

## **Organization, Management, and Wage Practices in Pakistan's Electrical Fan and Readymade Garment Sectors**

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### **Abstract**

*The electrical fan sector in Pakistan has existed since at least the country's independence and produced for the domestic market for most of its history, although the sector has had strong export growth in the last 15 years. On the other hand, the readymade garment sector has a shorter history, but has been export-oriented from the beginning. The fan sector has retained the traditional batch production system while garments are produced along a line. Nonetheless, both rely on piece rate-based wages to meet their production targets. In this paper, we describe production, management, wage practices, quality, and some barriers to reorganization in these sectors.*

**Keywords:** Production, management, quality, wage practices, ready-made garments, Pakistan.

**JEL classification:** D20, L23, L67.

### **1. Introduction**

Management, once primarily the domain of business consulting and business schools, now garners intense interest among academic economists. Recent research has provided concrete and convincing evidence of the profound and positive impact of sound management practices on firm-level productivity (Bloom & Van Reenen, 2007; Bloom et al., 2013).<sup>1</sup> In addition, the organization of firms – the delegation of authority and decentralization of decision-making, only possible when trust is high – is also seen to play a role in firm size and performance

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<sup>1</sup> Bloom and Van Reenen's (2007) study was based on a survey of firms' management practices in the US, UK, France, and Germany. Subsequently, they surveyed more than 30 firms from both developed and developing countries (see Bloom et al., 2014); Pakistan is among the most recent additions and the results are not yet available.

(Bloom, Sadun, & Van Reenen, 2012). The stakes are high, not just for firm profits but also for national economic performance; Bloom et al. (2014) suggest that a quarter of the variation in total factor productivities can be explained by the quality of private sector management.

In Pakistan, firms tend to be family-managed.<sup>2</sup> Ilias (2006) demonstrated this reliance on family management in Sialkot's surgical goods sector; firm growth was found to be associated with the size of the founder's family, such that firm founders with more brothers tend to grow into larger firms. The dominance of family management systems may be due to a dearth of professional managers, lack of trust in nonfamily management or systems to control them, or both. This could happen if weak legal systems and poor contract enforcement reduce a firm's ability to sanction nonfamily management in the case of shirking or expropriation of firm resources. Firms may find it easier to monitor family managers (for example, by observing spending habits) or sanction them through informal mechanisms (such as social exclusion).

At the same time, research has found that the family management of firms is associated with poorer-quality management, lower productivity, and smaller profits (Bloom & Van Reenen, 2007; Bandiera, Prat, & Sadun, 2013). Family ownership-cum-management structures can also run into succession difficulties: if there are not enough descendants to take over or if they lack competence to run the business, a firm might fail after losing its founder. On the other hand, if there are too many potential managers in the younger generation, the business may be split amongst the inheritors so that economies of scale are lost.

In addition to the aforementioned research on management, organization and family firms, a third, related, line of research deals with the design of wage schedules to raise productivity. Given the concerns surrounding the econometric identification of the impact of different wage systems on productivity, newer studies have borrowed techniques from the hard sciences and applied the randomized controlled trial (RCT) approach to economic experiments in the field.<sup>3</sup> Researchers randomly

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<sup>2</sup> Firm owners are not the only segment of society to look inward in Pakistan; marriage practices are also largely endogamous since most unions are between first or second cousins, according to the Pakistan Demographic and Health Survey (2006).

<sup>3</sup> Specifically, there are two potential sources of endogeneity that would bias results in observational studies of incentive wages on productivity. First, it is likely that unobservable firm-level characteristics, such as management ability, would be correlated with offering higher-powered incentives for workers and with firm performance. Second, firms offering piece rates may attract more productive workers than firms that offer a fixed wage (Bandiera, Barankay, & Rasul, 2011).

assign different wage schedules to control and treatment groups of actual workers to obtain an unbiased estimate of the impact of different incentive schemes. This research finds that, compared to fixed wages, piece rates and performance-based pay have proven effective in increasing worker productivity, both in developed and developing country settings (see Bandiera, Barankay, & Rasul, 2005; Choudhary, Gabriel, & Rickman, 2013; Goto, Aida, Aoyagi, & Sawada, 2013; Kaur, Kremer, & Mullainathan, in press; Shearer, 2004; Shi, 2010). Managers' performance can also be improved through incentives (Bandiera, Barankay, & Rasul, 2007, 2009). Another benefit to firms is that piece rates give them more flexibility to pay for work as needed when faced with lumpy demand, whereas firms that pay fixed wages need a constant flow of orders.

The aforementioned experiments have focused principally on low-skill agricultural work or data entry and the desired worker effort – for example, fruit-picking speed – is simple to verify and aligned with firm owners' objectives. Simple systems of performance pay such as piece rates may be less applicable in environments where performance is multifaceted or harder to measure. Too much emphasis on easier-to-measure performance metrics may even backfire by focusing efforts away from soft skills that may be more important to firm performance. Incentivizing workers' speed can increase the gross output, but might sacrifice quality, which can be especially detrimental for firms aiming to compete in export markets.

