University of Oxford

Department of International Development

SLPTMD Working Paper Series

No. 008

CLUSTERS OF MANAGEMENT PRACTICES, STRUCTURAL EMBEDDEDNESS AND FIRM PRODUCTIVITY

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ABSTRACT

"What impact do management practices have on the productivity of firms?" is one of the most critical questions in management research. We synthesize extant knowledge in both the economic and management literature to provide an integrative framework that advances our understanding of the dynamic relationships between clusters of complementary management practices, structural embeddedness, and the productivity of firms. In doing so, we highlight the importance of considering firms' embeddedness in their networks of interorganizational linkages when examining the effect of management practices on productivity.

Keywords: Management practices; network management; Structural embeddedness; Productivity

Acknowledgement: The authors are grateful to Andy Neely, Chris Clegg, Uwe Ackline, Giuliana Batistti, Alina Pretrescu, Helen Celia, Alfonsina Iona and Peer Olaf Siebers for helpful discussions, and the Engineering and Physical Science Research Council (EPSRC) (Grant No. EP/D503973/2) and the Advanced Institute for Management Studies (AIM) for generous funding.

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1. Introduction

Productivity has long been seen as an important driver of the competitiveness, growth, and wealth of firms and nations (Feenstra and Hiau, 2004; Feldstein, 1994; Porter, 1990, 1998). Enhanced productivity can enable firms to produce more goods of higher quality while also charging lower prices. Because of the central role that productivity plays in simultaneously driving firms' success, economic growth, and consumer welfare, authors in many disciplines have hypothesized about its determinants (Bartel, Ichniowski, and Shaw, 2004; Belorgey, Lecat and Maury, 2006; Mefford, 1986). The hypotheses proposed range from the classical technology-driven productivity argument to the management practices productivity-enhancing approach. While there has been a strong surge of academic as well as practitioner interest in how to achieve greater productivity, the literature reflects remarkably little effort to review and synthesize extant thinking on the concepts of management practices and productivity. Indeed, a review of the literature of the last 40 years reveals very little attention to the management practices-productivity relationship.

In this article, we seek to provide a foundation for the synthesis of extant studies in the literature to examine the influence of management practices on the productivity of firms. Two major bodies of research focusing on productivity have been the economic and management literature. While each presents a different approach to the conceptualization of productivity, each body of literature generally ignores the insights developed by the other. Similarly, given the multitude of research on, and conceptualizations of, management practices, the literature gives no clear answer to the question what exactly is meant by management practices. We argue that an understanding of what has been written can help us integrate perspectives developed by various streams of literature to gain a full appreciation of the management practices and productivity concepts.

Accordingly, the purpose of this article is to provide a discussion of the management and economics literature to identify and examine the effect of complementary management practices on the productivity of firms, and to construct a comprehensive framework for directing future research. This article complements and extends the literature in the following ways. First, by examining the dynamic relationships between clusters of complementary managerial practices, we distill some of the various elements of managerial practices that need to be considered when examining key determinants of productivity. Specifically, we explore lessons that can be drawn from linking the productivity of firms with operations and resources management practices. In doing so, we examine common definitions of productivity in the economic literature and corroborate the need to acknowledge the role played by managers in accounting for a significant proportion of between-firms variation in productivity.

Further, we review the body of literature on structural embeddedness to offer a comprehensive framework for analyzing the relationship between managerial practices and productivity. Although past research acknowledges the effect of structural embeddedness on the economic behavior of actors (Gnyawali and Madhavan, 2001; Gulati, Nohria and Zaheer, 2000; Uzzi, 1997), to this date, the influence of structural embeddedness on the management practices-productivity relationship has not been examined. Because firms are embedded in a network of relationships that can influence the impact of management practices on the productivity of organizations, we seek to complement and extend current thinking by integrating findings in the management practices, productivity and structural embeddedness literature.

The structure of the paper is as follows. In the first section, we examine the concept of productivity in various streams of thought. In the second section, we review extant studies to analyze the management practices-productivity relationship. In the third section, we argue that

an examination of the management practices-productivity relationship necessitates the adoption of a structural embeddedness perspective to gain a full appreciation of the dynamic interrelations of these concepts. We conclude by addressing managerial implications and provide avenues for future research.

2. The concept of productivity

Productivity: Traditional Definitions in the Economic Literature

There are two traditional definitions of productivity in the economic literature: First, partial factor productivity such as output per laborer or output per capital employed and, second, multi-factor productivity such as the Solow-type total factor productivity (TFP) index. The problem with partial factor productivity is that the marginal productivity of labor (or any other factor of production) changes with the amount of other substitutes/complementary inputs available to a firm. For example, given that capital and labor enter as complementary inputs in the production function, an extra machine will increase labor productivity, everything else constant. Moreover, the labor productivity profile is a decreasing function of the number of laborers. Increasing the number of workers would decrease their average productivity, *ceteris paribus*. Therefore, partial factor productivity can only provide limited insights of how inputs are transformed into outputs.

