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Determinants of Management Practices among Manufacturing Firms in Pakistan

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A strong case for looking at management quality as a source of productivity has been assembled in recent years by studies showing that variations in management quality account for a big part of the productivity gap across firms and countries. In this paper, we investigate the determinants of management quality among Pakistani manufacturing firms, using a new World Bank Enterprise Survey that provides firm-level information on the use of modern management practices. Our findings suggest that the adoption of good management practices is influenced by such characteristics as firm size, product market competition, ownership type, and the information available to staff and managers. We also find that such considerations are more relevant for medium and large firms than for small firms. Finally, we find that the link between management practices and productivity is not uniform and varies from practice to practice.

JEL Classifications: L1; L25; M5.
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(A) INTRODUCTION

Good management is associated with certain formal and structured practices in offices, factories, and other workspaces whose adoption is considered to lead to better business performance, as reflected in productivity, employee satisfaction, customer retention, or social welfare considerations. Indeed, this is the core justification for the academic discipline of management science and considerable literature exists on the conceptual and empirical ramifications of this idea. Good management is also of relevance to the discipline of economics. In recent decades, a series of empirical studies have shown that variation in management practices accounts for a considerable part of the variation in productivity across firms and countries. This is the conclusion, for example, of periodic reviews of "the new empirical economics of management" (Bloom *et al.*, 2014 and Scur *et al.*, 2021). Furthermore, in international comparisons, management quality in developing countries is found to be much lower than in developed countries due to the former's having a thick tail of poorly managed firms. Expanding the number of better-managed firms should, therefore, be a matter of high priority for developing countries.

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For many such countries, however, empirical assessment is hampered by a lack of datasets in which management practices are defined in a consistent manner, which are representative across different sectors and scales of enterprise, and which have been collected through a random sample approach. For Pakistan, published studies are typically based on samples selected non-randomly, containing a small number of observations, and narrowly focused on one or a few sectors.[1] Fortunately, better information on management practices in Pakistan has become available in recent years. One source is the latest World Bank Enterprise Survey for Pakistan (WBES, accessible at World Bank, 2023) which provides access to a large national random sample of manufacturing (and service) firms containing information on specific management practices.[2] The main objective of the present study is to conduct a rigorous analysis of the determinants of good management practices in Pakistan based on the latest WBES.

The remainder of this paper is organised as follows. Section B contains a brief review of what is known empirically about management practices in Pakistan from a variety of sources. It also contains a description of the management practices covered in the WBES dataset. This is followed by a discussion in Section C of the hypotheses we propose to investigate based on insights derived from theoretical considerations and the relevant literature. In Section D, we describe our analytic procedures and discuss the main results obtained. Section E concludes.

(B) MANAGEMENT PRACTICES AMONG PAKISTANI FIRMS

There are four main sources of information about management practices prevailing among Pakistani firms. First, some information about the awareness and application of different quality management practices is available from the secondary literature. Second, some information on the use of international certification is available from the International Organisation for Standards (IOS). Third, Choudhary *et al.,* (2018) provide information on management practices collected through the PK-MOPS project. Finally, some information is now available on management practices from the latest round of the WBES for Pakistan. We provide illustrative examples from the first three sources below and follow up with a more detailed description of information from the fourth source.

As already noted, the secondary literature for Pakistan consists largely of studies based on non-random samples of convenience whose findings cannot be generalised. Nevertheless, one study (Kureshi *et al*., 2009) provides a useful point of departure. This study surveyed 107 small and medium enterprises (SMEs) in northern Pakistan inquiring about the level of awareness (knowledge among managers) and application (actual use by firm) of nineteen practices related to business improvement. The main findings were the following: (a) awareness rates varied greatly among the practices, ranging from lows of 34 percent for benchmarking and 43 percent for Six Sigma to highs of 83 percent for customer surveys and 74 percent for corporate social responsibility; (b) application rates also varied widely, from lows of 4 percent for Six Sigma and 20 percent for PDCA (plan-do-check-

[1] Such samples of convenience may produce useful learning in limited domains, but their results are not generalisable for policy purposes. Case studies, staples of the management literature, may be good tools for teaching but are limited when it comes to testing hypotheses and designing policies for wide application.

[2] Information on management practices was also collected through the Management and Organisational Practices Survey in Pakistan (PK-MOPS), conducted by the Pakistan Bureau of Statistics in several stages during 2014-18. For a description and discussion of this dataset, see Choudhary *et al.,* (2018).

act) to highs of 90 percent for employee suggestion schemes and 75 percent for business practice reengineering. The study did not investigate the causes of differences in application rates by sector or firm size or other possible determinants.

Information from the IOS shows how many firms adhere to its standards, including ISO 9001 which is broadly concerned with management practices relating to customer focus, efficiency, evidence-based decision-making, and relationship management. Over the last two decades, this certification has spread widely across countries and sectors. For Pakistan, the number of ISO 9001 certifications rose from around 600 in 2000 to over 3100 by 2022 (see IOS, 2023).