Not all of the increased output induced by piece rates in these studies has met the required quality, even in the simple work of tree planting (Paarsch & Shearer, 2000).<sup>4</sup> Heywood, Siebert, and Wei (2013) explore the quantity-quality tradeoff in data entry work through a field experiment, finding that piece rates are associated with greater productivity as well as more errors, but that the quality problem can be fully mitigated with strict monitoring. At par in terms of performance are committed workers under low monitoring, suggesting that firms need to incur human resource costs either in terms of monitoring or selecting workers. Further, monitoring demotivates committed workers paid fixed wages. Lazear (1986) theoretically explores the circumstances under which piece rates or salary wage systems are preferable, suggesting that piece rates perform better when the measurement costs of quantity and quality of output are low, when workers are more heterogeneous, and when effort

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<sup>4</sup> The paper has used nonexperimental data, but limited the sample to those employees who had worked under both fixed and piece-rate wages.

monitoring costs are high. He also suggests that there need not be a quantity/quality trade-off as long as workers become residual claimants.

Anecdotally, Pakistan's quality problems in its readymade garment (RMG) sector are attributed to the piece-rate system, where workers are paid per garment completed. In addition, it has been suggested that labor costs might not necessarily be lower under piece rates as compared to well-managed fixed-wage workers. According to the consulting firm Technopak (2007), piece rates in the RMG sector tend to be based on the market price of particular stitching operations rather than on the content of the final output produced, which may make the cost per piece higher than under a salary-based system. Makino (2012) finds higher salaries among piece-rate garment workers, using a sample of 22 factories in Lahore and applying Mincerian wage regressions. She notes, however, that the type of work done by salaried workers may have been less skilled work.

Another consideration is that piece rates could inhibit the adoption of technology. Atkin et al. (2014) argue that the system of piece-rate wages paid to workers who cut leather pentagons and hexagons for soccer balls reduces the adoption rate of a new cutting technology because workers naturally slow down during the learning phase, lowering their take home pay. Thus, piece rates can misalign workers' incentives (speed) and owners' objectives (less wastage). Finally, financial incentives may crowd out individuals' intrinsic motivation and backfire in the long run (Bénabou & Tirole, 2003).

In this paper, we describe some aspects of firm organization, wage practices, and output quality for two sectors in which we have done fieldwork over the last few years: electrical fans and RMGs. The electrical fan sector in Pakistan, an example of light engineering, has focused historically on production for the domestic market, but diversified into export markets in the last 10 to 15 years, with exports reaching nearly US\$ 40 million in 2012. Altogether, textile exports account for over half of Pakistan's export receipts, of which garments, hosiery, towels, bed sheets, and other made-ups comprise more than half of these.<sup>5</sup> Garment exports reached US\$ 3.72 billion in 2011/12 (Nabi & Hamid, 2013). Data from the Ministry of Commerce indicate that exports of RMG and knitwear products increased by 12 and 6 percent, respectively, between FY2012 and FY2013.

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<sup>5</sup> Data from the All Pakistan Textile Mills Association, cited in Hussain et al. (2013).

## **2. Background of the Electrical Fan and RMG Sectors**

This section provides a context for analyzing the two sectors studied.

### **2.1. The Electrical Fan Sector**

Pakistan's electrical fan sector is clustered in the Gujrat and Gujranwala districts of Punjab. In addition to being geographically agglomerated, production is concentrated in five or six large firms, with the remaining production disbursed among medium and small firms in what is referred to locally as the "cottage industry."<sup>6</sup> The three largest firms in Gujrat estimate that they are responsible for roughly 50 percent of the sector's output.

Exporting is a relatively recent development in the fan sector, although both large and cottage firms now sell in domestic and export markets. Entry into export markets, which picked up around 10 to 15 years ago, was mainly a response to excess production capacity that had developed. The largest three firms were also under pressure from the competing cottage industry, having lost market share to them despite reducing their mark-ups and differences in quality and energy efficiency. However, export markets have proved a fruitful outlet; exports have continued to grow at a healthy pace, reaching nearly US\$ 40 million in 2012.

Domestic sales take place mainly through distributors and each of the large firms has a different regional strength.<sup>7</sup> With some distributors, the arrangement is that they provide working capital or "invest" in the firm every September by depositing money with the fan company. This establishes for the distributor a credit line with the company and fixes the prices at which they can purchase fans until their credit is exhausted.<sup>8</sup> Other distributors have profit-sharing arrangements in place and the distributor acquires the fans from the manufacturer on credit.

Both the demand for and production of fans is highly seasonal. The high season, lasting about six months, accounts for around 80 percent of annual production (Munir & Khan, 2011). Many of the small firms shut down temporarily for at least part of the slow season, while the large firms remain open but operate at less than full capacity. At least one firm

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<sup>6</sup> Cottage-industry fan factories can be as large as 100+ employees.

<sup>7</sup> Royal Fans is strong in Lahore, Pak Fans in Karachi, Younas Fans in KP, and GFC in southern Punjab.

<sup>8</sup> This is an acceptable credit arrangement for the religiously observant, given Islam's prohibition on interest income.

utilizes the slow season for repairing defective fans rather than producing new units. The seasonality of production is one potential reason for having retained the batch production system, which we discuss in more detail in the following section.

