Chapter 1

Managing Service Innovation: Variations of Best Practice

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1.1 Introduction

We know a great deal about the organization and management of new product development in the manufacturing sectors, but comparatively little about how applicable this is to the service sector (Miles, 2000; Tidd *et al.*, 2001). In this chapter we identify product development practices that explain variation in performance in a sample of 38 service firms in the UK (Tidd & Hull, 2002). These practices, which were derived from good management practice in manufacturing industries, were found to explain significant variance in performance indicators in the UK sample, a matching one in the USA of 70 firms, and a dataset combining the two (Hull & Tidd, 2002). However, scales measuring sets of "best management practices" constructed from the combined data better fit the USA than UK sample. Therefore, this paper builds new scales from analysis of only the UK data. The objective is to see if some configurations of practice better predict performance outcomes in the UK data than the model of "best practice" based principally on the USA data.

A typology of organization design is developed to classify the configurations observed in the UK data. The typology provides a theoretical context for hypothesizing which kinds of configurations are likely to have effects on which kind of performance outcome. Using the typology to classify these service data is challenging because

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contingency theory and the related notion of configurations were derived largely from industrial studies conducted prior to the emergence of large service firms and recent advances in information technology. Our study provides an opportunity to update and extend the notions of contingency and configuration to include service enterprises.

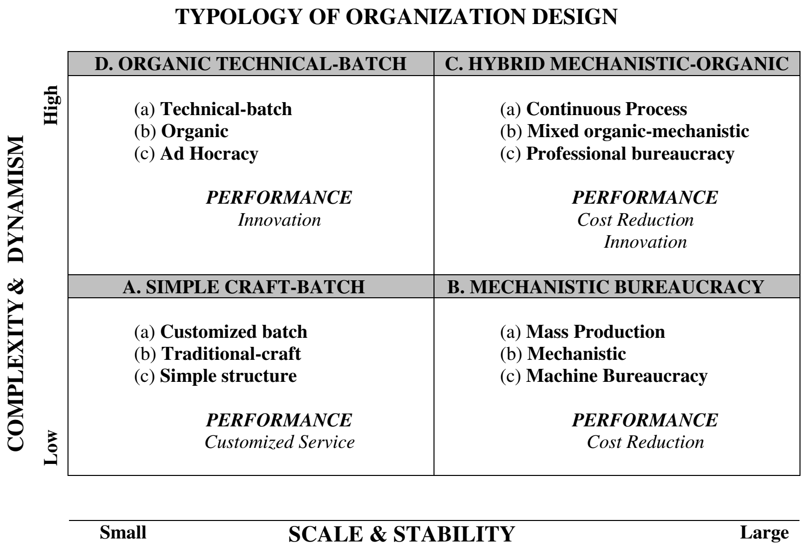
1.2 Theoretical Framework

The dominant management research and literature on new product and service development seeks to identify and to promote the notion of "best practice" management and organization (e.g. Clark & Wheelwright, 1993; Cooper & Edgett, 1999). In contrast, the notion that different types of organizational structures and management processes are appropriate for different kinds of tasks dates back to the pioneering work of Burns and Stalker (1961) and Woodward (1965), and the development of contingency theory. Central to contingency theory is the concept that no single organizational structure is effective in all circumstances. Instead there is an optimal organizational structure that best fits a given contingency, such as size, strategy, task uncertainty or technology (Donaldson, 1996). Therefore the better the fit between organization and contingency, the higher the organizational performance (Drazin & Van de Ven, 1985; Donaldson, 1999). This relationship between contingency, structure and performance has been supported by a substantial body of research conducted in the 1960s and 1970s, including qualitative comparative case studies (Burns & Stalker, 1961; Chandler, 1966; Lawrence & Lorsch, 1967) and quantitative analysis of large samples (Child, 1972). According to a large number of seminal studies, three contingencies appear to be associated consistently with organizational structure: size, technological complexity, and task uncertainty.

Much of the early research examined the relationship between formalization, specialization and firm size, the Aston Group (Pugh *et al.*, 1969; Pugh & Hickson, 1976) being the most influential work on this subject. Woodward (1965) identified technology as a contingency, and discovered a relationship between production technology, organizational structure and performance. However, Woodward's operationlization of technology was relatively crude, based simply on the flexibility and scale of production processes, whereas Perrow (1970) developed a finer grain typology of technology, based on task analyzability and variability. Similarly, Lawrence and Lorsch (1967) proposed that the rate of environmental change affected the need differentiation and integration within an organization, and found support for this in their comparative study of organizational structures in three different sectors. Galbraith (1977) argued that as task uncertainty increases, more information must be processed, which in turn influences the control and communication structures.

The basis of these theoretical typologies and empirical taxonomies are anchored on the dichotomy of the "mechanistic" bureaucracy and the "organic" type of organization design (Burns & Stalker, 1961). Organic designs are best for innovation, mechanistic ones for cost efficiency (Hage, 1980; Hull & Hage, 1982; Hull, 1988). The organic type is optimal for competition in complex, dynamic environments; the mechanistic is optimal for stable, predictable environments (Lawrence & Lorsch, 1967). Finer typologies have been proposed, for example, Donaldson (2001) distinguishes between "mechanistic" and "bureaucratic" types, but we believe that the more fundamental dichotomy is sufficient for identifying the relationships between organization and performance. One reason the dichotomy is so fundamental is because the strengths of each design correspond with the generic types of competitive advantage, cost versus innovative differentiation respectively (Porter, 1980).

The basic dichotomy may be expanded into 4-cell typologies as shown in Fig. 1.1. A hybrid type combines the advantages of both mechanistic and organic designs. A simple type lacks the advantages of either. The four types are: (A) Simple Craft-Batch, (B) Mechanistic Bureaucracy, (C) Hybrid Mechanistic-Organic and (D) Organic Technical-Batch. The hybrid type combines the advantages of mechanistic efficiencies and organic organization of professional knowledge to achieve both cost and innovation advantages simultaneously (Duncan, 1976; Hage, 1980; Daft, 1978).



(a) Woodward, 1961; Collins and Hull, 1986; Hull and Colins, 1987
(b) Burns and Stalker, 1961; Hage, 1980; Hull and Hage, 1982; Hull, 1988
(c) Mintzberg, 1979; Mintzberg and Quinn, 1996

Fig. 1.1 Typology of organization design.