Analysing data from the PK-MOPS survey, Choudhary *et al*., (2018) find 27 percent of Pakistani firms (from a combined sample of 6876 firm/year observations) using Performance Monitoring as a management practice and 22 percent using Incentives and Targets. They report that the use of these practices has risen over time (between 2010 and 2015) and varies enormously across provinces.

The latest WBES for Pakistan is our fourth source of information. It contains information on specific management practices collected on a national basis using a random sampling methodology. The WBES was administered to both manufacturing and service firms, the former being distributed across 23 industrial sectors and 5 regions of the country (see Annex 1). The sampling frame was designed to be stratified across sectors, regions, and establishment size.

The section on Management Practices contains 11 questions, including some of a follow-on nature that are only relevant if the previous question was answered in the affirmative. The questions pertain to six aspects of management with three relating to Operations (production monitoring, target setting, and process problem fixing) and three to Human Resources (bonus awarding, staff promotion, and underperformance remediation). These are shown in Table 1 below, along with the frequency distribution of usable responses. The exact questions asked, the possible responses, and how responses are coded are shown in Annex 2.

Table 1

Management Practice Questions and Responses in the WBES

Management Practices	Response Frequency
Performance Monitoring: Did this establishment monitor any production performance indicators?	320 yes, 501 no.
Target Setting: Did this establishment set any production provision targets?	314 yes, 506 no.
Problem Fixing: When production process problems occurred, were they addressed, or was no action taken?	501 appropriate actions taken, 312 not.
Bonus Awarding: Were performance bonuses for relevant staff based on production targets?	402 yes, 416 no.
Staff Promotion: Were non-manager staff promoted solely on performance and ability or based on other factors?	446 performance and ability; 290 other.
Underperformance Action: Was remedial action taken or not after identifying staff underperformance?	413 yes, 354 no.

Source: World Bank Enterprise Survey for Pakistan, 2023.

The first management practice, Performance Monitoring, records whether the firm monitors production performance indicators. Such indicators could include the volume of production, number of defects, cost of inputs, and so on. The second, Target Setting, records whether the firm sets targets with respect to production, defects, delivery times, and so on. The third, Problem Fixing, records whether the firm deals with process problems (such as machinery breakdown or worker errors) rapidly and thoroughly. The fourth, Bonus Awarding, records whether the firm rewarded relevant staff for meeting production targets. The fifth, Staff Promotion, records whether non-manager staff are promoted for performance and ability or other considerations. The sixth, Underperformance Action, records whether remedial action (reassignment or dismissal) is taken with respect to underperforming staff.

Note that affirmative answers to the above questions are considered good management practice (coded as 1) while negative answers are considered poor practice (coded as 0). Similar notions of good practice are found in the content of such concepts as Total Quality Management and ISO-9001 which are widely used in management science literature. The extent and distribution of relevant management practices is shown in Table 2. There are two main patterns. First, some practices are more popular than others. Less than half the firms claim that they follow good practices in the areas of Performance Monitoring, Target Setting, and Bonus Awarding while a much higher proportion reports following good practices in relation to Problem Fixing (61 percent), Staff Promotion (61 percent) and Underperformance Action (54 percent). Second, there is a clear relationship between management practices and firm size. The prevalence of each practice is higher among larger firms (with 20 or more workers) than among small firms (with fewer than 20 workers).

Table 2

Sample Means for Management Practices

	Full Sample	Larger Firms	Small Firms
Management Practice			
Performance Monitoring	0.39	0.44	0.25
Target Setting	0.38	0.43	0.25
Problem Fixing	0.61	0.64	0.55
Bonus Awarding	0.49	0.56	0.28
Staff Promotion	0.61	0.67	0.43
Underperformance Action	0.54	0.58	0.42

(C) THEORY, LITERATURE AND HYPOTHESES

What drives the adoption of good management practices? The management science literature reflects two broad conceptual approaches to this question. One considers that firms adopt practices largely to conform to established norms. The pressures that arise may be coercive (such as when certain practices are required by law or regulation), mimetic (such as when the adoption is imitative of peers or market leaders), or normative (when adoption is driven by an industry norm). This perspective goes under the name of new institutional theory (DiMaggio and Powell, 1983). Another perspective emphasises the

importance of the resources available to the firm as the main driver of management practices and is thus referred to as the resource-based view. The economics literature, of course, emphasises the perspective of profit-maximisation under which specific practices may be adopted if the benefits from doing so exceed the costs. The relevant costs and benefits need not be pecuniary and measurable in nature but could also be non-pecuniary and non-measurable.[3] A review of the empirical literature suggests that most factors found to be statistically related to management practices can be accommodated under one or the other of these perspectives. In the discussion that follows we consider five broad categories of determinants of management practices: firm size, market structure, ownership characteristics, human capital and information environment, and business performance.

Firm Size

The role of firm size is conceptually straightforward. The larger a firm the more likely it is to have multiple operational products and processes, and diverse specialised functions. All these make the management of a large firm inherently more complex than that of a small firm. Accordingly, the larger the firm the more likely it is to require formal management practices, both for operations and for human resource deployment. Furthermore, operational efficiencies and cost savings may be achieved from upgrading management practices, which suggests that the economic perspective may be appropriate in this case. At the same time, however, the larger a firm is, the more resources it is likely to have at its command to upgrade its management practices, suggesting a link with the resource-based perspective.