## 2.2. *The RMG Sector*

Pakistan now faces an opportunity in the RMG sector as increasing wage rates in China lead buyers to look for alternative sourcing countries. The recently granted GSP-Plus status by the European Union is another significant source of potential expansion for Pakistani exports. Nonetheless, productivity and quality must improve if export growth is to be sustained beyond the short term. Pakistan's knitwear sector grew rapidly in the 1980s under the Multi-Fiber Agreement, but these gains quickly dissipated once the quota regime was dismantled in 2005, as firms were unable to compete. The country also faces stiff competition from lower-wage countries including, importantly, Bangladesh.

Pakistan's RMG sector relies mainly on domestically produced fabric woven from domestically farmed cotton – one of the country's most important crops after wheat and rice. Its cotton varieties are well suited to the production of denim. In contrast, Bangladesh must import its material. Firms shy away from bank finance and rely on credit from suppliers, advances from buyers, and self-finance (Nabi & Hamid, 2013).

In Pakistan, the workforce in the garment sector is predominantly male, although many firms we surveyed claimed they would prefer to hire more women, who are perceived as being more reliable and attentive to quality.<sup>9</sup> Currently, only about 16 percent of stitching operators are female (Nabi & Hamid, 2013). On the other hand, stitching workers in factories in other major exporting countries, such as Bangladesh, Sri Lanka, Indonesia, and Thailand, are overwhelmingly female (Makino, 2012). Cultural attitudes, however, may be constraining more women from entering the manufacturing workforce in Pakistan; in a survey of 150 textile firms, Haque (2009) found that, on average, workers and managers believed that women should work only if economically necessary.

Most workers are trained on the job and the larger factories have small training centers onsite.<sup>10</sup> The availability of trained stitching

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<sup>9</sup> Haque (2009) finds that 64 percent of firms were willing to hire women.

<sup>10</sup> The Technical Education and Vocational Training Authority has training programs for stitching, but none of the firms we surveyed were familiar with its graduates.

operators seems to be a constraint among the firms we interviewed as well as among a larger sample of firms surveyed by Nabi and Hamid (2013). The lack of middle management is also cited as a constraint (Makino, 2012; Nabi & Hamid, 2013).

### 3. Organization of Production

In Pakistan, the fan and RMG sectors have adopted different modes of organizing production. Fans are produced using a batch or production group system, even though internationally, large producers such as China manufacture fans along an assembly line.<sup>11</sup> Garments in Pakistan, on the other hand, are produced along a line, which is the industry standard worldwide.

#### 3.1. Fan Production

Fans in Pakistan are produced as batches in a series of workshops dispersed throughout the factory. Each type of fan – including pedestal fans, ceiling fans, bracket fans, and exhaust fans – follows a slightly different process, although the essential components (especially of the motor) are more or less the same. Each workshop focuses on completing a series of operations on a single type of fan, even though the factory itself likely produces many models of each type of fan and each team has to work on a variety of models.<sup>12</sup> For example, the operations required to produce a ceiling fan include winding (of copper wire around a steel rotor), drilling, fitting, painting, and packing. Each stage takes place in individual workshops by teams of workers, under the supervision of a team leader known as an *ustad*.<sup>13</sup>

Multiple teams often work on the same stage of production, for example, winding, depending on the output required. Teams sometimes work side by side in a large hall or might work in separate workshops, according to the limitations of space in the factory.<sup>14</sup> Team sizes are mainly determined by the *ustad* and vary significantly, even within the same part of the production process. Senior workers on the team are

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<sup>11</sup> According to discussions, the batch system is common throughout the light engineering sector in Pakistan.

<sup>12</sup> It has been suggested that efficiency might increase if the teams each become specialized in fewer models.

<sup>13</sup> The *ustad-shagird* or master-apprentice system is the traditional, informal system of vocational skills training.

<sup>14</sup> The factory comprises a series of rooms of varying size, resulting from the gradual and organic growth of the firm over several decades.

multi-skilled and can perform a variety of tasks required by the workshop.<sup>15</sup> Therefore, daily production targets can be met by extending the working day when workers are absent.

Much of the responsibility for the day-to-day management of production is delegated to the ustads and a few foremen, including supervision of work, quality control, identifying and training new workers, negotiating piece rates, and monitoring attendance. In our survey of 85 workers (eight teams) in one of the sector's largest firms, the most common way of finding a job was for the worker or a family member to have directly contacted the ustad; just over half the workers got their jobs this way.<sup>16</sup> Another 43 percent of workers initiated contact through other employees of the firm. Most workers (89 percent) stated that their initial *nafri* or piece rate was decided solely by the ustad. Historically, the ustad collected payment for the team's output and distributed salaries to workers. This system may be in place in other factories still, but the large firm with which we had the most contact had taken over the function of making wage payments directly to its workers.

This same firm was interested in moving from batch manufacturing to an assembly line in order to adopt international best practice and reduce defects. Moving production from the batch system to an assembly line was perceived as potentially more cost-effective as less electricity would be used if the same amount of work could be completed in fewer hours, and through a reduction in in-process inventory.

However, the firm encountered many barriers to reorganizing production. First, the layout of the factory was a series of disjointed rooms rather than a large open hall, reflecting the firm's incremental and organic growth over decades. Second, workers resisted the change because operating along an assembly line meant they would be shifted to fixed wages. They may have also been concerned that their skills would become more specialized and less transferable between firms within the sector if they switched from batch to assembly line work (workers commonly move among jobs at different firms in the sector, given the

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<sup>15</sup> In our survey of around 85 workers in eight workshops of a large fan manufacturer, about 40 percent of winders and 60 percent of packers reported working on different tasks at least once a week.