Professional bureaucracies employ highly skilled people to perform complex work that is partially regulated by mechanistic standards required for control in large-scale settings (Mintzberg, 1979; Mintzberg & Quinn, 1996). The simple craft batch type offers highly adaptive, customized services as its performance advantage. Its relative simplicity enables it to be flexible and direct in development and delivery. Predictors of these four types include scale, knowledge complexity, and machine technology (Azumi *et al.*, 1983; Hull & Hage, 1982; Hull, 1988; Hull & Azumi, 1991).

Recently, management researchers (Mintzberg 1979;1983; 1994) and Galbraith (1994; Galbraith & Lawler, 1993) have developed these ideas into more prescriptive management frameworks, which attempt to match organizational structural templates to specific task environments. Activities that are unpredictable or uncertain require relatively more interpersonal methods of coordination and control than mechanistic-bureaucratic methods. A review of 21 innovation research projects concludes, "environmental uncertainty influences both the magnitude and the nature of innovation…(which) suggests that future research should adopt environmentally sensitive theories of organizational innovation by explicitly controlling for the degree and the nature of environmental uncertainty" (Damanpour, 1996). In particular, perceptions of environmental uncertainty appear to affect the organization and management of new product development (Hauptman & Hirji, 1999; Souder *et al.*, 1998; Tidd & Bodley, 2002).

Contingency theory is strongly positivist, and has been much criticized, as it appears to leave little scope for other influences, such as managerial choice or institutional pressures (Powell & DiMaggio, 1991; Tidd, 2001). However, Child (1972) offers some accommodation of the competing theories by allowing some "strategic choice" within boundaries determined by contingencies, an approach developed by Chandler (1990). A significant body of research on the environment-strategy and strategy-structure linkages supports this view (Dess *et al.*, 1993; Miller, 1996). Specifically, the notion of a "configuration" is an internally consistent combination of strategy, organization and technology that provide superior performance in a given environment. For example, the success of the multidivisional structure, or M-form, is associated with a strategy of diversification into related product areas because the volume and complexity of information strains the traditional functional structure (Chandler, 1966; 1990). Most recently, a number of studies have begun to challenge the notion of a single "best practice" and have re-examined the relationships between strategy, organizational structure and management processes (Thomas & Ramaswamy, 1996; Atuahene-Gima & Ko, 2001; Kald *et al.*, 2001). We adopt a similar position here, and argue that contingencies influence the strategic configuration of management, organization and technology, but that they constrain rather than fully determine "best practice" (Tidd, 2001; Tidd *et al.*, 2001), what we have referred to as "strategic degrees of freedom" (Tidd, 1993).

Much of the best-practice new product development today has been derived from the "lean" approach to product development

(Womack & Jones, 1996), based entirely on practices in the manufacturing sector, principally the car industry. From these and studies of Concurrent Engineering (Hartley, 1992; Susman & Dean, 1992; Gatenby *et al.*, 1994), we have distilled an operating core of good practices in new product development, which we refer to as OPTS (Organization, Process, Tools and Systems). This framework is an enlargement of a composite model tested by analyzing 100 industrial corporations in the US (Hull *et al.*, 1996; Collins & Hull, 2002; Liker *et al.*, 1999), and validated during the course of conducting 16 industrial case studies of companies participating in a user group. Each company in the group presented their methods of product development and helped shape the definition of good practices in terms of the OPTS constructs. Varied formulations of OPTS constructs are commonly used in the literature on concurrent engineering (Zirger *et al.*, 1990; Susman & Dean, 1992), organization design (Hage, 1980; Daft, 1995), and as building blocks in models for industrial improvement, such as the Lean Aerospace Initiative (Cusmano & Nobeoka, 1998; Henderson & Larco, 1999).

Each OPTS construct plays a different role in performance improvement. Organization provides coordination of people; process provides flexible controls; tools provides transformation/transaction capabilities. Cross-functional teams embody an organic alternative to control by bureaucratic hierarchy. Rigid bureaucratic rules are replaced by flexible, enabling processes (Adler & Boryn, 1996). Hard automation is replaced by soft, programmable automation (Collins *et al.*, 1996). The integration of the benefits of OPT constructs is hypothesized as resulting in an emergent property system. Concurrent systems are characterized by "reciprocal integration" (Thompson, 1967), which means that work performed by multiple functions along value chains are in a constant state of mutual adjustment as compared with pooled or sequential integration (Liker *et al.*, 1999). Systems characterized by reciprocal balance among its constructs are presumed to be more capable of achieving a portfolio of competitive advantages, such as both product differentiation and low cost simultaneously. We compare this OPTS model against new service development and delivery in the UK and USA.

1.3 Research Methods

Samples

UK sample. Respondents were drawn from a network of contacts of the School of Management at Imperial College London. A workshop was held at Imperial College to generate support from these constituents and to refine the questionnaire. Although the sample is one of convenience, the network of Imperial College includes links with most types of service company in the greater London area. A hundred questionnaires were sent and after a reminder, 38 usable questionnaires were completed and returned. The preferred respondent was someone in the service product development function, but respondents also included staff responsible for TQM (Total Quality Management), BPR (Business Process Reengineering), and performance improvement. The sample is not random or representative, but does not need to be as we are concerned with associations between service management, organization and performance, rather than a simple survey of practices used.

USA Sample. From a list of the largest employers in Crain's New York Directory, 120 service companies were identified for mailing questionnaires. Respondents from 70 businesses in 51 corporations returned questionnaires. Most major categories in the service sector were represented except advertising and broadcasting. With such exceptions, survey respondents appear to be reasonably representative of large service companies in the New York area and its diversity, especially financial.

Strictly speaking, the UK and USA samples were not matched, but in practice similar businesses were represented in each sample, with the exception of construction and services rendered by divisions of industrial firms (see Appendix A). On average, the firms in the USA sample were larger than those in the UK sample, but in both cases only medium to large organizations were represented (greater than 200 employees). Therefore our sample was unable to capture the effects of the scale of operations.

Analysis Procedures

The scales were constructed using factor analyses only of the UK data (Varimax method). The sets of practice items included in each scale are shown in Appendix B along with Alpha coefficients. Factor loadings and Alphas for the USA and combined samples are available (Hull & Tidd, 2002). Multiple regression analysis is used to predict variation in performance measures. The step-wise method was used to maximize variance explained.