A positive link between firm size and the adoption of good management practices is often found in the empirical literature. The interpretation of this link is complicated, however, by the fact that the relationship may be endogenous. Just as larger firm size may compel the adoption of formal management practices so also might the latter enable a firm to grow. In other words, better-managed firms may grow faster than poorly-managed firms. Bloom and Van Reenen (2016) report a positive correlation between firm size (measured by number of workers) and management quality score and interpret this as indicating that better management drives larger firm size. Agarwal *et al*. (2013) report a positive correlation for their study of firms in New Zealand but interpret it as larger firm size driving better management.

Studies of this link are rare for Pakistan because of the lack of datasets that cover a wide range of firm sizes. One study (Raziq, 2014), based on a sample of 357 firms (with 20-250 workers), reports mixed results that were only "partially supportive of a positive relationship between firm size and the adoption of high-performance management practices." Partially supportive means that some management practices differed among the firms while others did not. Choudhary *et al.*, (2018), using a much larger sample, report a statistically significant correlation between firm size (measured by number of workers) and management quality (a composite score based on the various management practices engaged in by firms).

[3] There is a fourth strand as well, sometimes referred to as contingent management. The idea here is that a firm's management practices vary as its environment varies. Every firm's management, therefore, is contingent on its specific circumstances.

Market Structure

The adoption of formal management practices could also be influenced by market structure. Firms in competitive markets have an incentive to adopt practices that may give them a production or marketing edge whereas firms in oligopolistic markets do not have a similar incentive. Also, in competitive markets, poorly--managed firms are more likely to exit, leaving better-managed firms to be more widely represented. Bloom and Van Reenen (2010) highlight variations in the intensity of product market competition as an important determinant of variations in the average quality of management practices across countries. In another study, Bloom *et al*. (2016) show that import penetration plays such a role across a multi-country sample: the higher the import penetration in an industrial sector the higher the management score of firms in that sector. Not all measures of competition find empirical verification. Agarwal *et al.* (2013) measure competitive pressure as the number of competitors reported by the firm and find that this is not significantly related to their measure of management quality for manufacturing firms in New Zealand. For Pakistan, Choudhary et al., (2018) report a positive link between the management quality score of firms and their exporting status. These results generally support the economist's perspective with good management practices being adopted in reaction to revenue and profit threats (from the potential loss of sales) posed by competition. However, one could also frame these results as being consistent with the institutional perspective. Firms involved in exporting tend to have better management practices and this norm spreads throughout the relevant sector through mimetic or normative pressure.

Ownership Characteristics

Ownership arrangements vary from concentrated forms, such as sole proprietors and limited partnerships, to diffused forms, such as joint stock companies with many shareholders. The more widely ownership is dispersed the more pressure there should be for formal management processes that boards and shareholders can observe, and the more likely it is that poorly performing managers will be removed by restive boards and shareholder groups. By the same token, at the other end of the ownership spectrum, sole proprietorships are more likely to be characterised by inertia in management style and a reluctance to adopt new practices due to habit or ego, sometimes referred to as the "owner knows best" syndrome. Sole proprietorships are also more likely to feature transitions in executive management from father to son (usually the eldest son) with no regard necessarily for the latter's suitability for the job.

In their study of manufacturing firms in New Zealand, Agarwal *et al*. (2013) report significant links between different measures of ownership and management quality. For example, family ownership has a significant negative correlation with management quality while diffused and international ownership have positive correlations. Indeed, in a broad review, Tsoutsoura (2021) finds much evidence that family firms are typically less eager to adopt modern management practices. For Pakistan, Choudhary *et al.,* (2018) find that concentrated forms of ownership are negatively correlated with management quality. Iqbal and Nakhoda (2024) report a similar correlation of ownership diffusion with international certification, which may also be considered a type of good management practice.

There is indirect evidence as well on this issue for Pakistan. Khan and Nouman (2017) report a negative relation between firm performance and family domination in ownership while Ullah *et al.*, (2017) report the same for concentrated ownership. Similar evidence is reported for the effect of different forms of ownership on financial management (involving dividend distribution and debt leverage policies). However, most indirect evidence comes from studies of publicly listed firms which tend to be relatively large in scale and not statistically representative of the manufacturing sector of Pakistan.

Human Capital and Information Environment

Firms whose staff and managers operate in an environment in which information is easily acquired are more likely to adopt good management practices. This is more likely to happen when staff and managers are educated and thus able to access and process information from a variety of sources (professional networks, print and social media, and so on). In a recent review, Valero (2021) confirms a positive link between staff and manager education and management quality in a variety of settings including manufacturing and healthcare provision. Indeed, positive links are also reported between the presence of colleges and business schools in specific locations and the adoption of good management practices in nearby firms, an example of a positive spillover externality. For Pakistan, Choudhary et al., (2018) report a positive correlation for management quality with measures of education of managers and non-managers. They also report a similar role for firm age which could also be thought of as a measure of accumulated human capital.