<sup>16</sup> Only about 8 percent of workers surveyed were relations of the ustad. Four out of eight ustads had at least one relation among their team members. On the other hand, more than a quarter of the workers had known the ustad before joining the firm and 18 percent lived in the same village as the ustad. Across individual ustads, this figure varies from 0 (for three ustads) to 72 percent.



agglomeration of firms).<sup>17</sup> However, since an assembly line requires a fixed and constant number of workers on the line, the largest impediments cited by the management were high rates of absenteeism and irregular working hours (including late arrivals and breaks for tea or smoking), which caused bottlenecks in the production process.<sup>18</sup> Batch production may be more flexible from the workers' perspective as they can take breaks during the day without disrupting the line and even take days off work for odd jobs or seasonal agricultural work in the villages.

We worked with this firm to address one of these barriers, that is, the irregular attendance of workers. We piloted two types of bonuses for high monthly attendance: (i) a bonus based on individual attendance (calculated per worker) and (ii) a group-based attendance bonus (calculated at the team level). The group-based bonus depended on the number of days each month that the team's target attendance was met.<sup>19</sup>

After the pilot, we tested the group-based bonus with a larger sample of teams, since it seemed to be the more promising of the two incentives at the pilot stage. Comparing the attendance records of the teams offered the group-based incentive to that of a control group, our early results show that this particular bonus increased by almost three days per month the number of days that the attendance target was met.

As a result of the project, the ceiling fan packing teams (which assemble the blades, test the fan, then disassemble and pack for shipping) started working on a nonmechanized assembly line where the fans were moved from worker to worker on a series of rollers. This allowed some specialization of the workers' tasks and helped protect the fans from damage in the final stages of inspecting and packing each unit.

### **3.2. RMG Production**

Under the assembly line system, each worker stitches a different part of the garment in a particular order so that the garment takes shape along the line. For example, in the stitching of denim garments, the factory floor is generally divided into four or five sections: small parts

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<sup>17</sup> Just over a quarter of the workers surveyed (24 workers, or 28 percent) had left the firm at some point and later returned. Of these, about a third had worked in another fan factory while away, while 29 percent had worked at other firms in the fan sector prior to joining the firm studied here.

<sup>18</sup> In our survey of workers, the most common reasons cited for absences were family weddings (34 percent), family illness (27 percent), a death in the family (25 percent), and other work, including agricultural (13 percent).

<sup>19</sup> The target depended on the team size, but for the average team was  $n - 1$  for a team of  $n$  members.

(such as pockets and belt loops), backs, fronts, and assembly. Some factories further divide the assembly section into two parts. In knitwear, lines are usually allocated to various styles to allow workers to specialize in the operations of particular styles. Most machine operators are multi-skilled and workers can be substituted for each other to minimize bottlenecks due to absenteeism. We have so far surveyed 33 line supervisors from six RMG factories in the Lahore area, covering both knitwear and woven items (mainly denim), to obtain a better understanding of the role of supervisors and the challenges they face.<sup>20</sup>

Similar to the fan sector, absenteeism seems to be a problem in the RMG sector. Accepted reasons for taking time off work, according to the supervisors, included family illnesses, death, and weddings, and (to a lesser extent) seasonal or agricultural work. About two thirds of the supervisors felt that absenteeism was an important cause of bottlenecks on the line.<sup>21</sup> In addition, workers tended to move between firms frequently. In response, some firms have introduced a sliding bonus payment tied to monthly attendance as part of the compensation package; this is referred to as the "incentive plus piece rate." The full amount of the fixed payment (ranging from PKR 2,000 to 3,000) is given if the worker is present every working day in the month. Deductions are made from the bonus for each day a worker takes off, unless he or she gives advance notice.

The supervisory structure of the typical RMG firm in Pakistan includes both production and quality supervisors. On each line there is one line supervisor (or section supervisor, in the case of denim) in charge of production, who is mainly responsible for looking after the inputs and output of the line and managing the workers.<sup>22</sup> Across lines, production managers (possibly with assistant managers) oversee multiple lines. There is also usually one quality supervisor per line or section. Under each quality supervisor are three to four quality inspectors who check the garments at various stages. Each quality inspector specializes in checking a handful of stitching operations. The hierarchy of quality and production supervisors can vary across factories: in some factories, the quality supervisors may be a level below the production supervisors, while in others they are at par. According to our survey, around 90 percent had at

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<sup>20</sup> There was one female supervisor among these.

<sup>21</sup> Unscheduled breaks during the day were generally considered not to cause disruptions on the line.

<sup>22</sup> Usually, there is one production supervisor per line for knitwear factories and one per section (back, front, assembly) in denim.

least some secondary schooling and nearly half had completed secondary school with an FA or higher.<sup>23</sup>

Based on our discussions with line supervisors, it appears that they exercise a fair amount of decision-making authority and can move around operators on the line as needed. They rely mainly on their own informal knowledge of each operator's skills to balance the line. If a machine breaks down or needs repairing, the line supervisors will consult other supervisors or managers to identify if an idle machine is available. Supervisors can also discuss the layout and targets for the line and suggest changes directly to the industrial engineers, since they visit the factory floor frequently. The production manager approves production targets, but supervisors can also suggest changes. Incidents on the line such as receiving the wrong accessory are typically reported to a production manager and then to the supply department. Decisions such as firing an operator are discussed with the production manager and then left to human resources personnel. Discipline issues with workers are also handled directly by the production supervisors. Conflicts between supervisors are often resolved by the assistant production managers and the issue then conveyed to the production manager.