Measures

The measures were adapted from a 200-page inventory of industrial best practices based on 16 case studies and analysis of 100 American companies (Hull *et al*., 1996). Many of the items had to be reconstructed at a more abstract, general level because of the intangibility and diversity of service products. The questionnaire consisted of 150 questions using seven point Likert scales. Pilot surveys were conducted in the USA and UK, and subsequent workshops in New York and London were used to help to refine the questions for the service context.

Performance measures. Twelve items loaded in four factors in the UK data. The four scales are labeled: (1) product innovation & quality, (2) improvements in service delivery process, (3) time compression in development & delivery, and (4) cost reduction in development & delivery.

Factor analysis of the questionnaire items within each of the OPTS categories resulted in five organization loadings, three for process, three for tools, and three for system. Factor analysis of these 14 sets of practice resulted in five loadings. Four of these included three practice sets and are described below as configurations. A fifth factor contained only two. Each of the 14 practice sets is tagged in Appendix B with the number of its factor within each of the OPTS categories.

Best practice summary index. The sum of all 39 items in the 14 sets of practice is calculated to assess the overall relationship between practices and performance outcomes.

Table 1.1 Correlations and descriptive statistics: UK and USA. **Legend**: **UK (bold)** *USA* (*italic*).

	Total	I & Q	Time	Cost	Service	Config. A	Config. B	Config. C	Config. D	Subsys. E	OPTS
Total Performance.	**1.00**										
	1.00										
Innovation & Quality	**.54****	**1.00**									
	*.81***	*1.00*									
Time Compression	**.46****	**–.12**	**1.00**								
	*.77***	*71***	*1.00*								
Cost Reduction	**.48****	**–.16**	**.31**	**1.00**							
	*.78***	*.62***	*.62***	*1.00*							
Service Delivery	**.87****	**.36***	**.25**	**.25**	**1.00**						
	*.91***	*.56***	*.51**	*.62***	*1.00*						
Configuration A	**.58****	**.29**	**.40***	**.28**	**.40***	**1.00**					
Project-based	*.60***	*.57***	*.52***	*.57***	*.50***	*1.00*					
Configuration B	**.44****	**.44****	**–.03**	**.31**	**.31**	**.45****	**1.00**				
Mass customization	*.56***	*.64***	*.61***	*.49***	*.39***	*.75***	*1.00*				
Configuration C	**.54****	**.39***	**.43****	**.12**	**.37***	**.48****	**.21**	**1.00**			
Cellular	*.61***	*.61***	*.57***	*.59***	*.50***	*.81***	*.66***	*1.00*			
Configuration D	**.39***	**.55****	**–.03**	**–.10**	**.27**	**.29**	**.29**	**.36***	**1.00**		
Organic-technical	*.60***	*.56***	*.56***	*.61***	*.48***	*.73***	*.62***	*.78***	*1.00*		
Subsystem E	**.40***	**.30**	**–.01**	**.21**	**.40***	**.44****	**.47****	**.24**	**.24**	**1.00**	
Partnership process	*.54***	*.58***	*.54***	*.52***	*.39***	*.80***	*.69***	*.64***	*.57***	*1.00*	
OPTS Sum	**.66****	**.55****	**.26**	**.19**	**.50****	**.76****	**.65****	**.70****	**.69****	**.60****	**1.00**
	*.66***	*.67***	*.62***	*.63***	*.53***	*.93***	*.82***	*.91***	*.86***	*.81***	*1.00*
UK Mean	**2.56**	**2.86**	**2.31**	**2.26**	**2.56**	**2.51***	**2.49**	**2.48***	**2.67***	**2.60**	**2.55****
UK S.D.	**0.51**	**0.83**	**0.78**	**0.97**	**0.68**	**0.64**	**0.72**	**0.65**	**0.75**	**0.69**	**0.49**
USA Mean	*2.70*	*3.09*	*2.20*	*2.38*	*2.73*	*2.81*	*2.72*	*2.75*	*3.06*	*2.66*	*2.83*
USA S.D.	*0.74*	*0.71*	*0.98*	*1.00*	*0.86*	*0.73*	*0.64*	*0.63*	*0.62*	*0.81*	*0.58*

**p=.01 *p=.05 t=p.10 (two taid significance)

1.4 Results

Descriptive Statistics

Means and standard deviations are shown for the UK and USA samples in Table 1.1 Performance indicators do not differ significantly between the two samples. However, three of the four configurations are lower in the UK as is an index summing best practices. This contrast suggests a kind of dilemma. How can roughly similar levels of performance be achieved with differing levels of practice?

A resolution of this seeming contradiction occurs if system configurations in the UK are more parsimonious in practices because their strategy narrowly focused on selected performance outcomes instead of multiple kinds of advantage simultaneously as in the USA. A system configuration approach might be more efficient for targeting specific kinds of performance outcomes, the best practice paradigm approach being more effective for multiple outcomes.

Performance Inter-Relationships

Performance indicators are less strongly correlated with one another in the UK than USA data. The index of innovation and quality is significantly correlated with service delivery, but not time compression and cost reduction. The correlation between time compression and cost reduction falls short of significance. By contrast, all four of these performance indicators are significantly inter-correlated in the USA data. This suggests companies in the UK sample may pursue niche strategies that do not require achieving multiple kinds of performance advantages simultaneously.

Practice Inter-Relationships

Sets of practice are less strongly correlated with one another in the UK than USA data. In the UK sample, 42 of 91 possible correlations among the 14 sets of practice are insignificant and three are negative as shown in Table 1.2. Variation in the strength of these relationships suggests the possibility of polymorphism. By

Table 1.2 Correlation Matrix of factors of performance and practices for the UK data.