In other studies, the information interpretation and dissemination role of computers is emphasised as a determinant of good management practices (Bloom *et al*., 2013). For Pakistan, the availability and use of websites and social media presence are found to be positively correlated with the adoption of international certification by Iqbal and Nakhoda (2024).

The roles of human capital and information appear to be more related to the institutional perspective than to other theoretical considerations. Knowledge about good management practices in peer or comparator firms is obtained through human capital and information technology channels. It is then communicated in the form of normative or mimetic pressure leading to the adoption of similar good management practices.

Business Performance

The link between management practices and business performance has been studied in diverse contexts using a variety of databases. Studies using the World Management Survey database have shown that higher management quality scores are correlated with better performance (measured in different ways) in a variety of manufacturing and service sector settings (Scur *et al*., 2021). However, studies focused on international certification measures, such as the ISO 9001 protocol, report mixed results. They find positive, negative, and insignificant correlations between protocol adoption and better business performance (Sfreddo *et al*., 2018).[4]

For Pakistan, Choudhary et al., (2018) find management quality scores for firms to be positively and significantly correlated with various measures of business performance,

[4] A negative correlation may arise because there is a financial cost involved in acquiring ISO 9001 and some firms may not be able to recover this cost in enhanced sales over time.

such as labour productivity, profitability, and employment growth. Other studies look at the correlation of international certification with different measures of business performance. Masakure *et al*. (2009) find export sales to be positively correlated with certification status among exporting firms in the textiles, leather, fisheries, and agro-food sectors in Pakistan. We may consider this study to be relevant as well since productivity is often associated with export success. Fatima (2014) reports a positive and statistically significant correlation of certification with financial performance among a sample of publicly listed firms in Pakistan. Raziq and Wiesner (2016) report a positive relationship between their measures of high-performance (human resource) management practices and financial and operational outcomes. The last two studies, however, are based on relatively small samples.

The role of business performance is directly related to the theoretical perspective prevailing in economics. Good management practices are adopted because they are thought to lead to gains in productivity and profitability. Whatever costs may be involved in changing management practices are expected to be more than offset by financial benefits over time.

As previously noted for firm size, the relationship between business performance and the adoption of formal management practices may also be endogenous. While the expectation of better performance may drive adoption, it may also be true that high-performing firms choose to adopt good management practices because they are better resourced. Indeed, for the ISO 9001 certification, some studies have found this to be the case (see Dick *et al*., 2008). To our knowledge, no study has examined the empirical importance of this endogeneity issue for Pakistan.

Hypotheses

The above review yields the following five hypotheses that we propose to test in the next section of this paper:

H1: Larger firms are more likely to adopt better management practices than smaller firms.
H2: Firms operating in more competitive industries are more likely to adopt better management practices.
H3: Firms with more concentrated forms of ownership, such as sole proprietorship, are less likely to adopt better management practices.
H4: Firms featuring work environments conducive to access and dissemination of information are more likely to adopt better management practices.
H5: Productivity is likely to be higher among firms with better management practices than among those without such practices.

(D) ANALYSIS AND RESULTS

Analytic Approach

Our analytic approach unfolds in three stages. First, we test a statistical model in which the dependent variables are the management practices listed in Table 1 and the independent variables are proxies for firm size, market structure, ownership characteristics, and the information

environment available to staff and managers (see Annex 3 for brief descriptions). Second, we investigate the role of firm size in more detail by creating two sub-samples, grouping large and medium firms in one category and small firms in the other, and testing our empirical model for each category separately. This allows us to comment on the link between firm size and management practices while reducing endogeneity concerns. Third, we run a model in which productivity is the dependent variable and management practices are independent variables; the results should help assess whether the expectation of higher productivity may be considered a significant determinant of the adoption of certain management practices.

Our dependent variable is different from that used in some of the literature cited above. Much of the empirical literature is based on the World Management Survey (WMS) dataset covering 11000 firms across 34 countries that has been conducted in waves since 2004 (see Scur *et al.*, 2021, for a recent overview). The WMS dataset contains 18 questions on management policies with responses recorded on a scale of 1-5. A composite management quality score is derived from these responses, giving each question equal weight.[5] Our WBES dataset contains 11 questions whose response format is not uniform. Some have Yes/No formats while others have more than two response options. We have, therefore, defined six management practices from this set using the original Yes/No responses for three practices and re-coding the remaining three to also get binary outcomes (See Annex 2 for coding details). Our procedure imposes minimum researcher discretion on the coding of the responses. Since the management practices thus derived are binary in nature, taking the value 1 for what we consider "good" practice and the value 0 otherwise, the econometric procedure chosen for their analysis is a probit regression.[6]

We measure firm size as the number of permanent full-time workers as of the last fiscal year. While other measures have also been used in the literature (such as volume of sales or value of assets) the number of workers is more easily observable and is widely used in the literature. The WBES sample is also stratified by this measure and adequate observations are thus available for analysis. Since some very large firms are present in the sample, we use the log of the number of workers in the actual statistical analysis to moderate the effect of outliers.