Total factor productivity (TFP), it may be argued, provides a more comprehensive guide to efficiency than partial productivity. In addition to labor and capital, TFP takes into account the contribution of other factors, such as managerial skills and technical know-how. For instance, the production of firm i at time t, Y_{it}, can be defined as a function $f(.)$ of labor (L_{it}), capital (K_{it}) and a constant (A_{it}) capturing the level of technology, technical efficiency, managerial capacity or any other unobserved components affecting productivity:

$Y_{it} = f(A_{it}, K_{it}, L_{it})$. A_{it} is referred to as total factor productivity (TFP). Accordingly, TFP

refers to the residual of output growth after the contributions of labor and capital inputs have been subtracted from total output growth. A traditional functional form used in both theoretical and empirical papers is the Cobb-Douglas production function: $Y_{it} = A_{it} K_{it}^{\alpha} L_{it}^{\beta}$, where α *and* β measure capital and labor expenditure shares, respectively. In practice, we can get an estimated measure of TFP for each firm as a residual by regressing log (Y_{it}) against log (K_{it}) and log (L_{it}): $TFP_{it} = \log(Y_{it}) - \{\hat{\alpha}\log(K_{it}) + \hat{\beta}\log(L_{it})\}$. However, this method attributes all deviations from expected output to TFP without taking into account measurement errors and is subject to several well-known assumptions: (1) the form of production function is known; (2) there are constant returns to scale; (3) there is optimizing behavior on the part of firms; and (4) there is neutral technical change. If these assumptions do not hold, TFP measurements will be biased (Arcelus and Arocena, 2000; Coelli and Perelman, 1999).

In order to get an accurate measure of productivity, a series of other methodological and measurement difficulties need to be overcome. First, estimations of TFP via applying conventional OLS to a Cobb-Douglas production function without any control of the residual will produce biased estimates. Olley and Pakes (1996) show that an instrumental variable estimation is needed to control for this problem. Second, a key condition to get an accurate measure of productivity is that both output and inputs are measured in the correct way. Because the quality level of the final output can vary significantly across firms, the comparability between outputs of two different firms can be misleading (Griffith and Harmgart, 2005). Quality, therefore, may have to be seen as an additional factor of production that needs to be controlled for. Finally, in some sectors, particularly the services and public sectors, outputs cannot be measured in monetary terms only. The single output based TFP measurement fails to capture the real outputs of these organizations that are multi-dimensional in nature.

While the TFP index measures productivity with respect to the mean, technical efficiency (TE) provides a multi-factor measurement of productivity with respect to the best practice frontier. Specifically, the efficiency measure of a firm's production activity is defined by its position relative to the frontier of best performance established mathematically by the ratio of the weighted sum of observed outputs to the weighted sum of observed inputs (Charnes, Cooper and Rhodes, 1978; Leibenstein, 1966). In other words, a firm can be said to be technically efficient, and thus highly productive, as long as it operates on the best practice frontier. Technical efficiency (TE) against the best practice frontier provides a natural measurement of X-efficiency, which refers to the general efficiency of a firm (judged on managerial and technological criteria) in transforming inputs at minimum cost into maximum outputs (Leibenstein, 1966). TE can be estimated by linear programming approach or parametric production function approach. The programming approach does not require any assumption about the form of the production function. In addition, it allows us to estimate efficiency with multi-outputs and multi–inputs, taking into account other potential elements of productivity, such as customer satisfaction and the quality of outputs. This technique, however, has a main shortcoming in that there is no provision for statistical noise or measurement error in the model (Greene, 1997; Norman and Stoker, 1991).

Alternative Ways of Conceptualizing Productivity

A review of the literature reveals that numerous studies ascertain productivity via subjective methods. Survey questionnaires, for example, have been used to examine productivity in terms of operational performance, customer satisfaction (Sánchez-Rodríguez, Hemsworth and Martinez-Lorente, 2004) and improvements in organizational performance variables, including the quality of purchased items, on-time delivery, process order cycle time, accuracy, and actual versus target costs (Hasan and Kerr, 2003). Customer satisfaction, on the other hand, has frequently been operationalized as service quality and measured

according to reliability, responsiveness, assurance, empathy and tangibles (Parasuraman, Zeithaml and Berry, 1988; Sánchez-Rodgríguez et al., 2004). Organizational performance has been measured in terms of both operational and financial performance compared to competing organizations, encompassing employee retention, product quality, speed of delivery, employee productivity, and operating costs (Paul and Anantharaman, 2003). All these elements should lead to a higher output per input ratio, which is the one of the standard definitions of productivity in the economic literature previously discussed. For the purpose of this article, we define productivity as the ratio of weighted sum of outputs to the weighted sum of inputs. To improve productivity, firms have to achieve more value of output per unit of input.

3. The Relationship between Management Practices and the Productivity of Firms

Management practices are multi-facetted. They are actions of mangers in all aspects of management activities, from strategic decision making to daily routines, including financial resources and operating practices. Given the diverse nature of management practices, there is no consensus in the literature for a unified definition. It is often conceptualized in a multidimensional fashion. Broadly speaking, management practices can be separated into two distinguishable categories: resources management practices and operations management practices (Table 1). Depending upon the theoretical approach adopted management practices are conceived in different ways. The resource-based view of the firm, for example, considers the potential for inherently inimitable ways of managing human resources (Lado and Wilson, 1994; Wright and McMahan, 1992), information resources (Bharadwaj, 2000; Mata, Fuerst and Barney, 1995), and operations management (Cox, 1996) as a source of sustained competitive advantage. In this article, we limit our discussion to the relationships between clusters of resources and operations management practices and the productivity of firms.