	Total	I&Q	Time	Cost	Serv.	**O**	O1	O2	O3	O4	O5	**P**	P1	P2	P3	**T**	T1	T2	T3	**S**	X1	X2	X3	**OPTS**
Total Performance	1.00																							
Innovation & Quality	.54	1.00																						
Time	.46	−.12	1.00																					
Cost	.47	−.16	.31	1.00																				
Service Delivery	.87	.36	.25	.25	1.00																			
Organization	.52	.46	.25	.31	.35	1.00																		
Factor O1	.20	.13	−.08	.25	.20	.61	1.00																	
Factor O2	.34	.23	.40	.11	.15	.67	.31	1.00																
Factor O3	.47	.23	.46	.37	.26	.60	.13	.43	1.00															
Factor O4	.29	.46	.06	−.06	.15	.68	.12	.16	.12	1.00														
Factor O5	.33	.50	−.14	.17	.25	.69	.44	.05	.27	.36	1.00													
Process	.64	.41	.13	.33	.53	.59	.60	.37	.14	.28	.49	1.00												
Factor P1	.48	.39	.07	.08	.48	.42	.52	.20	.12	.26	.33	.78	1.00											
Factor P2	.52	.20	.27	.37	.39	.58	.57	.55	.20	.19	.34	.87	.49	1.00										
Factor P3	.54	.47	−.12	.29	.42	.32	.24	.01	−.04	.19	.50	.73	.40	.46	1.00									
Tools	.47	.40	.29	.08	.30	.45	.04	.11	.15	.46	.32	.39	.32	.35	.21	1.00								
Factor T1	.34	.16	.37	.04	.26	.21	−.13	.06	.31	.09	.09	.24	.29	.23	.00	.75	1.00							
Factor T2	.38	.51	−.02	−.06	.22	.41	.03	.10	−.11	.66	.22	.18	.16	.11	.17	.67	.13	1.00						
Factor T3	.16	.06	.18	.30	.04	.32	.32	.03	.02	.14	.45	.42	.15	.45	.37	.50	.16	.12	1.00					
System	.55	.54	.16	−.09	.44	.56	.08	.47	.22	.48	.41	.51	.44	.45	.30	.63	.36	.61	.21	1.00				
Factor S1	.37	.23	.29	−.02	.28	.20	.04	.37	.16	−.08	.32	.46	.22	.55	.25	.26	.13	.07	.37	.70	1.00			
Factor S2	.42	.51	.18	−.19	.29	.56	.05	.43	.35	.54	.31	.33	.40	.25	.13	.58	.48	.51	.02	.83	.32	1.00		
Factor S3	.39	.50	−.12	−.16	.38	.37	.10	.26	−.01	.49	.25	.33	.37	.21	.24	.47	.09	.70	.12	.80	.35	.52	1.00	
OPTS	.66	.55	.26	.19	.50	.82	.45	.52	.35	.59	.60	.78	.62	.71	.49	.75	.47	.57	.45	.84	.56	.72	.62	1.00
Mean	2.56	2.86	2.31	2.26	2.56	2.48	2.43	2.45	2.36	2.63	2.54	2.60	2.76	2.47	2.64	2.49	2.42	2.73	2.28	2.64	2.60	2.65	2.68	2.55
S.D.	.51	.83	.78	.97	.68	.62	.87	.77	.83	.90	.90	.64	.73	.74	.96	.58	.83	.96	.89	.61	.71	.83	.75	.49

**p=.01 for coefficients greater than .41/ *p=.05 for coefficients greater than .32 (two tailed significance) contrast, only 9 of 91 possible correlations are insignificant in the USA data and only one is negative (not shown). This contrast suggests that the UK data may conform less closely to a best practice paradigm.

System Configurations

The notion of system configurations is explored as an alternative to an all-encompassing best practice approach to performance improvement in the UK data. Analysis of the 14 sets of practice loaded in five factors. Four of these had loadings with three components and are deemed configurations for the purpose of exploratory research. The fifth, with only two components, is designated as a subsystem. Interestingly, each of the five organization factors loaded in a configuration/subsystem. This result supports the prospect that varied configuration may be represented in the UK data.

Best Practice Summary Index

A best practice index, the sum of all practices, has an identical coefficient with total performance in both the UK and USA data ($r = .66$). However, the coefficients are weaker with each of the four components of performance in the UK data and insignificantly so in the instances of time compression and cost reduction. By contrast, the sum of best practices is strongly correlated with all four of the performance components in the USA data. This variation is consistent with the speculation that the UK data conforms less closely to a best practices paradigm than the USA data. Also, the mean of the best practice summary index is lower in the UK than the USA.

As shown in Table 1.2, configurations in the UK data have correlations that are as strong or stronger than the best practice summary index for three of the four components of performance: quality & innovation, time compression, and cost reduction. By contrast, none of the configurations in the USA data have correlations that are as strong as the best practice summary index. This contrast is consistent with the possibility that configurations of practice in the UK are characterized by more selective, parsimonious sets of practices than in the USA data.

To assess the relative contribution of each of the configurations to performance in the UK, all four were entered simultaneously into multiple regression analysis. System configurations explain significant amounts of variation in total performance and its four components as shown in Table 1.3. Subsystem E is omitted because it has no significant main effects if entered additionally. The greatest amounts of variance explained are for total performance and innovation & quality.

Each configuration has somewhat distinctive relationships with the four components of performance. Eleven of the effects are significant. Nine are positive; two are negative. These relationships are summarized by type of configuration in Fig. 1.2. Also shown

D. ORGANIC TECHNICAL-BATCH	**C. CELLULAR HYBRID**
O— Cross-functional collocation (4) **P—** **T—Shared technology** (2) **S— Reciprocal integration** (3) ***PERFORMANCE*** *1. Innovation & Quality* (+) *4. Total Performance* *4. Service Delivery* *4.Cost Reduction* (–) *4.Time Compression* (–)	**O— Cellular grouping** (3) **P—** **T—Shared technology** (1) **S—Knowledge integration** (2) ***PERFORMANCE*** *1. Total Performance* (+) *1. Time Compression* (+) *2. Service Delivery* (+) *3. Innovation & Quality* (+) *3.Cost Reduction*
A. PROJECT-BASED BATCH	**B. MECHANISTIC CUSTOMIZATION**
O— Project-based Management (2) **P—Customer focus** (2) **T—** **S—Holistic voice of customer** (1) ***PERFORMANCE*** *1. Service Delivery* (+) *2. Total Performance* (+) *2. Time Compression* (+) *2.Cost Reduction* (+) *4. Innovation & Quality*	**O—Customer involvement** (5) **P—Standardization** (3) **T—External linkages** (3) **S—** ***PERFORMANCE*** *1. Cost reduction* (+) *2. Innovation & Quality* (+) *3. Total Performance* (+) *3. Time Compression* *3. Service Delivery*

[4]Partnership process subsystem:
O—Partner involvement (1)
P—Documentation (1)

Fig. 1.2. Configurations of organization, process, tools, system and performance in UK services[4].

Table 1.3 Regression of performance measures on best-practice and configurations.