To assess the role of market structure, we consider two variables. The first, Exporter, indicates whether the firm produces any amount of output for exports. Firms operating in export markets are likely to face more competition and are thus more likely to want to improve management practices to retain customers. Bloom and Van Reenen (2010) highlight the role of exporting in improving management quality in their review of initial findings based on the WMS database. A second option is a variable called Informal Competition which reports whether the establishment competes against unregistered or informal firms. If it does, the degree of competition is likely to be significant and we would expect the firm to adopt practices to give it a productive or reputational edge. The signs of the coefficients for both variables are expected to be positive.

The key ownership characteristic we use in our empirical analysis is whether the firm is owned by a sole proprietor. For reasons already noted in the previous section, sole proprietors are more likely to be wedded to a traditional "owner-knows-best" version of

[5] Choudhary et al., (2018) use a similar approach for PK-MOPS dataset.

[6] When the dependent variable is binary, the popular Ordinary Least Squares estimator generates invalid standard errors. This is because its residuals violate common assumptions such as heteroskedasticity and normally distributed error terms. In such cases, probit or logistic regression techniques are preferred.

management and less likely to be open to experimentation with modern management practices. Based on this assumption and the findings of previous studies, we expect sole proprietorship status to be negatively correlated with good management practices.

Regarding the information environment, the literature suggests that the education level of staff and managers influences the adoption of formal management practices. Unfortunately, we have limited data on staff and manager education levels in our Pakistan sample. Accordingly, we use an alternative variable that offers indirect information about the skill level of staff. This is a variable called Training which records whether the firm offers training to its staff. We expect the average level of skills to be higher in such firms, leading to the same positive outcome for management practices as observed for education variables in previous studies.[7] Another proxy is whether the establishment has its website and social media page. Firms with websites and social media presence are likely to feature more open information-sharing attitudes and environments. We expect managers and staff in such firms to be better informed about business practices outside their firms.

Finally, we use the log of sales per worker as our preferred measure of business performance. While the relevant literature has experimented with a variety of such measures, sales are relatively easy to measure and report and likely to be more reliable than other measures such as profits which firms might be inclined to under-report.

Unobserved industry and regional variations are accounted for by conducting all regressions with industry and region-fixed effects. This procedure does not identify why a particular industry or region may exhibit specific results, but it does assist in making the statistical estimates more precise for the other included variables.

Table 3 provides some basic information about the variables we have chosen for our analysis. Among independent variables, exporters are relatively few (at 15 percent) while sole proprietorships and owned websites are relatively numerous (at 58 percent and 56 percent of our sample). There is a clear pattern of variation across firm size: larger firms are more likely to be exporters, have a website, and offer training; they are also less likely to be sole proprietorships or face informal competition.

Table 3

Sample Means

	Full Sample	Larger Firms	Small Firms
Independent Variables			
Exporter	0.15	0.19	0.03
Sole Proprietorship	0.58	0.51	0.79
Website/Social Media	0.56	0.63	0.38
Informal Competition	0.36	0.33	0.44
Formal Training	0.1	0.14	0
Firm Size	137	182	11
Observations	814	600	214

[7] Note that some of our independent variables could serve multiple roles. For example, exporting could also be thought of as an information conduit. Exporters are more likely to come across economic agents, such as buyers, equipment suppliers, and marketing professionals who are familiar with management practices in diverse global settings. Repeated dealings with such firms could influence management practices.

Empirical Results for Full Sample

Our empirical strategy for this part is to conduct an initial probit regression using all six management practices as dependent variables and a set of preferred proxies for the various categories of determinants as independent variables. This is followed by another regression in which some of the independent variables are replaced by alternative proxies to serve as a robustness check. The results are shown in Tables 4a and 4b.

The results of Table 4a provide strong confirmation that the four categories of independent variables we have considered (firm size, product market competition, ownership characteristics, and information environment) are statistically significant determinants of the adoption of good management practices. Of the twenty-four conditional correlations shown in Table 4a, seventeen have the correct sign and only one has the wrong sign. The rest are statistically insignificant.

Among management practices, Target Setting is best explained by our statistical model in that all independent variables are significant with the expected sign. Four other practices, Performance Monitoring, Problem Fixing, Bonus Awarding, and Staff Promotion, are also well explained in that they feature three significant determinants each. Only Underperformance Action is not well explained. Its only significant variable has the wrong sign.

Among determinants, firm size is the strongest, featuring as significant in five of our six models. The other three variables, exporter, sole proprietorship, and website are also strong, featuring as significant in at least four cases each.