To balance the line, the key measure is the standard minute value (SMV), which is used to estimate the time required by each operation in stitching a garment. The cumulative SMV for each operation gives the total required stitching time per piece. The SMV is used in allocating workers to stations along the line to avoid bottlenecks: operations with a low SMV may be allocated one worker; operations that take longer (with a higher SMV) will often have at least two workers stationed on the line. The SMV is also used to set the piece rates that workers receive per garment they stitch.

Most, though not all, of the larger garment producers in Pakistan that we visited now have industrial engineers and have adopted some version of the SMV to organize production, pay wages, and set production targets. Field visits to garment factories confirm that firms employ an adjusted version of the SMV, known as the standard adjusted minute (SAM). Some firms start with the internationally calculated SMVs and then adjust these according to the time it actually takes to produce a garment on their line. Other firms conduct their own time and motion studies to calculate the SAM, using a stopwatch to determine the time it takes to

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<sup>23</sup> Specifically, one had completed the eighth grade, two had completed the ninth grade, 14 were matriculates, 13 had achieved an intermediate degree (FA) pass, and three had completed a BA.

perform each operation of a particular garment a number of times. The piece rate is then set according to the SMV or SAM of the operation.

According to our discussions, the firms with industrial engineering departments regularly calculate the efficiency of workers and set targets based on these calculations. Supervisors revealed that workers are generally able to meet the targets set, except in cases such as machine breakdowns or delays in inputs. When supervisors were asked to assess whether poor planning or poor layout of the line was more important in creating bottlenecks on the line, their answers were almost evenly split – interestingly, even among supervisors within the same factory.

Some newer timesaving technologies, such as sewing machines with thread auto-trimmers, have not been widely adopted by the sector. Whether this is because firms are not willing to take on the added maintenance required of a more complex machine (to keep the trimmer in sync) or for other reasons is not known.

#### 4. Wage Practices

In Pakistan, wages based on piece rates appear to be the most common system of compensation in sectors including (but not limited to) electrical fan production, RMG production, and soccer ball production.<sup>24</sup> Discussions with production managers and firm owners in the RMG sector indicate that they believe productivity would fall significantly – leaving them unable to fill customers' orders in time – without piece rates to incentivize their primarily male workforce. One theory is that piece rates substitute for a lack of managerial capacity to supervise fixed-wage work. Managers in the RMG sector believe they would face fewer quality issues in the case of fixed wages and a female workforce, such as that in Bangladesh. However, the current workforce in Pakistan's RMG sector, unlike in Bangladesh, is primarily male and accustomed to working on piece rates. In Pakistan's electrical fan sector, the entrenched piece-rate system (preferred by workers) has made it difficult for firms to transition to an assembly line system with fixed wages that could help reduce in-process inventory and improve fan quality.<sup>25</sup>

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<sup>24</sup> In the soccer ball and RMG sectors, there are also firms that pay fixed wages. At least one RMG firm pays some lines piece rates and others fixed wages.

<sup>25</sup> Fan production along an assembly line (as in China's large factories) is thought to result in lower levels of in-process inventory and thereby in less damage to components and less need for reworking.

#### **4.1. Remuneration in the Electrical Fan Sector**

Output is measured at the team level and the team is paid at a piece rate per unit produced (for example, per motor wound with copper wire). Each member receives a share (*nafri*) of the team's daily output. The worker's individual *nafri* is determined primarily by the *ustad* (with occasional input from the management) and is based on the worker's experience.<sup>26</sup> The team's daily output is attributed to the workers present on a particular day. Each worker's share of the team's daily output depends on their *nafri* relative to the sum of the *nafri* of all team members present that day. Monthly salaries consist of a nominal fixed payment plus their share of the team's output, which depends on their *nafri*, the output on each day they were present at work, and the *nafri* of the other workers present on the same days.

Since the daily output is divided among only the team members present that day, workers get paid more on days that fewer workers are present (holding the output constant).<sup>27</sup> This reduces the incentive for workers, particularly senior workers, to put pressure on their fellow team members to minimize absenteeism, since those with higher *nafri* stand to benefit proportionately more from worker absences.

#### **4.2. Wage Systems in the RMG Sector**

As mentioned earlier, piece-rate wages are common in Pakistan's RMG sector.<sup>28</sup> According to Makino (2012), this is a historical remnant of the subcontracting system that originated when textile firms first entered into garment production. Lacking management capacity due to the capital intensity of spinning and weaving activities, textile firms initially contracted with *ustads* who were paid on the basis of output for cut, make, and trim (CMT) operations; the *ustads* in turn hired workers and supervised the actual work. This is known generally as "cell manufacturing." Makino notes that workers were later hired directly by the firms in order to satisfy the labor standards imposed by international buyers, but that aspects of the old system – particularly the lopsided role played by supervisors in hiring and managing workers – have persisted.