		Total Performance		**Innovation & Quality**		**Time Compression**		**Cost Reduction**		**Service Delivery**	
		Configu-ration	Best-Practice	Configu-ration	Best-Practice	Configu-ration	Best-Practice	Configu-ration	Best-Practice	Configu-ration	Best-Practice
Config. A	**Project based**	.30*		—		.25t		—		.29*	
Config. B	**Mass Custom.**	.24*		.29*		—		.28t		—	
Config. C	**Cellular**	.35**		19t		.37*		—		.24t.	
Config. D	**Organic-tech.**	—		.40**		−.23t		−.25t		—	
OPTS	**Σ Best-Practice**	—	.66**	—	.55**	—	.22t	—	.19	—	.50**
R^2		.47	.44	.42	.31	.24	.05	.18	.04	.20	.25
R^2 adj.		.42	.43	.37	.29	.17	.02	.10	.01	16	.23
F-Ratio		9.9**	28.4**	8.3**	15.9**	3.6*	1.7t	2.4*	1.3	4.5**	12.0**

**p=.01 *p=.05 t=p.10 (One tailed significance) is their rank order in terms of variance explained in each of the performance measures.

Overall, the results are generally consistent with the 4-cell typology built upon the Burns and Stalker continuum. Type D (organic technical-batch) is the most innovative; Type B (mechanistic customization) is the most cost efficient. Type C (cellular hybrid) is best for total performance. Type A (project-based batch) is best at service delivery. However, each of the types have nuances in practice and nomenclature that go beyond the original formulation because of the continued evolution of organization forms and the nature of services versus goods industries.

A. Project-Based Batch Configuration

Configuration A uses project leaders to organize the involvement of everyone early on to reduce hand-offs (O-2), the essence of concurrent product development (Collins & Hull, 2001). Structured processes, such as QFD (Quality Function Deployment), are used for identifying and migrating customer requirements. Processes are mapped and continuously improved (P-2). The system is integrated by the voice of the customer, holistic thinking, and early involvement of the customer in need fulfillment (S-1). In terms of the OPTS framework, Configuration A is strong in Organization, Tools, and System constructs. The main gap in configuration A is in tools/technology as none of the measures suggest technological sophistication in either knowledge or computers. However, the art and craft of project management, which is somewhat analogous to batch production in goods industries, may provide a strong yet flexible type of enabling control over the development and delivery of customer focused products.

To the extent Configuration A corresponds with a craft batch category in the typology, it is hypothesized to achieve high levels of service delivery. This hypothesis supported by its significant main effect in multiple regression analysis on service delivery. In addition, the organization component of this configuration has unanticipated significant main effects on time compression and cost reduction.

These effects on performance are consistent with the flexibility of project-base systems, which is desirable in part because Configuration A is the only one having a significant correlation with an index of environmental dynamism.[1] This profile of the project-based organization add value because this type has received relatively little attention in mainstream management research, particularly in the service sector (Gann & Salter, 1998; Hobday *et al.*, 2000).

Type A: Case example

Ove Arup is an international engineering consultancy firm that provides planning, designing, engineering and project management services. The business demands the simultaneous achievement of innovative solutions and significant time compression imposed by client and regulatory requirements. Since 1999, the organization has established a wide range of knowledge management initiatives to encourage sharing of know-how and experience across projects. These initiatives range from organizational processes and mechanisms, such as cross-functional communications meetings and skills networks, to technology-based approaches such as the Ovebase database and intranet. To date, the former have been more successful than the latter. For example, a survey of engineers in the firm indicated that in design and problem-solving, discussions with colleagues were rated as being twice as valuable as knowledge databases, and consequently engineers were four times as likely to rely on colleagues. Two primary reasons were cited for this. First, is the difficulty of codifying tacit knowledge. Engineering consultancy involves a great deal of non-codified knowledge and project experience, which is difficult to store and retrieve electronically. Second, the complex engineering and

[1]The index of environmental dynamism sums six factors (Technological complexity of service products, Rate of service product introduction, Compatibility of service products with other products, Customization, Globalization, and Quality) in terms of increased challenge in market requirements and turbulence, i.e. change regardless of direction. Configuration B has a significant correlation of .33 with this index (not shown in Tables).

unique environmental context of each project limits the re-use of standardized knowledge and experience.

B. Mechanistic Customization

Configuration B is organized by the involvement of external customers in product development and delivery process decisions (O-5). Standardization is a key factor in controlling the relationship (P-3). Electronic links are used to exchange data with customers and suppliers (T-3).

In terms of the OPTS framework, product development and delivery is organized around customers in Configuration B, a key feature of best practice (Hartley, 1992). Setting standards for projects and products is a key method of process control. Presumably customers help set these standards in conformance with their requirements. The electronic interchange between Configuration B and its customers provides the capability for routinely adapting them to market demand.

To the extent Configuration B corresponds to a mechanistic bureaucracy in the typology, it is hypothesized as achieving high levels cost leadership. This hypothesis is supported by its significant main effect in multiple regression analysis on cost reduction.

In addition, this type also has a significant main effect on product innovation & quality that was unanticipated in the typology. One may speculate that mass customization with programmable technologies had improved the capability of mechanistic firms to innovate, especially in services because the fixed costs sunk in dedicated equipment are relatively lower. Possibly, a goodly chunk of the product innovation decisions originate at the customer's rather than the service provider's location.[2] To the extent the locus of innovation is external, the operations of Configuration B conforms somewhat more closely

[2]This speculation is consistent with the fact that Configuration B experienced market demand for customized products that was growing and turbulent more than any other configuration ($r = .28$, not shown in Tables).

to the hypothesis as machine bureaucracies are typically less capable of indigenous creativity. However, this service type differs appreciably from a stereotypical mechanistic bureaucracy functioning as a closed system.

Configuration B has a negative effect with time compression that was unanticipated by the hypothesis. This relationship is consistent with the constraints often associated with machine bureaucracies. It is also possible that there are trade-offs between innovation and quality on the one hand versus time compression on the other.

Type B: Case example

For example, in British Gas Trading (BGT) standardized documentation and processes are used as an instrument of management control, and yet many different types of contract exist. Within BGT, there are formal procedures for assessing the financial performance of projects, and all projects over a certain threshold require the business owner to prepare a completion report within three months of completion. A project is complete when all physical work is completed, all costs relating to the work have been incurred, and all benefits have been delivered.

