2013

The Culture-Effectiveness Link in a Manufacturing Context: A Resource-Based View Perspective

Janine Sanders
University of St. Thomas, Minnesota, sand8871@stthomas.edu

Journal of World Business xxx (2013) xxx–xxx

Contents lists available at SciVerse ScienceDirect

Journal of World Business

journal homepage: www.elsevier.com/locate/jwb

The culture-effectiveness link in a manufacturing context: A resource-based perspective

Michael Naor [a,e,1], Janine Sanders Jones [b,2], Ednilson S. Bernardes [c,*], Susan Meyer Goldstein [d,3], Roger Schroeder [d,3]

[a] Wake Forest University, Winston-Salem, NC 27109, United States
[b] University of St. Thomas, Saint Paul, MN, United States
[c] West Virginia University, Morgantown, WV, 26506, United States
[d] University of Minnesota, Minneapolis, MN 55455, United States
[e] Azrieli College of Engineering Jerusalem, Jerusalem, 9103501, Israel

ARTICLE INFO

Keywords:
Resource-based view
Organizational culture
Effectiveness
East–West

ABSTRACT

The literature and the press tout organizational culture as a major source of competitive advantage and a key approach through which organizations can achieve superior effectiveness. However, research on this link within and across global regions remains inconclusive. Grounding the study on the resource-based view of the firm, analysis of 238 plants from eight countries shows that, while individual culture types predict manufacturing effectiveness, the combined effects of multiple culture types have a greater effect. Different culture types emerge as significant in East and West regions depending on the effectiveness dimension prioritized by the plant.

1. Introduction

The competitive strength of many organizations links anecdotally to their strong internal cultures. For instance, 3 M (Minnesota Mining and Manufacturing Company) built its competitive advantage around a culture of innovation with supporting programs such as the '15% rule'. This program allows employees to devote 15% of their work hours to personal projects that might benefit the organization in the future (Gundling, 2000). Kotter and Heskett (1992) find that firms perceived to have strong cultures (Sørensen, 2002) generally have greater return on investment and net income. As such, Schonberger (2007) conceive culture as a major approach through which organizations can achieve the customer-oriented 'golden goals' of better quality, quicker response, greater flexibility, and higher value. In addition, organizational culture can be a source of competitive advantage (Power, Schoenherr, & Samson, 2010; Yilmaz & Ergun, 2008). The literature indicates that the culture-effectiveness linkage remains inconclusive (Lewin & Minton, 1986; Alvesson, 2002; Martin, 2002; Wilderom, Glunk, & Maslowski, 2000) and so efforts to delineate the performance implications of organizational culture continue (Yilmaz & Ergun, 2008).

In a comprehensive literature review, Wilderom et al. (2000) calls for the adoption of additional recognized theoretical basis to advance further our understanding about the culture-effectiveness link. Others have studied the culture-effectiveness relationship in operations settings using various cultural frameworks, theories, and methodologies (Naor, Goldstein, Linderman & Schroeder 2008; Naor, Linderman & Schroeder, 2010; Kull & Wacker, 2010). We extend this literature using a different theoretical lens, methodological approach and level of analysis. In this study, we investigate the link between culture and effectiveness focusing on operational effectiveness at the plant level (cost, quality, delivery and flexibility), whereas most previous studies use financial measures such as sales, stock price, profit, and return on investment (Kotter & Heskett, 1992; Marcoulides & Heck, 1993; Wilderom et al., 2000). In this way, we follow Wilderom et al.'s (2000, p. 204) suggestion that new studies focus also on more complex multidimensional effectiveness concepts, including perceptual indicators.

We adopt a measurement instrument tailored for the manufacturing context and use multiple respondents at different organizational levels to assess organizational culture. Focusing on the operational context of manufacturing plants provides insight that reflects the effectiveness of business processes (Ray, Barney, & Muhanna, 2004), in contrast to financial measures, which may be influenced by economic and market conditions. Building on the resource-based view (RBV) premises (Barney, 1991; Perry-Smith & Blum, 2000; Flynn & Flynn, 2004; Newbert, 2007; Peng, Schroeder,

* Corresponding author. Tel.: +1 304 293 3011.
E-mail addresses: naorm@wfu.edu (M. Naor), sand8871@stthomas.edu (J.S. Jones), esbernardes@mail.wvu.edu (E.S. Bernardes), meyer033@umn.edu (S.M. Goldstein), rschroed@umn.edu (R. Schroeder).
[1] Tel: +1 336 758 5103.
[2] Tel: +1 651 962 4158.
[3] Tel: +1 612 626 0271/626 9544.

1090-9516/$ – see front matter © 2013 Elsevier Inc. All rights reserved.
http://dx.doi.org/10.1016/j.jwb.2013.06.003

& Shah, 2008), we argue that individual cultural types, as derived from the competing values framework (CVF), are valuable capabilities that link directly to individual aspects of organizational effectiveness (Yilmaz & Ergun, 2008). We further argue that the combination of these cultural types can constitute bundles that are difficult to imitate and, therefore, link more strongly to organizational effectiveness. This relates to the notion that organizations owning a bundle of resources will outperform organizations relying on a single resource (Barney, 1997; Flynn & Flynn, 2004; Newbert, 2007; Peng et al., 2008).

We empirically assess the relation between four cultural types and the four primary competitive priorities used by manufacturing organizations to achieve organizational effectiveness. Past research has focused mostly on financial outcomes (Siehl & Martin, 1990; Sørensen, 2002). By adopting setting-specific (manufacturing plant) effectiveness criteria, we enable a more fine-grained examination of their link with organizational culture. The use of widely recognized effectiveness criteria renders the findings more amenable to theoretical integration and accumulation in the literature. In addition, we adopt the cultural types defined in the competing value framework. In contrast to other cultural frameworks, the CVF advances the notion that an organization can have multiple types of cultures that simultaneously influence its effectiveness (Howard, 1998; Linnenluecke & Griffiths, 2010). Unlike Naor et al. (2008), our premise is that it is necessary to unbundle both the cultural framework and effectiveness criteria in order to study these direct relationships. Examining the link between the individual culture types and each of the four effectiveness criteria relevant for manufacturing organizations enables this study to contribute a more nuanced perspective.

Finally, differences in cultural beliefs between East and West global regions can lead to differences in both management practices and their impact on organizational effectiveness (Earley, 1993; Fey & Denison, 2003; Kull & Wacker, 2010). As such, we assess whether the patterns of relationships between cultural types and effectiveness are consistent across East and West. Thus, we extend knowledge about organizational culture's relationship with firm effectiveness by considering the broader environmental context in which the organization operates, i.e., industry and location.

2. Theoretical background

2.1. The resource-based view of the firm

The emergence of the resource based view as an organizational theory indicates that organizational resources are important, redirecting managerial attention inside the organization. Two key assumptions of RBV are that the resource bundles and capabilities underlying production are heterogeneous across firms and that these differences may be long lasting and imperfectly mobile (Penrose, 1958; Wernerfelt, 1989; Barney, 1991). The heterogeneity and imperfect transferability of most intangible resources precludes the use of market prices in assigning them value (Grant, 1991). In the RBV parlance, resources are inputs into the production process, while a capability is the capacity for a bundle of resources to perform some task or activity (Grant, 1991).

Capabilities involve, for instance, complex patterns of coordination between people (Grant, 1991). A key ingredient in the relationship between resources and capabilities is the ability of an organization to achieve cooperation and coordination within teams, encouraged by the intangible resources of the organization's style, values, and traditions (Grant, 1991; Barney, 1997). Barney (1986) postulates that firms with superior financial performance typically possess strong core managerial values. Other scholars empirically demonstrate that cultural organizational characteristics can be a valuable source of advantage for the firm (Power et al., 2010).