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<sup>26</sup> Overall, workers cited either seniority or years of experience in the fan sector as the major determinants of *nafri* (59 percent). Only 38 percent stated that knowledge and skills (23 percent) or efficiency (15 percent) were the primary factors.

<sup>27</sup> The team is typically responsible for completing a daily target.

<sup>28</sup> However, one medium firm we interviewed said it paid most of its workers fixed salaries. One line was given a base salary plus a bonus for meeting a target efficiency level.

In the garments sector today, workers are paid according to the number of bundles completed and the piece rate. The most experienced operators are multi-skilled. Even under the piece-rate system, firms must comply with the minimum wage regulations set by the government. If a worker's wage due, according to the pieces produced, is less than the minimum wage, then s/he is paid the minimum wage. Workers are allowed a maximum of two hours' overtime per day or 12 hours in a week.

Generally, we observed that workers tend to negotiate piece rates through supervisors in some factories and that the actual piece rates may be higher than those calculated through the SMV. Interviews with human resources personnel in the factories revealed that piece rates are usually set in line with the rate prevalent for each operation in the market, because if one factory is unable to offer a similar rate, the most efficient workers will move to higher-paying factories.

## 5. Quality Issues

Both the electrical fan and RMG sectors have struggled with quality issues. Discussions with key players in both sectors indicate that the main problems stem from both input quality and production methods.

### 5.1. Issues in Fan Quality

Anecdotally, Pakistan's fans are seen as superior to Chinese-made fans in tropical climates, given their popularity in markets such as Africa, the Gulf, and Bangladesh.<sup>29</sup> Gujrat's large fan producers distinguish their higher-quality models from those of the medium/small cottage industry through their use of rotors stamped out of electrical steel sheet by heavy (and very expensive) imported equipment. The cottage industry's rotors are stamped out of (often rusted) recycled steel, using low-tech locally made equipment. Incidentally, the large firms also produce lower-quality fans using recycled materials, but these are exported mainly to the Gulf and sold under other brand names by the importers.

One source of quality issues in the fan sector is the use of intermediate inputs. Firms produce a large number of different models of fans and purchase components from local intermediate input producers. Reports on the sector indicate a weak and unreliable vendor segment, although energy shortages can be partly to blame. As a result, the large

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<sup>29</sup> We were told of how some Chinese-made fans intended for the Bangladesh market were labeled "Made in Pakistan."

fan firms are unable to specialize in assembly like their competitors in China, but have to manufacture a number of components as well.

The second source of defects is related to the batch method of production. The fan motors are delicate and prone to damage, especially before they are fitted inside the fan casing. Along an assembly line, each in-process piece moves continually from one station to the next in the production process, possibly along a mechanized line. On the other hand, in the batch method, in-process pieces (literally) pile up between workers on workspaces. Workers are not paid for defective pieces, but otherwise are not penalized. If a piece passes inspection within the workshop and a defect is discovered after it has moved onto a subsequent step in the production process, the re-work is paid. Another opportunity for damage occurs when the completed units from one workshop are transported to the next workshop for the next stage of production.

Quality is also related to the vintage of the capital or its misuse. Older equipment, especially in the motor winding process, can raise defect rates. Another issue is that workers sometimes damage the machinery by setting it at a higher speed to finish the batch more quickly. Running the machines beyond the recommended speed is also bad for fan quality.

The firm we worked with to incentivize attendance with bonuses reported that quality had improved as a result of having more workers on a regular basis, although no formal analysis was performed. One concrete change observed by the management was that more fans were getting a final quality check prior to packing than before.

## *5.2. Quality Issues in the RMG Sector*

Our research so far indicates that Pakistan's RMG industry has a high rate of quality defects. These can be caused by a number of factors: negligence on the part of stitching operators, mechanical problems with the sewing equipment (such as the needle or oil stains), and existing defects in the fabric. In the case of denim, defects can arise after stitching due to special finishes that add value but damage the fabric. These include stone washes, rinse washes, and enzyme washes (known as "wet processes"); and scrapping, sand blasting, potassium permanganate spraying, and resin application (known as "dry processes").

As discussed earlier, stitching operators are mainly paid piece rates, which might enhance the quantity of output but is also believed to

be at least partly responsible for quality problems. In the stitching units, quality inspectors and supervisors check the bundles at multiple points along the line as they are stitched, and send garments back for re-work to any workers whose work has been found defective. This ability to attribute defects to particular workers is facilitated by the piece-rate system of payments: each garment in a bundle in process is marked with the bundle number and a record of which bundles each operator has completed is recorded in order to calculate his or her wage. Returning defective garments to the worker who caused the fault (called self-routing) has intuitive appeal – s/he who made the mistake should be responsible for correcting it. However, an interesting piece of recent theoretical work by Lu, Van Mieghem, and Savaskan (2009) suggests that this may be suboptimal and that routing defective pieces to dedicated re-workers or cross-routing (where workers do both re-work and new pieces) – so that the worker who gets the piece right also gets paid for it – might be a better way to induce quality.

As mentioned above, defects may also be discovered after (denim) garments have undergone chemical treatments, stone washing, and other wet or dry finishes. These garments lose their bundle tag (usually a small adhesive sticker) and any subsequent repair work is done by specialized operators (exclusively engaged in re-work).<sup>30</sup> Such defects can be related either to stitching errors, fabric defects not previously visible, or quite often the wet/dry processes themselves.