C. Cellular Hybrid

Configuration C organizes their people as a cross-trained, co-rewarded group, which reinforces their cellular identity (O-3). Electronic tools are distributed to all and enable cell members to map processes, share best practices, and communicate lessons learned on-line (T-1). Cellular systems are typically rather self-contained which may be one reason companies in this configuration are more likely to value knowledge, re-use it, and share it for achieving a balanced portfolio of performance advantages, and (S-2).

In terms of the OPTS framework, Configuration C is strong in dimensions of organization, tools, and system integration. Its lack of process may be compensated by the fact that tools/ technologies may serve as surrogates, e.g. common software for project mapping and process mapping. It is perhaps the most well rounded of the configurations in terms of the OPTS framework. Its strategic focus on achieving a balanced portfolio of competitive advantages is consistent with the goal of best practice.

Configuration C seems to correspond in some respects to a professional bureaucracy. Knowledge is regarded as a paramount competitive advantage garnered from outside the company as well as cultivated within. However, the extent to which knowledge is professionally based in a way analogous to that held by scientists and engineers in industrial firms is unclear. Perhaps the cellular group holds a kind of knowledge certification capability somewhat analogous to professional standards. For example, its use of tools focuses principally on knowledge management, e.g. distributed databases, templates for process mapping, etc. In any case, knowledge management seems to be a particular strength and is managed as part of a continuous process, e.g. on-line lessons learned databases, transfer of lessons learned, etc.

To the extent Configuration C corresponds to a hybrid system, it is hypothesized as achieving multiple kinds of performance advantage simultaneously. This hypothesis is supported because this configuration ranks highest in overall performance. It also has significant main effects on product innovation & quality, time compression, and service delivery. Moreover, the organizational component of this configuration is significantly correlated with cost reduction.[3]

An advantage of cellular organizations is their self-containment. Although the direct work of cross-trained employees is less efficient from a scientific management perspective of Taylor, cells can be cost effective for the total enterprise because administrative overhead is low. In addition, Configuration C has significant main effects on both time compression and service delivery. One may speculate that the self-containment of quasi-processionals in the cellular group

[3]The organizational factor of Configuration C, Cellular grouping, is significantly correlated with cost reduction ($r = .38$, not shown in Tables).

enables them to delivery more customer focused services more quickly than if external professional bodies were controlling internal activities. In any case, the cellular configuration, along with its organizational component, has more significant main effects than any other type. This result is consistent with the thrust of the typology that hybrids are capable of multiple kinds of performance.

Type C: Case example

Cable and Wireless Global Markets (CWGM), a division of the UK telecom operator Cable and Wireless, is a systems integrator and service provider which designs, integrates and operates telecommunications networks for multinational clients. CWGM was established in 1996 to deal with the increasing number of non-standard and highly complex outsourcing projects. The common processes and standards developed by the parent company were found to be inappropriate for this type of business. In contrast to the formal business processes and matrix structure used for simpler management network services, CWGM has adopted a more flexible teaming approach, which includes a "war room" to help build relationships and promote communication between team members and customers (Davies & Brady, 2000). In this way teams can more easily work closely with customers to develop innovative service packages of standardized products and customized applications to achieve the required service level agreements for outsourcing.

D. Organic Technical

Configuration D organizes co-located, cross-functional teams in a flattened hierarchy (O-4). Communications are open regardless of rank, both face-to-face and via E-mail (T-2). Its technical base utilizes expert systems and management information systems. Responsibility for work is shared and partnering is practiced throughout the value chain (S-2).

Many of these practices are core to the definition of the organic-technical type of design (Damanpour, 1991). Organic systems have dense communications facilitated by cross-functional teams and physical collocation (Hull *et al.*, 1996; Collins & Hull, 2002). Cross-functional teaming, whereby different specialists are assigned to work on the same project simultaneously, has been advocated and widely adopted in many companies as a strategy to improve their product development process. Collaboration among diverse functions typically provides better solutions to complex design problems (Gatenby, 1994). Physical co-location involves aggregating project team members in common space to enhance rich communications among group members (Daft & Lengel, 1986). The scale of operations is either small or managed in such a way that cross-functional teams are collocated with open communications within a reduced hierarchy. Everyone in the value chain accepts reciprocal responsibility for the product.

The organic design has the advantages for creativity and innovation. Accordingly, Type D ranks significantly higher than other configuration in innovation, but lowest in all other performance measures. The organic-technical configuration in the UK specializes in practices that a lengthy literature associates with innovativeness (Tidd *et al.*, 2001). The organic type continues to be a common organizational configuration for innovation in UK services. But the creativity of boffins involves trade-offs with other kinds of performance outcomes in a way that fits with the niche first described by Burns and Stalker.

Type D: Case example

For example, in BBC Worldwide (BBCW) speed/timeliness is essential to the processes given its strategic nature, and for this reason timelines are prescribed. Processes are strongly time-driven — indeed, diagrammatically they are captured in a timeline. A series of defined steps are involved from the initial receipt of programme treatment to sign-off by a senior management committee seven weeks later. In BBCW, processes are able to evolve reactively to emergent business needs. For example, if a new means of exploiting programmes arises (VOD, broadband video) these additional media would be included in the necessary documentation. In the case of an emergency item that requires urgent approval, informal contacts are exploited to minimize timescales, which is indicative of flexibility and the use of networking.

Within BBCW, approval thresholds are reviewed regularly to ensure that the company is able to devote appropriate management time to investments that have a significant impact on its businesses. The process facilitates effective and efficient co-ordination of offers, the objective being to increase awareness of programmes and products available for investment; to focus investment strategies; and to co-ordinate offer documents to expedite investment decisions. The process documentation at BBCW has in-built financial measures as well as benchmarks against the success of previous programmes. The quality of a bid is dependent on individuals and departments providing the required information on a timely basis, together with robust ROI analyses and sales projections.

E. Partnership Process Subsystem

Subsystem E is organized by involvement of external partners/suppliers in product and delivery process decisions (O-1). Processes are documented, checked for conformance, and benchmarked with best-in-class (P-1). This subsystem is similar to Configuration B except that the organizing focus is on partners or suppliers instead of customers and the process method is documentation instead of standardization. In terms of the OPTS framework, subsystem E is weak in specifics of organization, but strong in process control via documentation. No items measuring tools were included. System integration measures were also absent. Companies in this niche achieve either a kind of backward integration toward sources of supply and/or horizontal alliances with partners to provide more holistic services. As such, this subsystem is not viable as a stand-alone enterprise. However, it may be a harbinger of the future to the extent that major service companies serve as solution integrators for clients by bringing together the inputs from diverse organizations. The trend toward providing solutions instead of components is becoming a fixture in many industrial concerns and an increasing number of service providers.