Table 4a

Determinants of Selected Management Practices (Basic Model)

Variables	(1) Perf. Monitoring	(2) Target Setting	(3) Problem Fixing	(4) Bonus Awarding	(5) Staff Promotion	(6) Underperf. Action
Exporter	0.35***	0.23***	0.19***	-0.01	0.10*	-0.13**
	(0.06)	(0.06)	(0.05)	(0.07)	(0.05)	(0.06)
Sole Proprietorship	-0.01	-0.07*	-0.11***	-0.09**	-0.14***	-0.04
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Website	0.34***	0.28***	0.16***	0.33***	-0.03	0.02
	(0.04)	(0.04)	(0.04)	(0.04)	(0.05)	(0.04)
Firm Size (ln)	0.04**	0.04***	0.01	0.14***	0.10***	0.08***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Observations	815	814	801	809	735	761

Table 4b reports the results of choosing alternative proxies for product market competition and information environment. In place of Exporter, we introduce Informal Competition which records whether the firm faces significant competition from informal, unregistered businesses. In place of the Website, we introduce Training which records whether the firm offers formal training opportunities to staff.

The overall results remain strong: sixteen of the twenty-four conditional correlations obtained are statistically significant with the expected sign. As far as the new proxies are concerned, Training is significant in five of the six practices while Informal Competition is not a successful proxy for market structure because it has the right sign in only two cases

and the wrong sign in two. Firm Size and Sole Proprietorship remain significant in most cases. Target Setting remains the best-explained management practice while Underperformance Action remains the worst-explained.

Table 4b

Determinants of Selected Management Practices (Alternative Model)

	(1)	(2)	(3)	(4)	(5)	(6)
	Perf.	Target	Problem	Bonus	Staff	Underperf.
Variables	Monitoring	Setting	Fixing	Awarding	Promotion	Action
Informal Competition	0.29***	0.33***	-0.02	-0.05	-0.13***	-0.08**
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Sole Proprietorship	-0.06	-0.10**	-0.11***	-0.10**	-0.14***	-0.06
	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)	(0.04)
Formal Training	0.49***	0.44***	0.28***	0.16**	0.12**	-0.19***
	(0.06)	(0.07)	(0.05)	(0.07)	(0.06)	(0.07)
Firm Size (ln)	0.11***	0.10***	0.02	0.17***	0.09***	0.07***
	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)	(0.02)
Observations	805	804	791	800	727	752

Notes: The probit regression technique is applied, and marginal effects are reported with robust standard errors in parentheses; Levels of statistical confidence are represented by asterisks as follows: ***p<0.01, **p<0.05, *p<0.1; Industry and region fixed effects are applied but their results are not shown in the tables to economize on space.

Judging a hypothesis to be substantially confirmed if the relevant independent variable in Table 4a or 4b is a significant determinant for at least five management practices and moderately confirmed if it is significant for at least four practices, we can summarise our findings for the first four hypotheses as follows:

H1: The hypothesis that larger firms are more likely to adopt good management practices than smaller firms is substantially confirmed.

H2: The hypothesis that firms operating in more competitive industries are more likely to adopt good management practices is moderately confirmed.

H3: The hypothesis that firms with more concentrated forms of ownership are less likely to adopt better management practices is moderately confirmed.

H4: The hypothesis that firms with information environments conducive to access and dissemination of information are more likely to adopt better management practices is substantially confirmed for Training and moderately for Website/social media.

Results Disaggregated by Firm Size

Using the basic model of Table 4a we now investigate the effect of firm size in more detail by running probit regressions for two sub-samples, large and medium firms (having 20 workers and above) and small firms (having fewer than 20 workers). Since we have grouped the sample by firm size, we drop the firm size variable from the list of independent variables. The results (see Table 5) reveal clear differences between the two groups. Overall, our statistical model explains the adoption of management practices better for larger firms than for small firms. Indeed, for small firms, only the information variable is significant as a determinant while market structure and ownership considerations are not.

Looking at our choice of proxies may help explain why this is so. According to Table 3, only 3 percent of small firms are exporters and as many as 79 percent are sole proprietors. In other words, small firms are overwhelmingly non-exporters and largely owned by sole proprietors. This lack of variation probably accounts for the failure of these characteristics to register as significant determinants of management practices among small firms. Among determinants, what is both surprising and encouraging is that operating a website and/or social media page, which we relate to the information environment available to staff, works well for both categories of firms.

Table 5

Determinants of Selected Management Practices (for Small and Large Firms)

Variables	(1) Perf. Monitoring	(2) Target Setting	(3) Problem Fixing	(4) Bonus Awarding	(5) Staff Promotion	(6) Underperf.
			Large and Medium firms			
Exporter	0.37***	0.25***	0.17***	0.04	0.12**	-0.11*
	(0.06)	(0.06)	(0.05)	(0.07)	(0.05)	(0.06)
Sole Proprietorship	-0.05	-0.07	-0.12***	-0.12***	-0.16***	-0.05
	(0.05)	(0.04)	(0.04)	(0.05)	(0.04)	(0.05)
Website	0.38***	0.30***	0.18***	0.41***	0.02	0.01
	(0.05)	(0.05)	(0.05)	(0.04)	(0.05)	(0.05)
Observations	591	598	582	594	560	567
			Small firms			
Exporter	0.24	0.12	0.25	0.02	0.17	-0.24
	(0.22)	(0.20)	(0.20)	(0.18)	(0.21)	(0.15)
Sole Proprietorship	0.05	-0.13	0.12	-0.09	-0.11	-0.00
	(0.07)	(0.10)	(0.11)	(0.09)	(0.10)	(0.10)
Website	0.39***	0.37***	0.04	0.25***	-0.02	0.16*
	(0.08)	(0.09)	(0.10)	(0.09)	(0.09)	(0.09)
	213	197	206	213	173	189

Notes: The probit regression technique is applied, and marginal effects are reported with robust standard errors in parentheses; Levels of statistical confidence are represented by asterisks as follows: ***p<0.01, **p<0.05, *p<0.1; Industry and region fixed effects are applied but their results are not shown in the tables to economize on space.