Stitching operators are not penalized explicitly for quality defects. To the extent that operators carry out their own re-work for defects recorded before washing, they lose income they would have earned by working on a new piece. Our surveyed supervisors indicated that they would bring in a more experienced operator if a significant rise in defects were detected. However, not all quality defects are visible before the pieces are washed. For the most part, stitching faults can be eventually repaired. As a result, in the current system there may be less attention paid to preventing errors than to detecting and correcting them.

Since some garment producers in Pakistan are part of vertically integrated units, i.e., they also spin, weave, and dye the fabric, we were told there is sometimes pressure on fabric quality inspectors in the RMG units to accept substandard material. As a result, fabric wastage

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<sup>30</sup> RFID is a new technology in which small computer-readable tags are sewn into the garment to track its progress through the production process. Some firms are considering trying it, but none have so far, that we know of.



percentages are high compared to international averages. Firms try to minimize the loss by removing the portion of fabric with a significant defect, as fabric constitutes around 70 percent of the total cost of manufacturing a garment. However, not all fabric faults can be detected at the fabric inspection stage, and sometimes are only detected once the denim garment has been washed. Major fabric faults, such as a hole in the fabric, cannot be repaired and the entire worked garment will be rejected. In one firm, fabric defects not discovered until after the garment was completed were responsible for a quarter of the reject rate.

Given constantly changing fashion trends, factories have to adapt to producing a large variety of styles, regardless of whether they produce almost exclusively for one buyer or, like others, produce for multiple brands. This may have consequences for efficiency and quality if there is a learning curve for each new style. One large buyer for an international brand explained that one of their Pakistani suppliers had been the fastest factory in the world when they produced a single style of a pure cotton garment, but that their efficiency fell and defects increased when styles changed and stretch fabrics were introduced. In our survey, however, fewer than half the supervisors felt that changing styles were associated with a greater rate of defects. Our analysis of production and defect data from a sample of firms that is currently underway will yield a more objective answer. Supervisors did feel, however, that rushing to complete an order compromises quality and they try to avoid it as much as possible.

In one large denim factory, a new quality program was recently implemented, using color-coded cards that are hung on each operator's station. Roaming inspectors check seven pieces of each operator's first bundle on their shift and give out cards coded green (good), yellow (one or two problems), or red (serious errors). Operators who receive yellow and red cards are rechecked mid-shift and everyone is checked again toward the end of the shift. Supervisors then have a clearer idea of whose work needs closer monitoring and the public nature of the cards may incentivize workers who would be embarrassed by working underneath a yellow or red card. Stations assigned delicate or critical operations are marked with an orange card, and a blue card is hung on broken-down machinery. This way, supervisors and managers visiting the factory floor have a clear idea of the status of operations. When we visited, there were plans to designate a silver reward card. The firm felt that the experiment had been successful and planned to continue it as well as sharing its experience with other firms.

## 6. Concluding Remarks

According to our observations and survey responses, ustads in the fan sector and supervisors in the garment sector exercise a fair amount of authority and discretion. However, most of their training remains informal. Middle managers with more formal training would have more knowledge of modern techniques for quality control and lean production methods. However, in the context of Pakistan, where most firms remain firmly in the control of family members, what role can a cadre of outsider professional managers play?

We have also observed that output monitoring (quality checking) is widespread in both sectors under the piece-rate system, but that quality problems remain pervasive. Insiders perceive there to be a quantity-quality tradeoff under the piece-rate system, but see no other way to meet production targets on time for foreign buyers while the workforce remains primarily male. There is a belief – but it is no guarantee – that, if more women entered the workforce and took fixed-wage jobs, the quality problems would resolve themselves. Alternative systems of quality control, such as cross-routing defects or the colored card system of inspections, might be tried experimentally.

However, beyond quality tradeoff, piece rates may have other consequences, such as hindering the adoption of new technologies. For instance, Atkin et al. (2014) show that, when learning is required to adopt a new technology, workers paid piece-rates may earn less in the transition because learning slows them down. This will cause workers to resist innovation unless they are compensated during the transition to the new production technique. In the fan and garment sectors, as long as middle management is weak and demand lumpy, it is likely that piece-rate wages will remain in the medium term. There may be a role for large international buyers, however, to mandate changes in labor or wage practices; we have heard of many cases where firms in Pakistan have been responsive to buyers' rules and regulations.

In the future, it may pay dividends for researchers to consider firms' choices regarding management practices, organization, and wage practices as interrelated, rather than as independent, factors influencing firm performance. For example, Hong, Kueng, and Yang (2014) find that performance pay complements decentralized decision-making in the firm and is correlated with outsourcing and total quality management.

Some larger, related questions involve the role of clusters in manufacturing in developing countries, particularly Pakistan. On the one hand, agglomeration has helped the manufacturing sector to develop by inducing firm entry and growth (Delgado, Porter, & Stern, 2010; Glaeser & Kerr, 2009; Haroon, 2013; Otsuka, 2008; Rosenthal & Strange, 2010). On the other, might agglomeration be locking firms into suboptimal wage and management practices and technologies? For example, the incentives for firms to invest in training their workers may be low when the latter can easily (and often do) move between firms in the sector. Also, it may be difficult for firms to convince workers to learn new technologies, production processes, or management practices when there are other employers available nearby. Workers may choose to seek alternative employment in the cluster if such adjustments entail disutility or lost wages during the transition process. Finally, workers may hesitate to make their skills firm-specific because this might make it difficult for them to move to other firms in the cluster in the future.