Furthermore, we underscore the role of network management in strengthening the positive impact of outsourcing and operations management practices on the productivity of firms.

Insert Table 1 about here

In orthodox economic theory, managers' behavior is assumed to be always optimal given the information that is freely available in the market and that managers and owners share a common objective. Assuming perfect flows of information and homogeneous managerial competence, management practices are deemed as state variables rather than determinants of productivity. However, in a world where information is imperfect and asymmetric (Greenwald, Stiglitz and Weiss, 1984; Myers and Majluf, 1984), and motivations and competences of managers are heteroskedastic, the role played by managers in enhancing productivity can account for a significant proportion of between-firms variation in productivity under given technology. This highlights the need to address management practices when examining the productivity concept. In the following paragraphs, we review empirical evidence for the linkages between management practices and the productivity of organizations.

Resources Management Practices and Productivity

Human resources management. In order to capture the inherently intangible nature of management practices, the management of human resources has been conceptualized and measured in various ways. Bryson, Forth and Kirby (2005), for example, define what they call 'high-involvement practices' (HIM) as a combination of three separate practices: Task practices, individual supports, and organizational supports. In a related study, Paul and Anantharaman (2003) use interviews with employees in 35 different software companies located in India to show the positive effect of 'people management practices' on

organizational performance. People management practices were defined by nine indicators, including selection, induction, training, job design, work environment, performance appraisal, compensation, career development, and incentives.

Research studies that collected data on HRM practices through interviews frequently adopted a semi-structured questionnaire-led format. Examples include the extensive use of interviews with HR managers, operations managers, supervisors, production workers, and union representatives (Ichniowski and Shaw, 1999) as well as interactions with plant or production managers (Merino-Diaz de Cerio, 2003). Other measures of HR management were developed by asking questionnaire respondents to rate their employing organization against that of its competitors in terms of focus on training and encouragement of employee input (Park, Mitsuhashi, Fey and Bjorkman 2003).

There is strong empirical evidence that human resources management practices have a positive impact on the productivity of firms. For example, incentives schemes, group decision-making and training were found to positively affect innovation productivity (Laursen and Foss, 2003; Vinding, 2006). Studies also show that HRM practices are directly associated with employee satisfaction, quality improvement and productivity enhancement (Bryson et al., 2005; Geralis and Terziovski, 2003; Ichniowski and Shaw, 1999; Pun et al., 2001; Scotti et al., 2003). In addition to this, research findings illustrate that HRM practices are indirectly related to operational and financial performance parameters of organizations (Paul & Anantharaman, 2003) and directly impact employee skills, attitudes and behaviors which, in turn, have an effect on firm outcomes (Park et al., 2003: Pun, Chin and Gill, 2001).

On the other hand, a firm-level cross-sectional study of 82 multi-industry firms in Hong Kong presents empirical evidence indicating that high involvement management does not have a significant impact on company productivity performance (Chan, Shaffer and Snape, 2004). Moreover, the relationship between employee satisfaction and measures of productivity, efficiency and profitability may also follow that of an inverted U-curve in that

beyond a specific level of productivity employee satisfaction begins to decrease (Silvestro, 2003). One possible explanation is that pressure to maximize store efficiency can cause dysfunctional managerial behaviors, which in turn may create a stressful and unpleasant work environment resulting in lower employee satisfaction and higher staff turnover.

Information resources management. The main discussion in this area is whether managers can enhance productivity by strategically investing in information and communications technologies (ICT). The underlying assumption here is that ICT create strong spill-over effects giving rise to levels of aggregate productivity. To test this, studies employed several macro, meso and micro approaches. Studies employing a macro approach tended to make use of an accounting perspective linking aggregate measures of productivity with changes in the importance of ICT-producing and ICT-using sectors of the economy (Vijselaar and Albers, 2004). Other studies disaggregated the economy in several sectors (meso) in order to try to identify—by means of econometric analysis—spill-over effects if ICT (O'Mahony and Robinson, 2003; Stiroch, 2002). In addition, researchers conducted firm-level analyses with panel data techniques to exploit full firm-level heterogeneity. This last aspect was deemed crucial to test the more ambitious hypothesis conditioning ICT's productivity impact to other management practices like work practice innovation and other organizational changes (Ramirez, Kraener, & Lawler, 2001)

While ICT have a positive correlation with TFP, there may not be enough evidence supporting the new economy hypothesis (O'Mahony and Robinson, 2003; Stiroch, 2002; Vijselaar and Albers, 2004). In other words, there are few spill-over effects of ICT into the rest of the economy. Accordingly, ICT cannot account for increased levels of productivity observed in the US during the second half of the 1990s. The survey papers by Ignazio (2000) and Pilat (2004) arrive to the same conclusions. Ignazio (2000) goes further to suggest that high levels of human and physical capital are necessary a-priori conditions to get hold of the benefits derived from ICT investment. In the service sector, research findings are equivocal.