Do Management Practices Affect Productivity?

We now proceed to an analysis of the relationship between management practices and business performance. We model this differently from the earlier regressions, treating business performance as the dependent variable and the six management practices as independent variables. We do this because our objective is to determine whether an expectation of higher productivity might induce the adoption of good management practices. This requires us to assess to what extent good management practices are

determinants of productivity. Our estimation strategy is based on the standard production model of economic theory in which output is a function of capital, labour, and factors that affect the efficiency of these two basic production inputs. We use management practices as one such efficiency-enhancing factor (following Bloom *et al*., 2016) and the ownership of an electricity generator as a second such factor. The latter is introduced because Pakistani industry suffers from routine power outages and firms with access to a generator are likely to suffer fewer production losses consequently.

In the empirical analysis, we use (log) sales per worker as our measure of business performance and regress this with each of our six management practices in turn (see columns 1-6 in Table 6). Since we express productivity in terms of output per unit labour, we also divide the capital input by the number of workers to obtain a capital intensity (capital per worker) variable. This (in its logged form) and the generator are included in each regression. Industry and region-fixed effects are also used.

The results show weak support for management practices as a significant determinant of productivity. Two practices (Problem Fixing and Bonus Awarding) appear to increase productivity while another two (Performance Monitoring and Target Setting) appear to decrease it. The remaining two practices have a statistically insignificant relationship with productivity. Meanwhile, capital intensity and ownership of a generator are strongly significant in all cases. The strong effect of generator access testifies to the seriousness of the electricity availability problem for the Pakistani manufacturing sector. A study conducted on data from 2010-11 (Groinger and Zhong, 2019) found that the marginal impact of one additional hour of power shortage per day decreased value-added among Pakistani firms by close to 20 percent.

Our results do not conform with earlier studies. For example, Bloom *et al.,* (2016) report positive and significant correlations of management quality with measures of business performance. Choudhary *et al.,* (2018) obtained the same results for Pakistan. Agarwal *et al.,* (2013) get similar results for New Zealand with one difference: their management quality score is positively related to profit per worker, total sales, and total profit but not to sales per worker. Of course, the lack of conformance with past studies may be because we have entered each management practice as a distinct and separate variable while other studies have generated a single composite score to reflect the average of individual management practices.

Why might firms adopt some management practices even if they appear to have a negative impact on productivity, as shown for the practices of Performance Monitoring and Target Setting in Table 6? One possibility is that firms may perceive non-pecuniary advantages in such actions. They may wish to emulate peer firms or market leaders. If so, their actions would be consistent with institution-theoretic views where conformance with peer group standards is considered a prime motivating factor.

As noted earlier, it is possible that management practices are themselves determined by productivity: firms that have higher productivity to begin with may be the ones that choose to adopt certain management practices. Accommodating this endogeneity concern would require a different econometric procedure than the one used here or indeed in the prior studies we have cited.

We conclude as follows for our fifth hypothesis:

H5: Productivity is not affected uniformly by all management practices.

Table 6

Productivity and Selected Management Practices

Dep. Var: Sales per worker (ln)	(1)	(2)	(3)	(4)	(5)	(6)
Perf. Monitoring	-0.20**					
	(0.09)					
Target Setting		-0.29***				
		(0.08)				
Problem Fixing			0.33***			
			(0.08)			
Bonus Awarding				0.25***		
				(0.08)		
Staff Promotion					-0.06	
					(0.08)	
Underperf. Action						0.13
						(0.08)
Capital Intensity (ln)	0.19***	0.19***	0.17***	0.17***	0.16***	0.17***
	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)	(0.03)
Generator	0.45***	0.47***	0.37***	0.36***	0.44***	0.41***
	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)	(0.08)
Constant	8.13***	8.14***	8.16***	8.10***	8.45***	8.32***
	(0.24)	(0.24)	(0.28)	(0.24)	(0.28)	(0.29)
Observations	814	814	807	812	731	762
R-squared	0.18	0.19	0.19	0.18	0.18	0.17

Notes: The Ordinary Least Squares regression technique is applied, and marginal effects are reported with robust standard errors in parentheses; Levels of statistical confidence are represented by asterisks as follows: ***p<0.01, **p<0.05, *p<0.1; Industry and region-fixed effects are applied but their results are not shown in the tables to economize on space.

(E) CONCLUDING SUMMARY

We show that a statistical model using characteristics that reflect firm size, market structure, ownership type, and the human capital and information environment is successful in explaining the adoption of selected management practices among manufacturing firms in Pakistan.