2.2. Organizational culture

Schein (1992,p. 12) defines culture as "a pattern of basic assumptions that the group learned as it solved its problems of external adaptation and internal integration, that has worked well enough to be considered valid and that, therefore, is taught to new members as the correct way to perceive, think, and feel in relation to those problems." The nature of organizational culture manifests in two streams of research: culture as a variable or a metaphor (Smircich, 1983). The former sees culture as a phenomenon that stems from social interaction among organizational members, and that interacts with other organizational variables such as structure and technology (Baligh, 1994; Bates, Amundson, Schroeder, & Morris, 1995; Cameron & Quinn, 2005; Detert, Schroeder, & Mauriel, 2000; Hofstede, 1994; Marcoulides & Heck, 1993). In the latter view, culture is not something an organization 'has,' but something an organization 'is' (Smircich, 1983).

Several tools and frameworks exist to assess culture (Detert et al., 2000). In the current study, we use an instrument for measuring organizational culture similar to the competing values framework (Cameron & Quinn, 2005; Denison & Spreitzer, 1991; Quinn & Rohrbaugh, 1983). As argued by Linnenluecke and Griffiths (2010), while no single culture framework is exhaustive and captures every relevant aspect, the CVF has empirical backing and captures most of the proposed dimensions of organizational culture. Thus, following the CVF, we define four culture types during our hypotheses development.

2.3. Organizational effectiveness

Organizational effectiveness is a composite construct (Hirsch & Levin, 1999; Porter, 1990). The predominant approach to measuring effectiveness in a manufacturing arena is through outcomes related to cost, quality, delivery, and flexibility (Ward, McCreery, Ritzman, & Sharma, 1998). Following the literature (Schroeder, Bates, & Juntilla, 2002; Ward et al., 1998), we look at performance outcomes used in past empirical studies that reflect those dimensions in a manufacturing context.

3. Research hypotheses

In this study, we view the organizational culture types from the CVF framework as tacit capabilities. Each culture type contains distinct traits that develop over a long period, is socially complex and causally ambiguous, and should lead to superior organizational effectiveness (Denison & Mishra, 1995; Priem & Butler, 2001; Power et al., 2010). Shared organizational values, beliefs, and norms develop over time and become deeply rooted within idiosyncratic social structures; therefore, embedded in organizational processes (Grant, 1991; Barney, 1997; Power et al., 2010). Due to its socially complex, causally ambiguous and path dependent nature, organizational culture infused across processes does not transfer easily to other firms. Therefore, the embeddedness of culture types in a firm's processes and routines provides a potential source of competitive advantage.

3.1. Developmental culture

The characteristics of the developmental culture type focus on the pursuit of innovation and development (Cameron & Quinn, 2005). There is an emphasis on being first to develop new processes or introduce new products to the market. In a

Please cite this article in press as: Naor, M., et al. The culture-effectiveness link in a manufacturing context: A resource-based perspective. *Journal of World Business* (2013), http://dx.doi.org/10.1016/j.jwb.2013.06.003

manufacturing context, those traits promote efforts to stay on the industry's leading edge by constantly pursuing new ideas and ways to perform.

The focus on innovation and the consequent development of routines aimed at scanning the environment for new technological developments, and their adoption and implementation, can become a capability (Peng et al., 2008; Wu et al., 2010Wu, Melnyk & Flynn, 2010) that leverages the ability of the firm to build products fast and at lower costs. This culture type stimulates employees to utilize creativity to develop new processes based on new technologies that might prove more cost effective. Developmental culture should be associated with lower production costs, because of the gains in output per employee-hour led by innovation. The cost of material per unit of output may also decline, as innovation leads to better use of raw materials and energy.

The traits associated to developmental culture, which enables creativity and the search for innovations to improve processes and products, should improve the degree of conformance to specifications, quality conformance, since products often incorporate better materials and sophisticated processes. The capability to identify and implement new technological developments should result in less rework, defects, and scrap, all of which reflect quality conformance (Naveh & Erez, 2004). In addition, traits associated with developmental culture should also decrease time to market and delivery, because they focus on being first to the market. Ultimately, those traits result in shorter production times due to the capability to identify and implement leading edge innovations.

Peng et al. (2008) indicates that the essence of innovation is the pursuit of knowledge to discover new approaches to technologies, processes, or products. A developmental culture promotes the advance of job skills and processes that support complex learning and the ability to change frequently. Such skills and processes, nested in organizational routines that support the ability to recognize and implement innovations (Barney, 1997; Winter, 2000), are useful also for the performance of non-routine and unstructured tasks. Creative new ideas aimed at improving the manufacturing process and innovative practices aimed at satisfying customer needs enable product customization and, as such, flexibility. Thus:

H1a. *Developmental culture relates positively to cost.*

H1b. *Developmental culture relates positively to quality.*

H1c. *Developmental culture relates positively to delivery.*

H1d. *Developmental culture relates positively to flexibility.*

3.2. Rational culture

The rational culture type emphasizes goal accomplishment by communicating objectives and strategies to employees (Cameron & Quinn, 2005). In manufacturing, this means the plant formally has and frequently revises strategic plans and written mission to ensure implementation. In addition, the incentive system and processes encourage employees to pursue plant goals. The focus on achieving productivity, outcome excellence and goal fulfillment, and the consequent development of routines to produce and support well-defined goals, can become a capability (Peng et al., 2008) that leverages the ability of the firm to build products flexibly, fast, at lower costs, and with quality.

Past studies on quality indicate that challenging, but attainable goals motivate employees and instill an environment of teamwork and commitment to higher performance. For example, Linderman, Schoeder, Zaheer, and Shoo (2003) use a goal-theory perspective to explain the large cost savings achieved from Six Sigma projects. The capability to plan, set goals, and design proper incentives that characterize a rational culture type, should lead to greater efficiency. One of the tenets of quality management is the ambitious quest for excellence embodied in the notion of continuous improvement: no matter how satisfactory the outcomes of a process, there is always room for making them better. Importantly, one of the elements that define the rational culture is outcome excellence, which is congruent with the general goals of quality management. Thus, the capability to set ambitious goals and to design proper incentives for the achievement of excellence, which characterize a rational culture, should lead to greater quality.

The characteristics of rational culture can embed routines and processes to support the pursuit of manufacturing objectives. Setting clear and specific objectives, such as milestones during the manufacturing process, make it easier to track progress in order to match a predetermined schedule. These milestones divide a project into stages and enable management to build contingency plans that accommodate delays in design, development, or production. As such, rational culture should contribute towards better cost and delivery.

In addition, a facilitating factor for flexibility is the knowledge about what and when to change; this can produce anxiety on those involved with the production process and disruptions due to uncertainty and equivocality at the personal level. The underlying characteristics of rational culture can have a positive effect on flexibility because, when manufacturing activities include dealing with variations in product mix and production volume, employees may be frustrated and unmotivated in the absence of specific goals, i.e., not knowing what to do next. Setting clear objectives gives direction and a sense of purposefulness to employees (Zu, Robbins, & Fredendall, 2010). The capability to plan and set goals that characterize a rational culture type should also support greater flexibility. Hence:

H2a. *Rational culture type relates positively to cost.*

H2b. *Rational culture type relates positively to quality.*

H2c. *Rational culture type relates positively to delivery.*

H2d. *Rational culture type relates positively to flexibility.*

3.3. Hierarchy culture

The hierarchy culture type reflects many levels of management and supervision and focuses on stability and internal integration. It promotes processes and routines that emphasize centralization, regulation and close control (Cameron & Quinn, 2005). The focus on stability and internal integration, and the consequent development of routines aimed at creating rules and processes for control, can become a capability (Peng et al., 2008) that may be beneficial to a firm in times of crises or uncertainty. In a manufacturing context, the relationship between shop-floor employees and management has formal structure, so that decisions require supervisor approval—sometimes even small matters may go to a higher level of management. Alternatively, low levels of hierarchy are associated with less unnecessary administrative procedures, transactions, and other non-value-added activities that compose indirect accounting costs. In addition, low hierarchy decreases the amount of labor employed in supervisory and evaluative tasks, thus reducing direct accounting manufacturing costs as well.