The papers by Licht and Moch (1999) and Wolf (1999), employing data at the establishment and industrial level respectively, show a negative relationship between IT investment and TFP in the service sector. By contrast, the study by Gera, Gu and Lee (1999) shows that IT investment growth is positively correlated with labor productivity growth in the Canadian and US manufacturing and service industries.

Basu, Fernald, Oulton and Srinivasan (2003) challenge the view that ICT has no spill-over effects and therefore cannot contribute to explaining the productivity gap between countries. The authors' main argument is that investment in ICT has a 'lagged effect' upon TFP rather than a contemporaneous one. Moreover, contemporaneous investment in ICT can have a negative effect upon TFP. If this hypothesis is true, then all existing studies trying to identify ICT at time "*t*" as the main source of productivity differential between countries at time "*t*" will conclude that ICT cannot explain such gap. Taking data for the whole US economy at the 2-digit industrial level, Basu and colleagues (2003) find that growth in ICT between 1980 and 1990 has a positive effect upon TFP growth between the years 1995 and 2000. Given that the UK investment in ICT during the 1980s was considerable lower than the ICT investment in the US, the lagged effect of ICT growth upon TFP growth can—at least partly—explain the US/UK productivity gap.

Another type of analysis that tries to rescue the ICT hypothesis as a strong productivity determinant is found in studies that argue that the full impact of ICT is conditioned on the implementation of complementary management practices. Using firm-level data from the UK manufacturing and service sector, Ramirez et al. (2001) find that IT has a direct impact upon productivity and an indirect one via three human resources management practices, namely: Employment involvement work practices, total quality management (TQM), and reengineering. Empirically, departing from a Cobb-Douglas production function, the authors regress a measure of output against IT, capital, labor, management practices and interaction terms between management practices and IT. This kind

of complementary effect is also found in the study by Dorgan and Dowdy (2004) who use data from 100 manufacturing firms across France, Germany, UK and the US over the period 1993-2000.

Outsourcing. By hiring the service of factors of production from countries that enjoy a comparative advantage (say, a relative abundance of a given input), firms can decrease costs and, hence, increase productivity. For example, if hourly wages in China are lower than in North America, US firms may find it profitable to satisfy part of their labor demand with laborers located in China. The empirical evidence reviewed for this article supports the idea of a positive relationship between outsourcing and productivity. Egger, Pfaffermayr and Wolfmayr-Schnitzer (2001), for instance, use manufacturing data from Austria to test the productivity impact of outsourcing to Eastern European countries years before the European Union expansion. Their panel data estimation suggests that TFP in Austria increased as a consequence of Eastern European outsourcing between 1990 and 1998. In addition, Girma and Gorg (2004) employ an instrumental variable (IV) econometric approach for more than 3,000 UK manufacturing firms and find that outsourcing is positively related to labor and total factor productivity.

While, in general, there seems to be a consensus about the positive productivity impact of outsourcing, there may be significant problems in the measurement of this relationship. Heshmati (2003), for instance, stresses the measurement problems faced while estimating TFP and subsequently regressing it against a measure of outsourcing in manufacturing and service sectors. In order to avoid measurement problems, Heshmati (2003) suggests that analyses should be performed at the micro level (firm level analysis), employ panel data estimation techniques and control for specific attributes of inputs, outputs, production techniques and other firm-level characteristics (fixed effects estimation).

Operations Management and Productivity

Lean production. A body of literature suggests the adoption of a lean production approach to help eliminate waste, which in turn can result in improvements in costs, time and quality, thereby impacting productivity. Empirical evidence testament to this exists, for example, in the telecommunications service industry, where management practices were implemented in line with lean construction principles, resulting in less waste and a more flexible system attuned to demand fluctuations (Arbós, 2002). In addition, Dunlop and Smith (2004) show that a productivity increase of 25 percent can be achieved if recommended lean production methods are implemented to reduce wastage and improve productivity at construction sites. However, empirical evidence indicates that lean production may not automatically result in improved productivity performance.

In a longitudinal study of lean production with three case study manufacturing organizations, Lewis (2000) shows that being 'lean' can restrict a firm's ability to achieve long-term flexibility. In other words, there might exist a trade-off between degrees of lean production and innovation. In contrast, Kosonen and Buhanist (1995) show that productivity can be increased by decreasing total lead time and increasing flexibility in processes. While this study explicitly acknowledges the human aspects of organizational change and the need for worker participation, it fails to define productivity changes and how these are calculated. A concept closely related to lean production is total quality management. Like lean production practices, total quality management practices aim to reduce waist, maximize efficiency and achieve zero defects.

Total quality management. A number of recent studies examine the relationship between the extent to which companies implement TQM practices and firm performance (Hasan & Kerr, 2003; Kaynak, 2003; Kleiner, Leonard, & Pilarsk, 2002; Merino-Diaz de Cerio, 2003; Sánchez-Rodgríguez et al., 2004). In a combined sample of manufacturing and service firms, Kaynak (2003) shows that process management, supplier quality management,

and product or service design exert a direct positive effect on operating performance. In the same study, operating performance is suggested to mediate the positive effect of TQM practices on financial and market performance. In support of a direct relationship between the extent of an organization's implementation of quality management practices in purchasing and operational performance as well as internal customer satisfaction, Sánchez-Rodríguez and colleagues (2004) present empirical evidence from a cross-sectional study based on self-reported data from single respondents.