From a policy perspective, we find support for the notion that certain policies could encourage the adoption of good management practices. These include competition-enhancing policies such as anti-monopoly regulations in domestic markets or export promotion measures to incentivise firms to produce for overseas markets; ownership diffusion policies, such as differential tax treatment for different ownership structures; and information-enhancing policies, such as training for workers or having a website and social media presence.

Our statistical model is more relevant for large and medium firms and less for small firms. This is consistent with the general observation that small firms in Pakistan do not exhibit modern management practices. It is also consistent with our finding from the summary data (see Table 3) that small firms exhibit fewer of the

characteristics we have used as possible explanators, such as exporting and diversified ownership. Surprisingly, owning a website or social media page induces good management practices not just among large and medium firms but also among small firms.

Turning to business performance, we find weak support for a positive link between selected management practices and productivity. Our results suggest that the decision to adopt certain management practices may be dominated by considerations other than potential productivity and profit gains, such as the desire to emulate peers or market leaders regardless of pecuniary outcomes. However, weak support could also reflect the fact that the relationship may be endogenous, thereby requiring a different econometric procedure than the one we have used. This is a task left for further research.

Annex 1

Industries and Regions covered in World Bank Enterprise Survey for Pakistan

Industries are defined using ISIC Rev 3.1

Code	Description
15	Manufacture of food products and beverages
16	Manufacture of tobacco products
17	Manufacture of textiles
18	Manufacture of wearing apparel, except fur apparel
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
21	Manufacture of paper and paper products
22	Publishing, printing and reproduction of recorded media
23	Manufacture of coke, refined petroleum products and nuclear fuel
24	Manufacture of chemicals and chemical products
25	Manufacture of rubber and plastics products
26	Manufacture of other non-metallic mineral products
27	Manufacture of basic metals
28	Manufacture of fabricated metal products, except machinery and equipment
29	Manufacture of machinery and equipment n.e.c.
30	Manufacture of office, accounting and computing machinery
31	Manufacture of electrical machinery and apparatus n.e.c.
32	Manufacture of radio, television and communication equipment and apparatus
33	Manufacture of medical, precision and optical instruments, watches and clocks
34	Manufacture of motor vehicles, trailers and semi-trailers
35	Manufacture of other transport equipment
36	Manufacture of furniture; manufacturing n.e.c.

Regions	
1.	Baluchistan
2.	Islamabad
3.	Khyber-Pakhtunkhwa
4.	Punjab
5.	Sindh

Source: World Bank (2023).

Annex 2

Management practices in World Bank Enterprise Survey for Pakistan: Questions, Responses, Coding

Management Practice and Responses	Frequency
Performance Monitoring: Did this establishment monitor any performance indicators? Yes coded as 1 and No coded as 0.	1: 320 0: 501
Target Setting: Did this establishment have any production targets? Examples are production volume, quality, efficiency, waste, or on-time delivery. Yes coded as 1 and No coded as 0.	1: 314 0: 506.
Problem Fixing: What best describes what happened at this establishment when a problem arose in the production process? (a) We fixed it and took action to make sure it did not happen again. (b) We fixed it and took action to make sure that it did not happen again and had a continuous improvement process to anticipate problems like these in advance. (c) We fixed it but did not take further action. (d) No action taken. Responses (a) and (b) were coded as 1 while (c) and (d) were coded 0.	1: 501 0: 312
Bonus awarding: Did this establishment have performance bonuses for managers? Yes coded as 1 and No coded as 0.	1: 402 0: 416
Staff promotion: What was the primary way non-managers were promoted at this establishment? (a) Based solely on performance and ability. (b) Based partly on performance and ability, and partly on other factors (for example, tenure or family connections) (c) Based mainly on factors other than performance and ability (for example, tenure or family connections) (d) Non-managers are normally not promoted. Response (a) was coded as 1 while (b), (c) and (d) were coded 0.	1: 446 0: 290
Underperformance Action: When was an under-performing nonmanager reassigned or dismissed? (a) Within 6 months of identifying under-performance (b) After 6 months of identifying under-performance (c) Rarely or never Responses (a) and (b) were coded as 1 while (c) was coded as 0.	1: 413 0: 354

Source: World Bank (2023).

Annex 3

Determinants of management practices in World Bank Enterprise Survey for Pakistan: Questions and Responses

Exporter
Did this establishment export directly in the last fiscal year?
(i) Yes (120 observations)
(ii) No (705 observations)
Sole proprietorship
Is the firm legally a sole proprietorship?
(i) Yes (481 observations)
(ii) No (344 observations)
Formal training
Did this establishment have formal training programs for its permanent, full-time workers in the last fiscal year?
(i) Yes (84 observations)
(ii) No (737 observations)
Informal competition
Does this establishment compete against unregistered or informal establishments?
(i) Yes (292 observations)
(ii) No (526 observations)
Website
At the present time, does this establishment have its own website or social media page?
(i) Yes (467 observations)
(ii) No (357 observations)
Firm Size
Number of permanent full-time workers in the last fiscal year

Source: World Bank (2023).

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