1.5 Discussion

All four configurations had one or more significant effects on specific performance indicators. Examination of the actual measures suggests that each of the four system configurations provided several common elements, including:

- Organizational mode of bringing people together;
- Control mechanisms, either impersonal (standards, documentation, common software) or interpersonal (collocated teams);
- Shared knowledge and/or technical information base;
- External linkages, e.g. customers and/or partners/suppliers.

Each configuration appears to have parsimoniously evolved or acquired sufficient good practices to be viable at least in niche markets. The viability of these configurations in the UK data argues for updating the standard contingency typologies to encompass advances in technology and making such typologies more generic to better accommodate service as well as manufacturing sectors.

A trend that seems to apply to all the systems in the typology is the devolution of business responsibility. The project-based configuration and the cellular are conspicuous additions to the organic-technical type. Mechanistic customization also implies some degree of devolution in that highly centralized decisions about large volumes of standard items build for inventory are no longer the only option. This trend is also illustrated by partnership process subsystems that have such a narrow scope of responsibility they are viable only in alliance with others. In sum, the general trend toward smaller, more decentralized units suggests significant changes in the structure and operations of all the configurations in the typology and fragmentary subsystems.

The traditional notion of simple craft-batch organization needs rethinking in light of the project-based organization. Although lacking in tools, the project-based configuration was rather sophisticated in organization and process. For example, its organization involved downstream functions early on. The processes deployed by Configuration A to incorporate the voice of the customer in their products were advanced, e.g. QFD (Quality Function Deployment). This is consistent with the fact that Configuration A made more use of TQM (Total Quality Management) and BPR (Business Process Reengineering) than any other. (r = .39 and .53 respectively, not shown in Tables). Both goods and service companies increasingly deploy project-based organizations to integrate resources more quickly to serve their customers (Gann and Salter, 1998). In sum, companies in this niche may compensate for a lack of advanced technology with prowess in organizational and process. Moreover, their lack of advanced technology may be relatively less important for adding value in services than in goods industries.

The mechanistic customized configuration differs from a traditional machine bureaucracy in two important ways. First, the limitations of dedicated assembly-line equipment during the period when Woodward's mass production type was first described, have been largely surmounted by flexible, programmable automation (Collins *et al.*, 1996; Tidd, 1991). Second, the openness of Configuration B to customers contrasts with the closed systems of the past that produced large quantities of standard units to stock (Mintzberg, 1979). Its programmable capabilities enable a degree of mass customization that was impractical in earlier era of dedicated equipment for specialized production. This has enabled mass producers to customize products more easily and respond to the voice of customers in new ways.

Professional bureaucracies have often been burdened by conflicting masters, the knowledge-based codes of professional conduct and large-scale administrative requirements. However, the growing volume and specialization of knowledge challenges the boundaries of traditional professions and has weakened external control over internal activities within corporations. A growing number of loosely regulated communities of practice have emerged both within and across different subject-based disciplines. The Cellular configuration enables a relatively self-contained group of people to become experts in developing and delivering products as qu\asi professionals. Cellular organizations thereby get some of the advantages of codified knowledge with far less hierarchical control by bureaucratic forms.

An organic organizational design originally meant little more than the absence of bureaucratic constraints. Today the organic-technical type of configuration has a more active agenda. Relatively more influence and resources are given to project teams instead of functional departments. Open communications are not left to chance encounters, but structured by collocated, cross-functional teams deployed in flat hierarchies so that communications are more horizontal than vertical.

Partnership process subsystems are increasingly important because of the vertical disintegration of large corporations into smaller units that no longer have end-to-end responsibility for their value chain. Many kinds of subsystem have evolved with the growth of alliances, partnerships, joint ventures, and electronic networks during the past quarter century. They have core competencies that are viable only in symbiotic relationships (Tidd, 1995). To the extent customers want integrated solutions, many service companies may increasingly emulate industrial practices by building more extensive supply-chain relationships. Subsystems such as Type E may possibly be in ascendancy even though they are more difficult to capture in classic typologies of system design.

These contrasting approaches to performance may provide opportunities for service enterprises in each nation to learn from one another. Some USA service enterprises might modify the somewhat monolithic best-practice paradigm by emphasizing selected practices from system configurations. For example, they might more fully implement practices associated with the organic-technical configuration to achieve higher levels of innovation. A similar adaptation of the then best practice Fordist paradigm was required when Toyota adapted this to local requirements and changing product markets (Tidd & Fujimoto, 1985).

Alternatively, UK service enterprises might need to place more emphasis on integrated strategies that focus on time and cost as well as innovation to compete in global markets. One possibility that this may be occurring is the fact that unlike OPTS constructs, the score for a strategy of rapid product redevelopment is almost as high in the UK as the USA data (Hull & Tidd, 2002) and may be a harbinger of subsequent structural changes. In any case, local configurations can continue to provide niche advantages in local markets for a long time, as Souitaris (2001) has demonstrated in the case of innovation strategies in Greece. In the case of services in the UK, many services are not internationally traded or subject to international competition (Krugman, 1997; Turner, 2001), which may make the configurations sustainable for some time to come. Nevertheless, in the longer term, this Balkanized approach to the adoption of best practices in services may prove sub-optimal to the extent markets for services in UK markets become more global.

The contrast in practices in the two nations appears to largely pivot around a conceptual change that occurred quite recently in the USA. Many New York area enterprises have redefined their service as a product. Enterprises having formal dedicated product development function are far more likely to comprehensively deploy OPTS practices. Indeed, controlling for this one variable reduces differences in the level of the best practice index between the two nations to insignificance (Hull & Tidd, 2002). So some of the contrast between the two nations is due to the strategic choice of how to view their enterprise.

1.6 Summary and Conclusion

The best practice model of new product development as defined by the OPTS framework has applicability in the service sector in both nations. However, USA firms conform more to the model than those in the UK. The four system configurations identified and described above seem to fit the UK data better than the more comprehensive OPTS framework. The four configurations feature different combinations of components of the OPTS model, and appear to confer performance advantages for different environmental niches.