Empowerment gives workers autonomy, responsibility, means and knowledge to improve processes or fix quality issues as they emerge, without management approval (Zu et al., 2010). For

Please cite this article in press as: Naor, M., et al. The culture-effectiveness link in a manufacturing context: A resource-based perspective. *Journal of World Business* (2013), http://dx.doi.org/10.1016/j.jwb.2013.06.003

organizations pursuing quality, low hierarchy builds psychological safety for learning and knowledge creation (Choo, Linderman, & Schroeder, 2007).

Similarly, fast delivery requires agile processes, which allow for quick decision-making and open communication. Low hierarchy speeds communication by diminishing bureaucracy and formality. It empowers shop floor employees to make decisions to fix problems without delaying delivery, because there is less need to seek authorization from management. The characteristics of hierarchical culture however runs counter those notions. In addition, Kathuria and Patrovi, 1999 identify delegation as effective in managing work when the emphasis is on high flexibility. Flexibility requires that managers entrust employees with decision-making and open communication to deal with changes in product and volume mix. Excessive bureaucracy and monitoring are counter-productive when employees need to accommodate frequent changes. However, once again, the characteristics of a hierarchical culture run counter these notions. Thus:

H3a. *Hierarchy culture type relates negatively to cost.*

H3b. *Hierarchy culture type relates negatively to quality.*

H3c. *Hierarchy culture type relates negatively to delivery.*

H3d. *Hierarchy culture type relates negatively to flexibility.*

3.4. Group culture

The characteristics of group culture emphasize human relations and tend to focus on collectivism through teamwork and positive working relationships (Cameron & Quinn, 2005). Processes and routines embed mechanisms for exchanging opinions and sharing ideas, and promote the development of pride in and commitment to organizational affiliation. This focus on belongingness, trust and participation, and the underlying processes and routines aimed at the human relations and employee commitment become a capability (Peng et al., 2008; Wu et al., 2010) that leverages the ability of the firm to achieve effectiveness.

Group culture, via open and participatory processes, improves the dissemination of information across an organization, allowing employees to avoid costly errors due to misunderstandings. In addition, information sharing also diminishes costs related to performing redundant tasks and reduces overlapping activities. The teamwork and empowerment facilitate processes capable of producing outputs more efficiently. Better coordination among employees and teamwork decreases rework and waste, reduces cost, and improves quality (Naveh & Erez, 2004). The characteristics of group culture promote a common language among employees, reduce functional barriers and stimulate cooperation. It leads to faster decision-making, because it facilitates communication of requirements and constraints. Faster decision-making is critical for better delivery time and flexibility, because it enables quick collective action. For instance, Kathuria and Patrovi, 1999 find that, as the emphasis on flexibility increases, manufacturing managers obtain better results when promote participation and team behavior.

H4a. *Group culture type relates positively to cost.*

H4b. *Group culture type relates positively to quality.*

H4c. *Group culture type relates positively to delivery.*

H4d. *Group culture type relates positively to flexibility.*

3.5. Combining culture types

Although we theorized the link between culture types and effectives individually, in practice organizations may exhibit a combination of the four cultural types (McDermott & Stock, 1999). Accordingly, the CVF framework posits that competing culture types co-exist. For instance, Quinn and Spreitzer (1991) assert that measuring the culture types using Likert scales allows more realistic relationships to hold among the culture quadrants; that is, the culture quadrants may all be rated high, low, or any combination thereof. Similarly, Quinn and Rohrbaugh (1983) argue that certain pairs of culture types are mapped as opposites, and therefore paradoxical in nature, but this does not imply that they are empirical opposites. Furthermore, Quinn and Rohrbaugh (1983) postulate that the four CVF cultural types are simultaneously complementary and opposites, because they are embedded in contradictory or competing values. Nevertheless, each culture type is useful for explaining organizational behavior. This suggests that, in practice, an effective organization may need to perform well on multiple types. Quinn and Rohrbaugh (1983) conclude that organizations are plagued by contradictory functional requirements that are associated with mutually antagonistic arrangements. This is consistent with Buenger, Daft, Colon, and Austin (1996) conclusion that an organization can display competing culture types simultaneously. The embedding of characteristics of multiple culture types on the organizational processes and routines over time forms a complex resource bundle.

Based on the foregoing discussion, characteristics from different culture types can cater to different organizational challenges. Importantly, imitating comparative advantage built through the complex combination of multiple culture type is likely difficult. Such would require a competitor to emulate a firm's *whole* culture set. Consequently, multi-type organizational cultures should become rarer and imperfectly imitable, resulting in comparative advantage according to the RBV. Thus, we test the explanatory power of the combined effects:

H5. The combined effect of multiple culture types predicts effectiveness better than individual culture types.

3.6. Impact of regional location: East and West

Hofstede (1980) empirically shows a significant difference in regionally (East vs. West) based values (Smith, 2006). Hofstede (1980) studied 50 countries and found that East countries focus more on group cohesiveness, achievement, and inequality of power, whereas West countries displays more individualism and acceptance to uncertainty. House, Hanges, Javidan, Dorfman and Gupta (2004) found in the GLOBE study similar results indicating that the East region is more prone to control, risk-aversion, and hierarchy than the West region. These differences in cultural beliefs can lead to regional differences in practices and their impact on organizational effectiveness (Hirst et al., 2008; Earley, 1993; Kull & Wacker, 2010).

Building on Gelfand, Erez, and Aycan (2007) and on Kull and Wacker (2010), regional location acts as a control variable influencing the relationship between organizational culture and organizational effectiveness. Naor et al. (2010) further supports this view by observing that national culture does not have a direct impact on performance. Given the inherent cultural differences between the East and West regions, a different set of cultural values may be necessary in one region to achieve better performance than in the other region. Thus, we propose:

H6. Regional location influences the relationship between organizational culture and organizational effectiveness in manufacturing firms.

Please cite this article in press as: Naor, M., et al. The culture-effectiveness link in a manufacturing context: A resource-based perspective. *Journal of World Business* (2013), http://dx.doi.org/10.1016/j.jwb.2013.06.003

4. Methods

4.1. Sample

The data used in this study were obtained in 2004 to 2008 from manufacturing plants in round 3 of the High Performance Manufacturing (HPM) Project (Huang, Rode, & Schroeder, 2011; Schroeder & Flynn, 2001). The sample includes randomly selected manufacturing plants from eight countries (Italy, Austria, Finland, Germany, Japan, South Korea, Sweden and United States) in three industries (electronics, machinery, and transportation). These industries represent important sectors of industrialized production across the world. Sixty-five percent of the plants contacted agreed to participate in the study. This high response rate was obtained by personally contacting plant managers by telephone and by giving the participating plants a feedback profile report.

The respondent set includes 238 plants. Data from each country is composed of 21 to 41 plants with at least 250 employees that are divided among the three industries. Table 1 shows additional details of the sample. Data collection was conducted in each plant through a coordinator who distributed 13 different printed questionnaires to 21 informants at different levels in the plant, ranging from the plant's top management to shop-floor employees. The measurement instruments used in the survey were pilot tested using structured interviews with manufacturing plant employees. Questionnaires were translated into the native language of each country and back translated for validation.