According to Hasan and Kerr, "…quality is one of the effective strategic weapons for improving productivity and enhancing reliability in the organizations" (2003: 290). In their investigation of service organizations, Hasan and Kerr (2003) demonstrate that the role of top management and customer satisfaction have the strongest impact on business performance. Interestingly, results suggest that both top management and customer satisfaction have a stronger effect on organizational performance in TQM firms than non-TQM firms, underscoring TQM practices as a moderating variable. A significant relationship also emerged between the level of implementation of quality management practices and improvement in operational performance in terms of cost, quality and flexibility (Merino-Diaz de Cerio, 2003). Specifically, results from 965 manufacturing plants indicate that TQM practices related to product design and development, together with HRM practices, are the most significant predictors of productivity performance (ibid., 2003).

Other findings, however, indicate that TQM exerted little or no observable impact on the productivity of firms over a short time it was in place (Kleiner et al., 2002). In fact, the authors show that TQM practices reduced labor productivity and increased labor costs in its first year of implementation. On the other hand, a movement from TQM to an authoritarian mode of management displayed positive productivity effects in the short run (ibid., 2002). The fact that TQM practices were observed to have a positive effect on labor productivity during its second year suggests that that it is reasonable to expect that a time lag of some

duration is required for a change in management practices to exert an impact on productivity levels. Because management under pressure for results is less likely to commit to the achievement of long-term results, TQM practices may not always result in enhanced productivity if the short-term costs are too great.

Business process reengineering. Considering the total of all inefficient work hours, Thomas, Horman, Miching and Chen (2003) show that 58 percent are attributable to ineffective labor flows. More specifically, the study presents empirical findings to indicate that effective flow management, including flow of labor and availability of reliable materials, information and equipment resources, can improve construction labor performance. Rotab and Khan (2000) devise BPR for air cargo handling and infer from calculations that cycle times can be shortened, work efficiencies can be improved, and overall costs reduced. The authors go on to state that "BPR has proved to be a modern innovative useful management technique to achieve dramatic improvement in operational efficiencies for quality services of an airline's cargo handling process (ibid., 2000: 108).

The main conclusion that one can read from the cited papers on productivity of innovation is that management practices have frequently been conceptualized as involving the management of resources and/or operations that can influence productivity through enhanced cost-efficiency, allocative-efficiency and X-efficiency (Leibenstein, 1966) (Figure1). Put differently, management practices can help align the interests of managers and shareholders, motivate and monitor employees and managers, reduce total costs, allocate resources more effectively, and transform inputs at minimum costs into maximum profits, thereby influencing a firm's productivity. Firms that have higher formality in management practices are more productive than those who are informal in management practices (Cosh, Fu and Hughes, 2005). Management practices contribute significantly to explain the US/UK productivity gap (Bloom and Van Reenen, 2006). However, the findings reported in the cited

papers support the idea that there are no universal productivity-enhancing management practices. More specifically, optimal management practices can vary across countries and industries. The success of management practices is industry-specific (Cosh, Fu and Hughes, 2005), and may even be firm-specific and can be affected by the prevailing institutional environment at individual workplaces (Edwards, Battisti and Neely, 2004).

Insert Figure 1 about here

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4. Structural Embeddedness, Management Practices and Productivity

A growing body of literature suggests that firms are embedded in a network of inter-organizational linkages that influence their behavior (Balkundi and Kilduff, 2005; Baum and Dutton, 1996; Gnyawali and Madhavan, 2001; Granovetter, 1985; Hagedoorn, 2006; Kilduff and Tsai, 2003). Building upon these findings, we address the role of structural embeddedness in impacting the link between management practices and productivity. More specifically, we show how network density (the extent of interconnection among actors in a network) tends to moderate the management practices-productivity relationship.

Network density: Impact on the management practices-productivity relationship. The more interconnected actors in a network are the greater network density. A network in which actors frequently interact with each other, for example, can be seen as a dense network. Network density is likely to influence management practices' effectiveness in directing the change in productivity of organizations for a number of reasons. First, although management practices can create the potential for increased productivity by facilitating greater specialization of inputs and outputs, actors need to identify appropriate exchange partners to unlock the benefits from outsourcing and operations management practices such as just-in-time, lean production and business re-engineering. Network density facilitates the interaction

among actors (Coleman, 1990) and, thus, reduces time and costs associated with finding the most suitable business partners.

Because of a more efficient flow of information (Coleman, 1988), dense networks may also enable firms to gather important information on each other and, thus, increase the confidence that exchange partners have in each other's reliability and integrity (Gulati, 1995; Kenis & Knoke, 2002). As actors start to communicate with each other more frequently, they are more likely to trust each other and, consequently, develop greater compatibility in decision processes (Coleman, 1990; Uzzi, 1997). Evidence from companies' ability to reduce costs and operate more flexibly indicates that exchange partners often discover new ways of exploiting synergies when network embeddedness is high (Dyer and Nobeoka, 2000; Echols and Tsai, 2005; Lorenzoni and Lipparini, 1999). All this is likely to have an immediate impact on how effective management practices can influence productivity.

