benchmarking

Quality function deployment

Supplier/vendor inspection*

Marketing tools (7-point scale with "not used/frequently used" end-point)

"Please evaluate your business unit's use of the following tools and techniques in achieving your quality strategy goals. . . . .

Customer satisfaction tracking

Primary market research (for example, focus groups, customer surveys)

Secondary market research (for example, industry reports, trade press scanning, and so forth)

Marketing communications to external customers

Competitive Intensity (5-point scale with "strongly disagree/agree" anchors)

"Thinking about your main product marketplace, please indicate your level of agreement with the following statements. . . .

Competition in our industry is cut-throat

There are many 'promotion wars' in our industry

Anything that competitors can offer, others can readily match

One hears of a new competitive move almost every day

Our competitors are relatively unthreatening

Product quality alignment (7-point scale with "much worse/better than competitors" anchors)

"Thinking about your main marketplace, how would your firm currently rate the quality of your main product/ service in comparison with your major direct competitors in terms of -

"Thinking about the same marketplace, how do you think customers currently perceive the quality of your main product/service in comparison with your major direct competitors in terms of -

Core "product" quality

Overall "service" quality

Image/reputation quality

Business unit performance (7-point scale with "much worse/better than competitors" anchors)

Market share

Sales growth

Average profits per customer

Customer retention

* Denotes items deleted during scale purification

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Biographical sketches

Neil A. Morgan is Assistant Professor of Marketing in the Kenan-Flagler Business School at the University of North Carolina at Chapel Hill. He teaches and researches in the areas of marketing strategy and implementation. His previous work has been published in journals including *Journal of the Academy of Marketing Science, Journal of Business Research, British Journal of Management, European Journal of Marketing, Long Range Planning* and *Industrial Marketing Management.*

Douglas W. Vorhies is Assistant Professor of Marketing in the College of Business at Illinois State University. He teaches and researches in the areas of marketing strategy, innovation management and sales. His previous work has appeared in journals including *European Journal of Marketing, Journal of Market-Focused Management, Journal of Personal Selling & Sales Management, Journal of Small Business Management, Journal of Services Marketing* and *Journal of Strategic Marketing.*