A limitation of some past studies is that they include as respondents only managers or executives who may not represent the overall organizational culture (Wilderom et al., 2000). Because organizational culture encompasses attributes of the entire organization, it is crucial that researchers seek out organizational members who represent the various hierarchical levels of the organization (Wilderom et al., 2000). We address this need in our study by obtaining culture-related data from respondents in a variety of levels (supervisors, superintendent, engineers, human resource manager, and shop floor employees).

4.2. Measures

4.2.1. Organizational culture

The original instrument of the CVF (Quinn & Spreitzer, 1991) consisted of three items per culture type. In the current study, the original instrument was further expanded upon based on Roth, Schroeder, Huang, and Kristal (2007) and Naor et al. (2008) with additional items specifically related to the manufacturing arena (see Appendix A). The four organizational culture types (group, hierarchy, developmental, and rational) are assessed in each plant using a six-item scale for each type (Appendix A). Supervisors, superintendent, engineers, human resource manager, and shop floor employees in each plant responded to the culture scale items. The multiple responses are aggregated to the plant-level using the average response per item. The ratio method (James, Dameree, & Wolf, 1994) is utilized to test inter-rater agreement. The inter-rater agreement coefficients R_{wg} for the culture scales are: group (.86), hierarchy (.77), developmental (.88), and rational (.88). These R_{wg} values are all above 0.70, providing evidence of acceptable agreement among the respondents within each plant. Each organizational culture scale is evaluated for measurement reliability utilizing the method of composite reliability (Hair, Black, Babin, & Anderson, 2009), because it accounts for the factor loadings, thus not using an equal weight for each item (Netemeyer, Bearden, & Sharma, 2003). The composite reliability values for the culture scales are: developmental (.66), group (.81), rational (.77), and hierarchy (.86). Newly constructed scales are considered to be internally consistent if the reliability value exceeds 0.60 (Flynn, Sakakibara, Schroeder, & Flynn, 1990). In addition, scale unidimensionality is supported by assessment against criteria that the first component of each scale explains more than 40% of the variance in the items, and all item loadings are greater than .40.

4.2.2. Manufacturing plant's effectiveness

Plant effectiveness is typically assessed using four traditional measures (cost, quality, delivery, and flexibility) that together represent performance and competitive advantage in a manufacturing setting (Ward et al., 1998). We utilize a set of measurement items to assess each plant's manufacturing effectiveness in terms of cost, quality, delivery, and flexibility (Appendix B). The plant manager responded to these survey items. Each scale is evaluated for reliability, with composite reliability values of: cost (.73), quality (.61), delivery (.76), and flexibility (.75). We obtain responses for the dependent and independent variables from different people in each plant to avoid common respondent bias. To further test for common method variance, we conducted the Harman's single-factor test (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). First, with all items pooled together, factor analysis yielded eight factors. Second, each culture type was paired with each of the effectiveness priorities. No single factor emerged in the factor analysis results and neither factor accounted for the majority of the covariance among the pairs. Finally, a model positing that a single factor underlies the study variables was assessed using confirmatory factor analysis in which all dependent and independent items were loaded on one factor. The results of the single factor yielded a significant difference ($\Delta\chi^2 = 1107.5$ for 405 degrees of freedom) compared to a model in which items loaded on the factors they were intended to measure. Thus, there is no significant evidence of common method variance.

4.2.3. Control variables

The control variables are plant size and industry (electronics, machinery, and transportation). We use a log transformation to correct the distributional properties of plant size (number of employees).

4.3. Discriminant validity

The correlation matrix for the constructs is shown in Table 2. We test the fit of the overall measurement model (Shah & Goldstein, 2006), with all possible paths estimated as bi-directional correlations (Maruyama, 1997) between the constructs measuring the four culture types and four effectiveness dimensions. We performed confirmatory factor analysis by the maximum likelihood method to validate the underlying factor structure of the constructs. Our analysis yielded acceptable fit measures of RMSEA = .072, $\chi^2 = 836.7$, df = 377, $\chi^2/df = 2.2$, NFI = .97, RFI = .96, CFI = .98, IFI = .98, and TLI = .98 (Hair et al., 2009;

Table 1
Distribution by country and industry of 238 study plants.

Industry	Germany	United States	Japan	Finland	South Korea	Sweden	Italy	Austria
Electronics	9	9	10	14	10	7	10	10
Transportation	19	9	13	10	11	7	7	4
Machinery	13	11	12	6	10	10	10	7

Please cite this article in press as: Naor, M., et al. The culture-effectiveness link in a manufacturing context: A resource-based perspective. *Journal of World Business* (2013), http://dx.doi.org/10.1016/j.jwb.2013.06.003

Table 2
Descriptive statistics and Pearson correlation coefficients.

Variables	Mean	SD	1	2	3	4	5	6	7	8
1. Hierarchy	3.35	.85	1.0							
2. Group	5.30	.58	−.33**	1.0						
3. Rational	5.29	.65	−.23**	.54**	1.0					
4. Development	4.88	.74	.03	.12	.29**	1.0				
5. Cost	3.35	.68	.02	.13	.24**	.27**	1.0			
6. Quality	3.85	.57	−.08	.24**	.26**	.19**	.41**	1.0		
7. Delivery	3.81	.77	−.11	.24**	.32**	.11**	.39**	.44**	1.0	
8. Flexibility	3.89	.67	−.16*	.27**	.25**	.24**	.36**	.37**	.47**	1.0

$N = 238$.
* $P < 0.05$.
** $P < 0.01$.

Joreskog, 1970). We established discriminant validity using a chi-square difference test. Models are constructed for each pair of latent constructs, first allowing unconstrained correlation between the two constructs and then fixing their correlation at 1.0. A significant difference in chi-square values for the free and fixed solutions indicates distinctiveness of the two constructs (Bagozzi, Yi, & Phillips, 1991; Bagozzi & Phillips, 1982). Each chi-square difference between the free and fixed solutions was significant ($p < .001$), providing strong evidence of discriminant validity among the theoretical constructs.

5. Results

We analyzed the data using the regression method. We assessed the assumptions of the regression model by several statistical tests, including normal probability plots and tests for normality. We did not find evidence for violation of any of the assumptions. To juxtapose cultural effects in East and West regions, we split the data into two groups of countries: (Japan and South Korea) and (Italy, Austria, Finland, Germany, Sweden and United States). This procedure allowed us to identify how the most effective set of culture types differs between East and West regions. An alternative method is conducting the analysis on the entire sample by using the countries as dummy control variables; however, this was not feasible due to lack of degrees of freedom. Tables 3 and 4 show results for the two regions. We entered the control variables (size and industry) in the first step. Next, we entered each culture type into the regression equation as an independent variable. In the final model (far right column in each quadrant in Tables 3 and 4), the four culture types are simultaneously included as independent variables.

5.1. Regression of East region

East region countries include Japan and South Korea. The control variables of size and industry are not significant in most of the models, except for delivery. Next, we observe the individual main effects of each culture type in the East region (Table 3). The analysis considers the significance of the beta coefficients and significance of the *F-value*. The developmental cultural type has a significant individual positive effect on flexibility, thus supporting hypothesis H1d. Rational culture has a significant individual

Table 3
Regression of East region.