Outsourcing and operations management practices, such as lean production, TQM and business re-engineering, are more likely to positively influence productivity of organizations the easier it is for management to establish trusting relationships with appropriate exchange partners. Because it can be very costly and time consuming, if not impossible, to explicitly contract for all value-creation contingencies (Williamson, 1985), outsourcing practices may not always lead to desired results. In self-enforcing agreements based on trust or reputation, on the other hand, actors can rely on exchange partners' good intent or reliability (Mishira, 1996; Ring and Van de Ven, 1994). As a result, firms are more willing to take risks in such exchange. Outsourcing and operations management practices demand organizations to coordinate production processes and information flows with other actors.

While low levels of interconnection among actors may suffice for the transfer of easily-codified information, network density takes on added significance by facilitating close, embedded interaction among actors to transfer sticky or tacit knowledge when information is more ambiguous (McEvily and Marcus, 2005; Nahapiet and Ghoshal, 1998). Accordingly,

dense networks of inter-organizational linkages are likely to reduce search costs and increase the speed and ease with which knowledge is transferred among organizations, thereby, facilitating the successful implementation of outsourcing and operations management practices. In summary, the extent of interconnection among actors in a network makes opportunities for synergy and complementarities more visible and, thus, enhances productivity by reducing search and transaction costs.

In addition to the positive effects described above, network density can also inhibit actors' capacity to identify and accommodate new business partners (Uzzi, 1997). For example, highly dense networks may be more likely to foster membership stability, which can consequently lock-in actors in existing business relationships (Kim, Oh, & Swaminathan, 2006; Rowley et al., 2005). This is because frequent exchange among network members may influence actors' attachment to each other based on shared goals and beliefs (Salancik, 1977) and the accumulation of partner-specific knowledge (Levinthal & Fichman, 1988). As companies build relationships based on mutual trust and reciprocity, they may become less open to new business opportunities with firms outside their existing network and, thus, suffer from reduced competitive vigilance (Portes & Sensenbrenner, 1993).

Managing Networks: Impact on Productivity

As previously discussed, the extent of interconnection among the actors of a network is likely to influence the impact of management practices on the change in productivity of organizations, but managers also can try to shape the structure of the network. By developing and strengthening inter-organizational linkages, managers not only can facilitate effective interaction among appropriate exchange partners and ensure actors stay committed; they also manage the network of linkages itself. In order to improve productivity, an organization's network of inter-organizational linkages must be structured in such a way that production is efficient and effective. Evidence from U.S. public education shows that managers can shape

the structure of a network by actively promoting interactions, fostering coordination, and signaling identity (Ibarra, Kilduff and Tsai, 2005; Meier and O'Toole, 2001). Network management, we argue, is a practice through which managers can influence the change in productivity of organizations.

Network management can ensure that resources are allocated most efficiently among actors and, thus, leverage external opportunities. Meier and Gill (2000), for example, show that greater network density and frequency of interaction among actors leads to higher performance. Managers can shape and manage the network in which their organizations are embedded in a number of ways. One important practice in managing networks is the identification and incorporation of key actors (Lipnack and Stamps, 1994; Nebus, 2006; Termeer and Koppenjan, 1997). Management can take an active role in assessing potential exchange partners and attracting the most appropriate actors to a network of inter-organizational linkages and, thereby, open new opportunities for exploiting synergies. The selection of exchange partners is a critical component of network management (Agranoff and McGuire, 1999) that can help organizations benefit from more effective and efficient inter-organizational exchanges.

In addition to identifying appropriate exchange partners, managers can help frame the structure of a network by creating connections among actors and defining norms and rules of the network. Network management also includes the development of commitment by organizations to participate in, and contribute to, productivity enhancing exchanges. Managers may achieve this by forging an agreement on the scope of network operations and active networking efforts (Kickert and Koppenjan, 1997). Accordingly, network management shapes inter-organizational linkages in a way that maximizes their advantages to an actor. For instance, networks may continually evolve and sometimes linkages can become redundant in terms of their benefit to the network. In order to avoid inertia (Nooteboom, 2000) or overembeddedness (Uzzi, 1997), whereby actors become blind in a way they ignore

competition, markets and technologies outside their network, managers can actively pursue a strategy of welcoming new actors to, or remove current actors from, the network and new create linkages with actors outside network. Accordingly, the most successful companies may be the ones that manage to balance their strong relationships with a number of weak ties in their network to benefit from trusting links but avoid ossification (Noteboom, 2000; Ring and Van de Ven, 1994).

The capability to judge network opportunities and exploit them accordingly is a critical quality in the management of inter-organizational linkages. Managers contribute by developing relationships and furthering interaction among actors (Agranoff and McGuire, 1999) and facilitating information exchange (Lipnack and Stamps, 1994; Termeer and Koppenjan, 1997) that result in achieving the network purpose. In other words, managers can shape the environment in which fruitful exchanges among actors can take place. This can be done by mobilizing exchange partners, forging an agreement on the role and scope of interactions, and identifying appropriate members to join a network.