Limitations of the study include heterogeneity in the sample, which is partly due to the diversity of the service sector. Although the nature of the service rendered was not found to affect results much in the USA data (Hull, 1999), this remains a possibility because parallel measures were not collected in the UK. Also, no small service organizations were represented in the two samples, so the effects of scale were not captured. Finally, a single respondent in both nations provided the data.

A particular gap in the applying the best practice paradigm derived from industry to services is its weaker capability of explaining service delivery performance. Variance explained in service delivery was less than half that for product innovation & quality. One reason is because much of the value customers perceive in service product may be closely tied to delivery processes, especially to the extent interpersonal exchanges are involved (Gronroos, 1990; Lovelock, 1996; Reichheld & Sasser, 1990; Storey & Easingwood, 1999; Zeithaml *et al.*, 1990). More robust models of product development are needed in both nations that include design for service delivery. To be more predictive of overall service performance, future research needs to be more inclusive of delivery process.

Appendix 1.A Types of companies in samples.

Category	**UK**	*US*
Financial Services	**13**	*18*
Retail banking	**1**	*5*
Credit Card	**–**	*3*
Lending	**2**	*2*
Private Banking	**–**	*1*
Investment Services	**10**	*7*
Insurance	**2**	*8*
Consulting Services	**5**	*4*
Construction	–	*1*
Distribution/logistics (*)	**2**	*6*
Education/training	**0**	*1*
Healthcare	**4**	*8*
Diagnostic services	**2**	*4*
Hospital	**1**	*1*
Pharmaceutical services	**1**	*2*
Manufacturing related services (**)	–	*4*
Non-profit	**1**	*3*
Publishing	**1**	*2*
Retail	**2**	*3*
Travel/Hotel	**3**	*2*
Telecommunications	**2**	*5*
Transportation	**3**	*5*
TOTAL	**38**	*70*

*Utilities, Engineering Services, Distribution of Product, etc.
**Credit, Risk, etc.

Appendix 1.B Measures.

	# Factor	α UK	*α USA*
Performance Improvement		**.77**	*.94*
Product innovation & quality	**1**	**.88**	*.85*
a. New features			
b. Upgraded features			
c. Higher quality			
Time compression	**3**	**.59**	*.95*
a. Shorter time from concept to test market of service product			
b. Shorter time from test market to full-scale delivery of the service product			
Cost reduction	**4**	**.74**	*.87*
a. Reduced cost of service product development			
b. Reduced cost of service product delivery			
Service delivery improvement	**2**	**.75**	*.91*
a. Shorter response time to order for existing service products			
b. Shorter time for adjustments to complaints			
c. Better after sales support services			
d. Higher quality of delivery process, e.g. fewer customer complaints			
e. Conformance with service product development process and procedures			
Configuration A: Project-based batches		**.74**	*.95*
Organization: Project-based management	**O2**	**.62**	*.85*
a. Strengthening the role of project managers			
b. Reorganization of jobs to reduce hand-offs			
c. Increasing the influence of downstream functions in upstream decisions, e.g. customer service input in product development			
Process: Customer focus	**P2**	**.74**	*.78*
a. Using structured processes for identifying customer needs and translating into requirements (QFD)			
b. Institutionalizing systematic reviews for development projects			
c. Mapping processes to reduce non-value activities			
d. Institutionalizing continuous improvement processes			

Appendix 1.B Measures (*Continued*).

	# Factor	α UK	*α USA*
System: Holistic voice of customer	**S1**	**.79**	*.70*
a. Align competing product requirements by focusing on "Voice of the Customer."			
b. Cultivate staff to provide holistic, system-wide thinking as well as specialized knowledge			
c. Involve customers early in the service product development process, pulling the product design in the direction of customer needs			
Configuration B: Mechanistic customization		**.81**	*.88*
Organization: Customer involvement	**O5**	**.69**	*.79*
a. Involvement of customers in decisions about service product development			
b. Involvement of customers in decisions about delivery processes			
Process: Standardization	**P3**	**.62**	*.64*
a. Setting performance criteria for projects			
b. Setting standards for the performance of products			
Tools: External linkages:	**T3**	**.59**	*.71*
a. Electronic data interchange with customers			
b. Electronic data interchange with suppliers			
Configuration C: Cellular hybrid		**.62**	*.83*
Organization: Cellular grouping	**O3**	**.70**	*.69*
a. Cross-training specialists			
b. Rewarding project teams/groups			
Tools: Shared technology	**T1**	**.71**	*.80*
a. Building on-line databases with lessons learned and best practice templates			
b. Distributed databases on-line to multiple functions			
c. Common software for project management			
d. Common software for process mapping			

Appendix 1.B Measures (*Continued*).

	# Factor	α UK	*α USA*
System: Knowledge integration	**S2**	**.75**	*.64*
a. View knowledge as a paramount competitive advantage to be gained from outside as well as inside the company			
b. Transfer lessons learned from previous activities to succeeding people so that they build upon an existing base to reach ever higher future targets			
c. Focus on achieving a balanced portfolio of competitive advantages for which customers are willing to pay, e.g. cost with novelty			
Configuration D: Organic technical-batch		**.78**	*.89*
Organization: Cross-functional collocation	**O4**	**.69**	*.79*
a. Cross-functional teaming			
b. Collocation			
c. Flatter hierarchy in the organization chart			
T2. Internal technology	**T2**	**.74**	*.65*
a. Expert Systems			
b. Management Information Systems			
c. E-mail			
S3. Reciprocal integration	**S3**	**.67**	*.67*
a. Involve all functions throughout the development and delivery process with few hand-offs so that every works together reciprocally — sharing responsibility for the service product			
b. Act as a good partner with others, such as suppliers, external service providers, alliance partners and customers, in creating and maintaining mutual win/win scenarios			
c. Open communication channels to all functions and ranks in the organization			
E. Subsystem: Partnership process		**.78**	*.89*
Organization: Partner involvement	**O1**	**.86**	*.84*
a. Involvement of external partners/ suppliers in decisions about service product development			
b. Involvement of external partners/suppliers in decisions about changes in service delivery processes			

Appendix 1.B Measures (*Continued*).

	# Factor	**α UK**	*α USA*
Process: Documentation	**P1**	**.73**	*.70*
a. Benchmarking best-in-class companies			
b. Improving documentation of processes			
c. Measuring conformance with processes			