	Dependent variable cost						Dependent variable quality					
Size	.04	−.00	−.01	.05	−.02	−.05	.09	−.05	.03	.08	.02	−.02
Electronics	−.12	−.15	−.09	−.12	−.13	−.11	−.10	−.12	−.05	−.11	−.10	−.10
Machinery	−.09	−.11	−.09	.08	−.09	−.08	.07	.06	.08	.04	.08	.04
Developmental		.27*				.18†		.27*				.18†
Rational			.30**			.17			.34**			.19†
Hierarchy				.04		.09				−.15		−.10
Group					.28*	.18					.34**	.19†
R^2	.02	.09	.11	.02	.09	.17	.03	.09	.13	.05	.14	.21
Adj R^2	−.03	.03	.05	−.05	.03	.07	−.02	.04	.08	−.02	.08	.11
ΔR^2		.07*	.09**	.00	.07*	.15*		.06*	.10**	.02	.11**	.18*
F	.37	1.50	1.81	.30	1.54	1.65	.52	1.59	2.36†	.73	2.41†	2.17†
	Dependent variable delivery						Dependent variable flexibility					
Size	−.12	−.14	−.17†	−.13	−.19†	−.21†	.02	−.04	−.05	.00	−.08	−.13
Electronics	−.22†	−.23†	−.18†	−.23†	−.22†	−.22†	−.10	−.14	−.06	−.13	−.11	−.14
Machinery	−.13	−.14	−.12	−.18	−.12	−.17	−.08	−.10	−.07	−.15	−.07	−.14
Developmental		.15				.07		.39**				.30**
Rational			.29**			.17			.38**			.14
Hierarchy				−.23*		−.17†				−.30**		−.24*
Group					.32**	.19†					.46**	.27*
R^2	.04	.06	.12	.09	.14	.19	.01	.16	.15	.10	.22	.37
Adj R^2	.00	.00	.06	.03	.09	.09	−.04	.10	.09	.04	.16	.29
ΔR^2		.02	.08*	.05†	.10*	.15*		.15**	.14**	.09*	.21**	.36**
F	.91	1.03	2.11†	1.53	2.50†	1.97†	.22	2.84*	2.63*	1.68	4.18**	4.78**

$N = 66$.
† $P < 0.1$.
* $P < 0.05$.
** $P < 0.01$.

Please cite this article in press as: Naor, M., et al. The culture-effectiveness link in a manufacturing context: A resource-based perspective. *Journal of World Business* (2013), http://dx.doi.org/10.1016/j.jwb.2013.06.003

Table 4
Regression of West region.

	Dependent variable cost						Dependent variable quality					
Size	.14*	.09	.09	.14*	.14*	.06	.03	−.01	−.03	.03	.02	−.05
Electronics	−.01	−.05	−.02	−.02	−.01	−.06	−.06	−.08	−.07	−.06	−.05	−.08
Machinery	.09	.08	.14†	.10	.10	.12	.07	.06	.13†	.08	.09	.11
Developmental		.23**				.19*		.15*				.10†
Rational			.21**			.18*			.26**			.18*
Hierarchy				−.09		−.03				−.08		.02
Group					.07	−.05					.20**	.10
R^2	.03	.08	.07	.04	.04	.10	.01	.04	.07	.02	.05	.09
Adj R^2	.01	.06	.05	.02	.01	.06	.00	.01	.05	.00	.03	.05
ΔR^2		.05**	.04**	.01	.01	.07*		.03†	.06**	.01	.04**	.08*
F	1.80	3.53**	3.10*	1.66	1.57	2.64*	.77	1.53	3.29*	.87	2.30†	2.27*
	Dependent variable delivery						Dependent variable flexibility					
Size	.04	.02	−.04	.03	.02	−.04	.04	−.01	−.01	.04	.02	−.03
Electronics	.03	.02	.01	.02	.04	.01	.04	.01	.03	.04	.04	.01
Machinery	.02	.03	.11	.05	.05	.11	−.02	−.03	.03	−.01	.00	.00
Developmental		.08				.00		.19**				.16*
Rational			.34**			.28**			.21**			.10
Hierarchy				−.20**		−.09				−.09		.00
Group					.22**	.04					.19**	.13†
R^2	.00	.01	.10	.04	.05	.11	.00	.04	.04	.01	.04	.07
Adj R^2	−.02	−.02	.08	.02	.03	.08	−.01	.02	.02	−.01	.02	.03
ΔR^2		.01	.10**	.04*	.05**	.11**		.04*	.04*	.01	.04*	.07*
F	.13	.33	4.81**	1.77	2.26†	2.99**	.25	1.66	1.85	.52	1.69	1.84†

$N = 172$.
† $P < 0.1$.
* $P < 0.05$.
** $P < 0.01$.

positive effect on quality, delivery, and flexibility, supporting hypotheses H2b, H2c, and H2d. The group culture type has a significant positive effect on quality, delivery, and flexibility. Thus, we find support to hypotheses H4b, H4c, and H4d. Fig. 1 summarizes the results, where we see support to 7 of 16 relationships (between the four culture types and the four priorities). Next, we look at the effects of simultaneously including the four cultural types in the regression equation to examine the RBV argument. We test for multicollinearity (Kutner, Nachtsheim, Neter, & Li, 2005) among the independent variables in the East region. The variance inflection factor (VIF) values for the four cultural types (developmental = 1.02, rational = 1.05, hierarchy = 1.04, and group = 1.05) are acceptable, well below the cut-off value of 10.0 (suggested by Kutner et al., 2005, p. 409).In the quality model, developmental, rational, and group culture have a significant positive effect. In the delivery model, group culture has a significant positive effect, and hierarchy culture has a significant negative effect. Finally, in the flexibility model, both developmental and group have a significant positive effect, and hierarchy culture has a significant negative effect. The bottom of Fig. 1 summarizes the results.

Finally, we test models including the six interaction terms between pairs of culture types (hierarchy × group, hierarchy × rational, hierarchy × developmental, group × rational, group × developmental, rational × developmental). Adding the interaction terms did not yield a significant improvement in the variance explained (ΔR^2) for any of the dependent variables, compared to the original (simultaneous) models, which include the four culture types, in any of the priorities. While our assessment of multicollinearity among the culture types raises

Summary of Hypotheses Testing

	Effectiveness Criteria							
	East				West			
Individual Culture effect	**Cost**	**Quality**	**Delivery**	**Flexibility**	**Cost**	**Quality**	**Delivery**	**Flexibility**
Dev	NS	NS	NS	S	S	NS	NS	NS
Rat	NS	S	S	S	S	S	S	NS
Hie	NS	NS	NS	NS	NS	NS	NS	NS
Grp	NS	S	S	S	NS	S	S	NS
Simultaneous effect of Culture types	NS	Dev Rat Grp	Hie Grp	Dev Hie Grp	Dev Rat	Dev Rat	Rat	Dev Grp

S=supported
NS=not supported
Dev = Developmental
Rat = Rational
Hie=Hierarchy
Grp=Group

Fig. 1. Summary of hypotheses testing.

Please cite this article in press as: Naor, M., et al. The culture-effectiveness link in a manufacturing context: A resource-based perspective. *Journal of World Business* (2013), http://dx.doi.org/10.1016/j.jwb.2013.06.003

no concerns (i.e., the types are independent), it is possible that interaction among the culture types may be observed in their effect on effectiveness.

5.2. Regression of West region

In our study, this group includes Italy, Austria, Finland, Germany, Sweden and United States. The control variables are not significant in most of the models except for cost. Next, we observe the individual main effects of each culture type (Table 4). The analysis considers the significance of the beta coefficients and significance of the *F-value*. The developmental cultural type has a significant individual positive effect on cost, thus supporting hypothesis H1a. Rational culture has a significant individual positive effect on cost, quality, and delivery. Thus, lending support to hypotheses H2a, H2b, and H2c. The group culture type has a significant positive effect on quality, and delivery. Thus, we find support to hypotheses H4b, and H4c. Fig. 1 summarizes the findings, where we find support to 6 of the 16 relationships (between the four culture types and the four priorities).