5. Conclusions and Discussions

To conclude, the relationship between management practices, structural embeddedness and productivity of firms can be summarized by a synthesized conceptual model (Figure 2). First, clusters of resources management practices and operations management practices affect firms' productivity directly and jointly. Second, the structure of the network to which an organization belongs can influence the impact of resources and operations management practices on the productivity of firms. Third, network management practices may influence productivity of firms directly. Finally, management can affect the structure of the network to which their organizations belong and, thereby, strengthen or weaken the impact of resources and operations management practices on the productivity of firms.

Insert Figure 2 about here

The article contributes to our understanding of the relationship between management practices and the productivity of firms by considering the role of management in the measures of productivity. Specifically, our objective in this article is to highlight how management practices can influence the productivity of organizations in important ways. In doing so, we examine the stream of research studies on the potential relationships between productivity and management practices and identified two bodies of literature: Resources management and operations management. Building upon these, we develop the following clusters of complementary management practices: Human resources management, information resource management, outsourcing management, operations management, and network management practices.

The integration of a structural embeddedness perspective into our analysis provides a unique perspective that complements our current understanding of the relationship between productivity and management practices. The proposed framework adds value to both the literature on management practices as well as structural embeddedness by linking these powerful concepts to create a more coherent picture.

Our framework complements existing research in important ways. First, our focus on identifying clusters of complementary management practices contributes to the literature in stimulating further exploration of complementary practices by managers. Progress made in this area will be beneficial in helping us formulate and examine more parsimonious models of management practices. Second, the integration of a structural embeddedness perspective will encourage more context-specific analyses on the impact of management practices on productivity. Our review of the literature shows that empirical evidence supports the argument that effective management practices need to be context specific. As we argue in this article,

network density can have a significant influence on the effectiveness of important management practices in changing the productivity of firms. The moderating role of network density highlights the dynamism and context-specificity involved in understanding how management practices can influence productivity.

While suggesting network density as an important factor to consider when studying the effect of management practices on productivity, we complement our current understanding of management practices by proposing the active management of networks as a principal management practice. Managers not only evaluate their firms' links with other organizations (Ring and Van de Ven, 1994), they can also impact network density and, thus, create and sustain the structure that characterizes their firm's network of inter-organizational linkages to extract value (Dhanaraj & Parkhe, 2006).

Directions for Future Research.

Advances in information and communication technologies may not only improve the productivity of firms, but they are also likely to affect employees' behaviors and skills that are required to trade upon increased levels of market dynamism (Hoogervorst, Koopman, & Van der Flier, 2002). To this date, the dynamic relationships between human resource management practices and firms' investments in information and communication technologies. A promising avenue for future research, therefore, is to examine to what extent HR management practices may enhance the positive impact of IT technologies on the productivity of firms.

Although outsourcing practices can positively affect efficiency and reduce production costs, they may also create a work environment of high pressure, causing dysfunctional behaviors by employees scared to lose their jobs. As argued by Polanyi and Tompa (2004), the quality of employees' work experience can be determined by both work environment and the fit of employees' needs and personality with the work environment. By outsourcing parts of their value chain, firms may alter the work environment of remaining employees. As a

result of this, employees' trust in, and loyalty to, their organization may be affected (Biggs & Swailes, 2006). Human resource management practices, however, may be used to send a strong signal of commitment to an organization's workforce and, thus, enhance the effect of outsourcing on productivity. Further, increased communication and interaction between an organization and its workforce through induction, training, appraisal and incentive schemes, can foster the development of similar goals, emotional contagion, and promote employee involvement in activities desirable by firms (Benson, 2006; Dorenbosch, Van Engen, & Verhagen, 2005; McFadyen & Cennalla, 2004; Thompson & Heron, 2005). Future research may examine the ability of HR management initiatives to reinforce employees' perceptions of their firm's integrity and, thus, corroborate the positive relationship between outsourcing and the productivity of firms.

As previously discussed, the extent of interconnection among actors in a network is likely to affect the impact of management practices on the change in productivity of organizations. Network density, we argue, can be influenced through the active management of a firm's inter-organizational linkages. Therefore, we expect that network management practices will have a positive impact on the change in productivity of organizations. Furthermore, outsourcing and operations management practices will have an increased effect on the productivity of firms as both network density and network management practices increase. We encourage additional research on the roles of network management practices and the productivity of firms and suggest future research to consider the structural embeddedness of firms when testing the relative effectiveness of individual management practices in enhancing productivity.

Managerial Implications

Our review indicates the need for viewing management practices as complementary actions. Managers seeking to influence the change in productivity of their organizations need

to be aware of, and focus on, the dynamic relationships between various management practices. Specifically, if managers complement investments in information and communication technologies and efforts in outsourcing, lean production, TQM and business re-engineering with HRM practices, they will benefit from a greater positive changes in their firms' productivity levels. In other words, managers wishing to improve productivity will be more successful when clusters of complementary practices are employed than a single-minded focus on outsourcing, lean production or business re-engineering. Accordingly, we argue that the identification of complementary clusters of management practices adds considerable value to the literature by explicitly defining management practices as a set of complementary actions.