Next, we once again look at the effects of simultaneously including the four cultural types in the regression equation to examine the RBV argument. We test for multicollinearity between the independent variables in the West region (Kutner et al., 2005). The variance inflection factor (VIF) values for the four cultural types (developmental = 1.09, rational = 1.13, hierarchy = 1.01, and group = 1.02) are acceptable, and well below the cut-off value of 10.0. In the cost model, the developmental and rational cultures have a significant positive effect. In the quality model, developmental and rational types have a significant positive effect. In the delivery model, rational culture has a significant positive effect. Finally, in the flexibility model, both developmental and group have a significant positive effect. The bottom of Fig. 1 summarizes the findings.

Overall, while we find limited support for the link between individual culture types and effectiveness in both regions, we find evidence that the impact of the set of culture types is significantly greater than that of individual types. We also observe a difference in the set of cultural types that affect organizational effectiveness when comparing plants located in the East vs. West. This indicates that regional location plays a role in the linkage between organizational culture and effectiveness.

6. Conclusion

6.1. Discussion

This study contributes to the literature in various ways. First, we investigate the impact of culture on operational priorities, whereas most past studies on the culture-effectiveness linkage looked at financial outcomes (Marcoulides & Heck, 1993; Sørensen, 2002). Hubbard, Vetter, and Little (1998) encourage replication research to validate constructs and examine how broadly conclusions about relationships are generalizable. Such research is particularly absent in the context of an operations setting (Frohlich & Dixon, 2006). This is critical, because, arguably, organizational culture manifests explicitly within the operations (production) function, where employees produce the organizational outputs. Siehl and Martin (1990) contend that such employees 'play out' an organization's culture by affecting innovation, creativity, and process, which embed cultural characteristics. Examining the effect on culture on operational performance, then, expands the results from studies looking at financial outcomes only. Past studies' emphasis on non-operational outcomes may obscure the importance of organizational processes (Siehl & Martin, 1990). The use of the operational priorities of cost, quality, delivery, and flexibility addresses Wilderom et al. (2000) call for multi-dimensional performance measures that fully capture the impact of culture on organizational functions. Thus, we examine these dimensions individually as opposed to other studies aggregating them into a single measure of performance (Naor et al., 2008, 2010). It also addresses Ray et al. (2004) call to include such proxies specifically in RBV studies. By using multi-dimensional performance measures at the plant level for organizational effectiveness, we are able to uncover interesting relationships that add to the body of knowledge on this topic.

Conversely, a comparison between East and West reveals that, the group type and low hierarchy are more dominant in the East, whereas rational culture is more dominant in the West. These findings are consistent with Hofstede (1980) and House et al. (2004). The East is well known for teamwork and empowerment, whereas the West is more goal-oriented. Overall, these findings imply that regional location impacts the relationship between organizational culture and effectiveness.

Hopp (2004) emphasizes that understanding a manufacturing plant requires not only an organization theory and a theory of material flow, but also the means for describing the interaction between the two. The current study addresses these needs in a manufacturing arena by employing the RBV as a theoretical lens. From the RBV perspective, a large set of multiple culture types is difficult to imitate. We find that eastern plants have larger sets of culture types than western plants. Specifically, in the East, quality and flexibility are pursued by combinations of three culture types and delivery by two, whereas in the West, cost, quality and delivery are pursued by combinations of two culture types. Thus, manufacturing plants in the East have a richer blend of cultural types, which may make its plant cultures harder to imitate. This may provide insight why the East has competitive advantage over the West in manufacturing. As Boudreau (2004) notes, the topic of organizational effectiveness continues to receive attention, because it is motivated by questions about the competitiveness and productivity of U.S. companies relative to the emerging success of oversea competitors. Finally, the results of this study provide a steppingstone toward further inquiry in this research stream. While we examine the link between culture and performance at the granular level of the manufacturing plant, grounded on the theoretical notion that cultural organizational characteristics can be a source of advantage, future studies can focus on whether these relationships hold in other environments. Based on analysis of corporate officers, Kerr and Slocum (1987) suggest that a given culture type may not be effective in all environments. Thus, based on the results from our study and the insights advanced by Kerr and Slocum (1987), there is, for instance, the opportunity for future studies to expand this stream of research utilizing the complementarity theoretical lens (Tanriverdi & Venkatraman, 2005) to examine the fit between individual culture types and specific organizational strategies, and their effect on performance.

6.2. Managerial relevance

There are practical implications that emerge from this study. Although our results show that each culture type is individually linked with effectiveness, the developmental culture appears more dominant than other culture type in both the East and West. Thus, this results suggest that, for any competitive priority, managers can invest in developing and incorporating the characteristics of a developmental culture into organizational processes and routines

Please cite this article in press as: Naor, M., et al. The culture-effectiveness link in a manufacturing context: A resource-based perspective. *Journal of World Business* (2013), http://dx.doi.org/10.1016/j.jwb.2013.06.003

as a potential source of competitive advantage. Not only will the underlying focus on innovation stemming from this culture type contribute to competitive priorities across the board, but they hold valid also across regional geographical areas.

As our study examines the effects of each cultural type on each of the measures of performance relevant to manufacturing settings, managers can use the results to map the specific cultural characteristics that will favor an intended competitive priority. As we separated our analysis according to geographical location, managers cannot only use the results to identify the ideal combination of cultural characteristics, but also the ideal combination for specific regions. For instance, in the East region, a combination of developmental, rational and group types is effective when the priority is quality, a combination of high group and low hierarchy is preferred for delivery, and a combination of high developmental and group, and low hierarchy types is preferred when the priority is flexibility. In the West, a combination of rational and developmental types is preferred for cost and quality, and a combination of developmental and group types is preferred for flexibility. Manufacturing managers can map the cultural characteristics that have most effect on a specific competitive priority within a given region. The results suggest that managers should not only identify the relative fit among culture type characteristics, organizational competitive priorities and geographical region, but also strengthen the incorporation of multiple cultural characteristics into the organizational processes and routines. The embedding of multiple cultural characteristics will not only support various aspects of different competitive priorities, but are also more complex. Thus, when managers build a competitive advantage through culture-driven organizational capability based on the characteristics of multiple culture types, they will make it more difficult for competitors to replicate processes and routines. Finally, an avenue for future research exists to expand our study's East–West comparison to other regional clusters across the world such as Latin America, Sub-Saharan Africa and the Middle East (Gupta, Hanges, & Dorfman, 2002).

Appendix A

Survey items for organizational culture

All items are rated on a 1–7 scale: 7 = strongly agree, 6 = agree, 5 = slightly agree, 4 = neutrality, 3 = slightly disagree, 2 = disagree, 1 = strongly disagree.

A.1. Hierarchy culture

Hier1 Even small matters have to be referred to someone higher up for a final answer.

Hier2 Any decision I make has to have my boss's approval.

Hier3 There can be little action taken here until a supervisor approves a decision.

Hier4 Our organization is very hierarchical.

Hier5 There are many levels between the lowest level in the organization and top management.

A.2. Group culture

Group1 Our supervisors encourage the persons who work for them to work as a team.

Group2 Our supervisors encourage people who work for them to exchange opinions and ideas.

Group3 Our supervisors frequently hold group meetings together where the people who work, for them can really discuss things together.

Group4 Generally, speaking, everyone in the plant works well together.

Group5 Departments in the plant communicate frequently with each other.

A.3. Rational culture

Ratio1 Our incentive system encourages us to vigorously pursue plant objectives.

Ratio2 In our plant, goals, objectives and strategies are communicated to me.

Ratio3 Our plant has a formal strategic planning process, which results in a written mission, long-range goals and strategies for implementation.

Ratio4 Plant management routinely reviews and updates a long-range strategic plan.

Ratio5 We encourage employees to work together to achieve common goals, rather than, encourage competition among individuals.

A.4. Developmental culture

Dev1 Our plant stays on the leading edge of new technology in our industry.

Dev2 Compared with our industry, we introduce new products more slowly.

Dev3 We have reduced the time to introduce products by designing product and process together.

Dev4 Introduction speed is our top priority in developing new products.

Dev5 We achieve a competitive advantage by introducing new products more quickly than our competitors.

A.5. Survey items for manufacturing plant's effectiveness

Please indicate your opinion about how your plant compares to its competition in your industry, on a global basis: 5 = superior, 4 = better than average, 3 = average, 2 = below average, 1 = poor or low end of the industry.

A.5.1. Cost

Cost1 Inventory turnover.

Cost2 Cycle time.

Cost3 Unit cost of manufacturing.

A.5.2. Delivery

Deli1 On time delivery performance.

Deli2 Fast delivery.

A.5.3. Quality

Qual1 Product capability and performance.

Qual2 Conformance to product specifications.

Qual3 Customer support and service.

A.5.4. Flexibility

Flex1 Flexibility to change product mix.

Flex2 Flexibility to change volume.

Please cite this article in press as: Naor, M., et al. The culture-effectiveness link in a manufacturing context: A resource-based perspective. *Journal of World Business* (2013), http://dx.doi.org/10.1016/j.jwb.2013.06.003

References

Alvesson, M. (2002). *Understanding organizational culture*. London, UK: Sage Publications.

Bagozzi, R. P., & Phillips, L. W. (1982). Representing and testing organizational theories: A holistic construal. *Administrative Science Quarterly*, 459–489.

Bagozzi, R. P., Yi, Y., & Phillips, L. W. (1991). Assessing construct validity in organizational research. *Administrative science quarterly*, 421–458.

Baligh, H. H. (1994). Components of culture: nature, interconnections, and relevance to the decisions on the organization structure. *Management Science, 40*(1): 14–27.

Barney, J. B. (1986). Organizational culture: can it be a source of sustained competitive advantage? *Academy of Management Review, 11*(3): 656–665.

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1): 99–120.

Barney, J. B. (1997). *Gaining and sustaining competitive advantage*. Reading, MA: Addison-Wesley.

Bates, K. A., Amundson, S. D., Schroeder, R. G., & Morris, W. T. (1995). The crucial interrelationship between manufacturing strategy and organizational culture. *Management Science, 41*(10): 1565–1580.

Boudreau, J. W. (2004). 50th Anniversary Article: Organizational behavior, strategy, performance, and design in management science. *Management Science, 50*(11): 1463–1476.

Buenger, V., Daft, R. L., Colon, E. J., & Austin, J. (1996). Competing values in organizations: contextual influences and structural consequences. *Organization Science, 7*(5): 557–576.

Cameron, K., & Quinn, R. (2005). *Diagnosing and changing organizational culture: based on the competing values framework*. San Francisco: Jossey-Bass.

Choo, A. S., Linderman, K. W., & Schroeder, R. G. (2007). Method and psychological effects on learning behaviors and knowledge creation in quality improvement projects. *Management Science, 53*(3): 437–450.

Denison, D. R., & Mishra, A. (1995). Toward a theory of organizational culture and effectiveness. *Organization Science, 6*(2): 204–223.

Denison, D. R., & Spreitzer, G. M. (1991). Organizational culture and organizational development: A competing values approach. *Research in organizational change and development, 5*(1): 1–21.

Detert, J. R., Schroeder, R. G., & Mauriel, J. J. (2000). A framework for linking culture and improvement initiatives in organizations. *Academy of Management Review, 25*(4): 850–863.

Earley, P. C. (1993). East meets west meets mideast: Further explorations of collectivistic and individualistic work groups. *Academy of Management Journal, 36*(2): 319–348.

Fey, C. F., & Denison, D. R. (2003). Organizational culture and effectiveness: can American theory be applied in Russia? *Organization Science, 14*(6): 686–706.

Flynn, B. B., & Flynn, E. J. (2004). An exploratory study of the nature of cumulative capabilities. *Journal of Operations Management, 22*(5): 439–458.

Flynn, B. B., Sakakibara, S., Schroeder, R. G., Bates, K. A., & Flynn, E. J. (1990). Empirical research methods in operations management. *Journal of Operations Management, 9*(2): 250–284.

Frohlich, M. T., & Dixon, J. R. (2006). Reflections on replication in OM research and this special issue. *Journal of Operations Management, 24*: 865–867.

Gelfand, M., Erez, M., & Aycan, Z. (2007). Cross-cultural organizational behavior. *Annual Review of Psychology, 58*: 479–514.

Grant, R. M. (1991). The resource-based theory of competitive advantage: implications for strategy formulation. *California Management Review, 33*(3): 114–135.

Gundling, E. (2000). *The 3M way to innovation: balancing people and profit* (1st ed.). Japan: Kodansha International.

Gupta, V., Hanges, P., & Dorfman, P. (2002). Cultural clusters: methodology and findings. *Journal of World Business, 37*(1): 11–15.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2009). *Multivariate data analysis* (7th ed.). Upper Saddle River, NJ: Prentice-Hall.

Hirsch, P. M., & Levin, D. Z. (1999). Umbrella advocates versus validity police: a life cycle model. *Organization Science, 10*(2): 199–212.

Hirst, G., Budhwar, P., Cooper, B., West, M., Long, C., Xu, C., & Shipton, H. (2008). Cross-cultural variations in climate for autonomy, stress, and organizational productivity relationships: a comparison of Chinese and UK manufacturing organizations. *Journal of International Business Studies, 39*(8): 1343–1358.

Hofstede, G. H. (1994). Management scientists are human. *Management Science, 40*(1): 4–13.

Hofstede, G. H. (1980). *Cultures consequences: international differences in work-related values*. Beverly Hills: Sage Publications.

Hopp, W. J. (2004). Fifty years of management science. *Management Science, 50*(1): 1–7.

House, R. J., Hanges, P. J., Javidan, M., Dorfman, P. W., & Gupta, V. (2004). *Culture leadership and organizations: the GLOBE study of 62 societies*. Thousand Oaks, CA: Sage Publications.

Howard, L. (1998). Validating the competing values model as a representation of organizational culture. *International Journal of Organizational Analysis, 6*: 231–250.

Huang, X., Rode, J. C., & Schroeder, R. G. (2011). Organizational structure and continuous improvement and learning: moderating effects of cultural endorsement of participative leadership. *Journal of International Business Studies, 42*(9): 1103–1120.

Hubbard, R., Vetter, D., & Little, E. L. (1998). Replication in strategic management: scientific testing for validity, generalizability, and usefulness. *Strategic Management Journal, 19*(3): 243–254.

James, L. R., Demaree, R. G., & Wolf, G. (1984). Estimating within-group inter-rater reliability with and without response bias. *Journal of Applied Psychology, 69*(1): 85–98.

Joreskog, K. G. (1970). A general method for analysis of covariance structures. *Biometrika, 57*: 239–251.

Kathuria, R., & Patrovi, F. Y. (1999). Work force management practices for manufacturing flexibility. *Journal of Operations Management, 18*(1): 21–39.

Kerr, J., & Slocum, J. W. (1987). Managing corporate culture through reward systems. *Academy of Management Executive, 1*(2): 99–108.

Kotter, J. P., & Heskett, J. L. (1992). *Corporate culture and performance*. New York: Free Press.