Effective management practices need to be context specific. In this article, we propose the structural embeddedness perspective to shed additional light on the effectiveness of management practices in changing productivity. For managers it is critical to realize how network density can influence the effectiveness of their attempts to improve productivity. Therefore, we suggest the active management of networks as an important practice through which the productivity of organizations can be changed. For example, important actions that managers can take include the identification and consequent invitation of appropriate exchange partners to exploit potential synergies. Further, managers can foster trust and commitment among network actors by forging an agreement on the role and scope of network exchanges. Importantly, managers can take action to avoid lock-in or ossification by balancing network density with practices that encourage openness to a diverse set of new members.

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TABLE 1

Effect of Management Practices on Productivity

Type of Management Practice	**Main Findings**	**Examples of Studies**
Operations management	Lean production practices lead to an improvement in productivity	Arbós (2002) Dunlop & Smith (2004) Kosonen & Buhanist (1995)
	TQM practices positively affect productivity	Kaynak (2003)
	Business re-engineering lifts productivity	Rotab (2000)
Resources management	Investments in IT lift productivity	Dorgan & Dowdy (2004) Gera et al. (1999) Licht & Moch (1999) Pilat (2004)
	Outsourcing has positive effects on productivity	Egger et al. (2004) Girma & Gorg (2004)
	HRM practices have positive impact on productivity	Geralis & Terziovski (2003) Ichniowski & Shaw (1999) Ichniowski et al. (1995) Merino-Diaz de Cerio (2003) Pun et al. (2001)

FIGURE 1

Management Practices and Productivity: Transmission Mechanisms

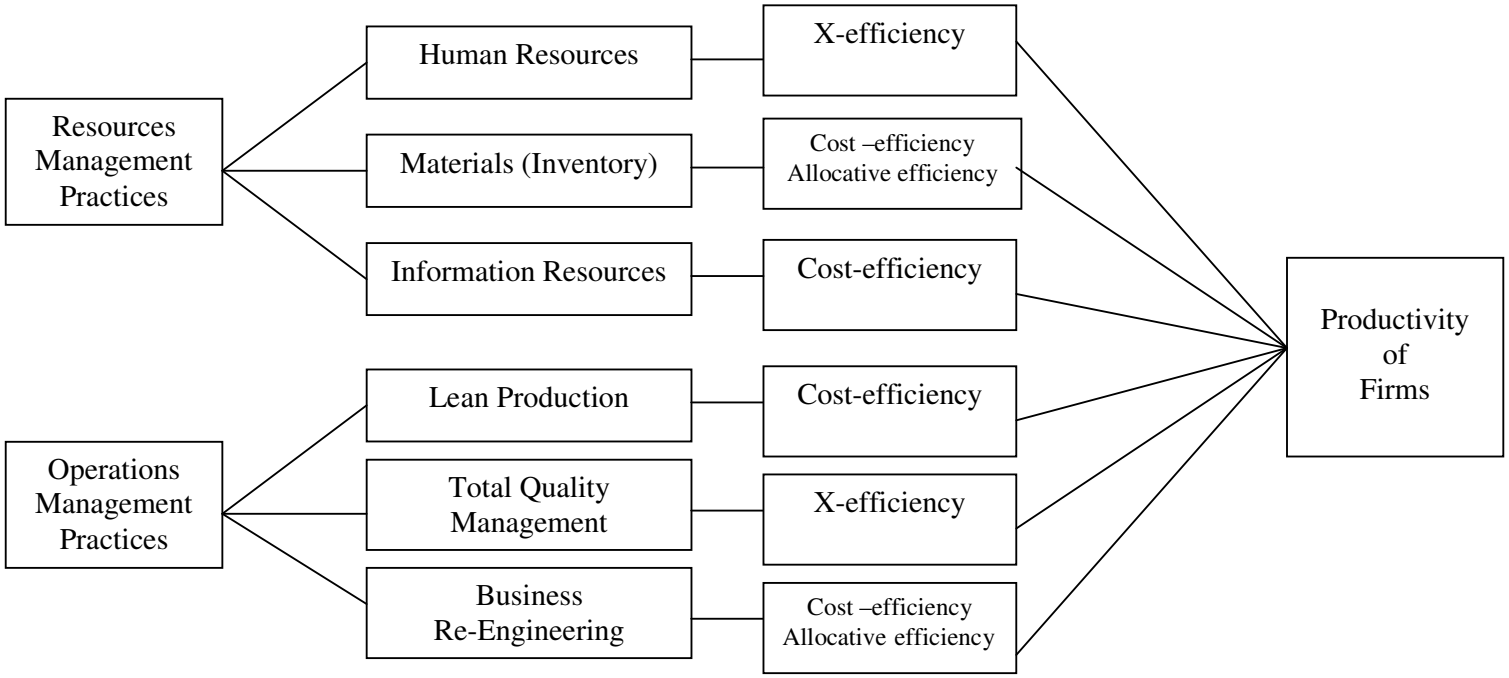

FIGURE 2

Conceptual Model