Kull, T., & Wacker, J. (2010). Quality management effectiveness in Asia: the influence of culture. *Journal of Operations Management, 28*(3): 223–239.

Kutner, M. H., Nachtsheim, C. J., Neter, J., & Li, W. (2005). *Applied linear statistical models* (5th ed.). New York, NY: McGraw-Hill.

Linderman, K., Schroeder, R. G., Zaheer, S., & Choo, A. S. (2003). Six Sigma: a goal-theoretic perspective. *Journal of Operations Management, 21*(2): 193–203.

Linnenluecke, M. K., & Griffiths, A. (2010). Corporate sustainability and organizational culture. *Journal of World Business, 45*(4): 357–366.

Lewin, A. Y., & Minton, J. W. (1986). Determining organizational effectiveness: another look, and an agenda for research. *Management Science, 32*(5): 514–538.

Marcoulides, G. A., & Heck, R. H. (1993). Organizational culture and performance: proposing and testing a model. *Organization Science, 4*(2): 209–225.

Martin, J. (2002). *Organizational culture: mapping the terrain*. Thousand Oaks, CA: Sage Publications.

Maruyama, G. M. (1997). *Basics of structural equation modeling*. Thousand Oaks, CA: Sage Publications.

McDermott, C. M., & Stock, G. N. (1999). Organizational culture and advanced manufacturing technology implementation. *Journal of Operations Management, 17*(5): 521–533.

Naor, M., Goldstein, S. M., Linderman, K. W., & Schroeder, R. G. (2008). The role of culture as driver of quality management and performance: infrastructure versus core quality practices. *Decision Sciences, 39*(4): 671–702.

Naor, M., Linderman, K. W., & Schroeder, R. G. (2010). The globalization of operations in Eastern and Western countries: unpacking the relationship between national and organizational culture and its impact on manufacturing performance. *Journal of Operations Management, 28*(3): 194–205.

Naveh, E., & Erez, M. (2004). Innovation and attention to detail in the quality improvement paradigm. *Management Science, 50*(11): 1576–1586.

Netemeyer, R., Bearden, W., & Sharma, S. (2003). *Scaling procedures: issues and applications*. Thousand Oaks, CA: Sage Publications.

Newbert, S. L. (2007). Empirical research on the resource-based view of the firm: an assessment and suggestions for future research. *Strategic Management Journal, 28*(2): 121–146.

Perry-Smith, J. E., & Blum, T. C. (2000). Work-family human resource bundles and perceived organizational performance. *Academy of Management Journal, 43*(6): 1107–1117.

Peng, D. X., Schroeder, R. G., & Shah, R. (2008). Linking routines to operations capabilities: a new perspective. *Journal of Operations Management, 26*(6): 730–748.

Penrose, E. T. (1958). *The theory of the growth of the firm*. New York: Wiley.

Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: a critical review of the literature and recommended remedies. *Journal of Applied Psychology, 88*(5): 903–979.

Porter, M. E. (1990). *The competitive advantage of nations*. New York: The Free Press.

Power, D., Schoenherr, T., & Samson, D. (2010). The cultural characteristic of individualism/collectivism: a comparative study of implications for investment in operations between emerging Asian and industrialized Western countries. *Journal of Operations Management, 28*(3): 206–222.

Priem, R. L., & Butler, J. E. (2001). Is the resource-based "view" a useful perspective for strategic management research? *Academy of Management Review, 26*(1): 22–40.

Quinn, R. E., & Rohrbaugh, J. R. (1983). A spatial model of effectiveness criteria: towards a competing values approach to organization analysis. *Management Science, 29*(3): 363–377.

Quinn, R. E., & Spreitzer, G. M. (1991). The psychometrics of the competing values culture instrument and an analysis of the impact of organizational culture on quality of life. In Woodman, R. W., & Pasmore, W. A. (Eds.), *Research in Organizational Change and Development.* pp. 115–142). (5Greenwich, CT: JAI Press.

Ray, G., Barney, J. B., & Muhanna, W. A. (2004). Capabilities, business processes, and competitive advantage: choosing the dependent variable in empirical tests of the resource-based view. *Strategic Management Journal, 25*(1): 23–37.

Roth, A. V., Schroeder, R. G., Huang, X., & Kristal, M. M. (2007). *Handbook of metrics for research in operations management: multi item measurement scales and objective items*. Thousand Oaks, CA: Sage Publications.

Schein, E. H. (1992). *Organizational culture and leadership* (2nd ed.). San Francisco: Jossey-Bass Publishers.

Schonberger, R. J. (2007). *Best practices in Lean Six Sigma process improvement*. Hoboken, New Jersey: John Wiley & Sons.

Schroeder, R. G., Bates, K. A., & Junttila, M. A. (2002). A resource-based view of manufacturing strategy and the relationship to manufacturing performance. *Strategic Management Journal, 23*(2): 105–117.

Schroeder, R. G., & Flynn, B. B. (2001). *High performance manufacturing: global perspectives*. New York: John Wiley & Sons.

Shah, R., & Goldstein, S. M. (2006). Use of structural equation modeling in operations management research: looking back and forward. *Journal of Operations Management, 24*(2): 148–169.

Siehl, C., & Martin, J. (1990). Organizational culture: a key to financial performance? In B. Schneider (Ed.), *Organizational climate and culture* (1st ed., pp. 241–281). San Francisco: Jossey-Bass.

Please cite this article in press as: Naor, M., et al. The culture-effectiveness link in a manufacturing context: A resource-based perspective. *Journal of World Business* (2013), http://dx.doi.org/10.1016/j.jwb.2013.06.003

Smircich, L. (1983). Concepts of culture and organizational analysis. *Administrative Science Quarterly, 28*(3): 339–358.
Smith, P. B. (2006). When elephants fight, the grass gets trampled: the GLOBE and Hofstede projects. *Journal of International Business Studies, 37*(6): 915–921.
Sørensen, J. B. (2002). The strength of corporate culture and the reliability of firm performance. *Administrative Science Quarterly, 47*(1): 70–91.
Tanriverdi, H., & Venkatraman, N. (2005). Knowledge relatedness and the performance of multibusiness firms. *Strategic Management Journal, 25*(2): 97–**119**.
Ward, P. T., McCreery, J. K., Ritzman, L. P., & Sharma, D. (1998). Competitive priorities in operations management. *Decision Sciences, 29*(4): 1037–1048.
Wernerfelt, B. (1989). From critical resources to corporate strategy. *Journal of General Management, 14*(1): 4–12.
Wilderom, C. P., Glunk, U., & Maslowski, R. (2000). Organizational culture as a predictor of organizational performance. In N. M. Ashkanasy, C. P. Wilderom, & M. F. Peterson (Eds.), *Handbook of organizational culture and climate*. (pp. 193–209). Thousand Oaks, CA: Sage Publications.
Wu, S. J., Melnyk, S., & Flynn, B. B. (2010). Operational capabilities: the secret ingredient. *Decision Sciences, 41*(4): 721–754.
Yilmaz, C., & Ergun, E. (2008). Organizational culture and firm effectiveness: an examination of relative effects of culture traits and the balanced culture hypothesis in an emerging economy. *Journal of World Business, 43*(4): 290–306.
Zu, X., Robbins, T., & Fredendall, L. (2010). Mapping the critical links between organizational culture and TQM/Six Sigma practices. *International Journal of Production Economics, 123*(1): 89–106.

Please cite this article in press as: Naor, M., et al. The culture-effectiveness link in a manufacturing context: A resource-based perspective. *Journal of World Business* (2013), http://dx.doi.org/10.1016/j.jwb.2013.06.003