### References

- Atkin, D., Chaudhry, A., Chaudry, S., Khandelwal, A., & Verhoogen, E. (2014). *Organizational barriers to technology adoption: Evidence from soccer-ball producers in Pakistan*. Unpublished manuscript. Retrieved from <http://economics.mit.edu/files/9882>
- Bandiera, O., Barankay, I., & Rasul, I. (2005). Social preferences and the response to incentives: Evidence from personnel data. *Quarterly Journal of Economics*, 120(3), 917–962.
- Bandiera, O., Barankay, I., & Rasul, I. (2007). Incentives for managers and inequality among workers: Evidence from a firm-level experiment. *Quarterly Journal of Economics*, 122(2), 729–773.
- Bandiera, O., Barankay, I., & Rasul, I. (2009). Social connections and incentives in the workplace: Evidence from personnel data. *Econometrica*, 77(4), 1047–1094.
- Bandiera, O., Barankay, I., & Rasul, I. (2011). Field experiments with firms. *Journal of Economic Perspectives*, 25(3), 63–82.
- Bandiera, O., Prat, A., & Sadun, R. (2013). *Managing the family firm: Evidence from CEOs at work* (Working Paper No. 19722). Cambridge, MA: National Bureau of Economic Research.
- Bénabou, R., & Tirole, J. (2003). Intrinsic and extrinsic motivation. *Review of Economic Studies*, 70(3), 489–520.
- Bloom, N., Eifert, B., Mahajan A., McKenzie, D., & Roberts, J. (2013). Does management matter? Evidence from India. *Quarterly Journal of Economics*, 128(1), 1–51.
- Bloom, N., Lemos, R., Sadun, R., Scur, D., & Van Reenen, J. (2014). *The new empirical economics of management* (Working Paper No. 20102). Cambridge, MA: National Bureau of Economic Research.
- Bloom, N., Sadun, R., & Van Reenen, J. (2012). The organization of firms across countries. *Quarterly Journal of Economics*, 127(4), 1663–1705.
- Bloom, N., & Van Reenen, J. (2007). Measuring and explaining management practices across firms and countries. *Quarterly Journal of Economics*, 122(4), 1351–1408.

- Choudhary, M. A., Gabriel, V. J., & Rickman, N. (2013, April). *Individual incentives and workers' contracts: Evidence from a field experiment*. Paper presented at the Annual Conference of the Royal Economic Society, University of London.
- Delgado, M., Porter, M. E., & Stern, S. (2010). Clusters and entrepreneurship. *Journal of Economic Geography*, 10(4), 495–518.
- Glaeser, E. L., & Kerr, W. R. (2009). Local industrial conditions and entrepreneurship: How much of the spatial distribution can we explain? *Journal of Economics and Management Strategy*, 18(3), 623–663.
- Goto, J., Aida, T., Aoyagi, K., & Y. Sawada (2013). "Incentives and social preferences in a traditional labor contract: Evidence from rice planting experiments in the Philippines," mimeo.
- Haque, E. (2009). *Current status and prospects of female employment in the apparel industry in Pakistan*. Islamabad: UNDP.
- Haroon, M. (2013). *The effects of agglomeration on the formation and scale of operation of new firms* (Working Paper No. 03-13). Lahore: Centre for Research in Economics and Business.
- Heywood, J. S., Siebert, S., & Wei, X. (2013). *The consequences of a piece rate on quantity and quality: Evidence from a field experiment* (Discussion Paper No. 7660). Bonn: Institute for the Study of Labor.
- Hong, B., Kueng, L., & Yang, M.-J. (2014, May). *Estimating management practice complementarity between decentralization and performance pay*. Paper presented at 10 Years of the World Management Survey: Lessons and Next Steps, Harvard Business School, Cambridge, MA.
- Hussain, S. T., Malik, K. Z., Khan, U., Faheem, A., Nabi, I., & Hamid, N. (2013). *A comparative analysis of the garments sector of Pakistan*. Unpublished manuscript, International Growth Centre, Pakistan.
- Ilias, N. (2006). Families and firms: Agency costs and labor market imperfections in Sialkot's surgical industry. *Journal of Development Economics*, 80(2), 329–349.
- Jacoby, H. G., & Mansuri, G. (2010). "Watta satta": Bride exchange and women's welfare in rural Pakistan. *American Economic Review*, 100(4), 1804–1825.

- Kaur, S., Kremer, M., & Mullainathan, S. (in press). Self-control at work. *Journal of Political Economy*.
- Lazear, E. P. (1986). Salaries and piece rates. *Journal of Business*, 59(3), 405–431.
- Lu, L. X., Van Mieghem, J. A., & Savaskan, R. C. (2009). Incentives for quality through endogenous routing. *Manufacturing and Service Operations Management*, 11(2), 254–273.
- Makino, M. (2012). Garment industry in Pakistan in the post-MFA period. In T. Fukunishi (Ed.), *Dynamics of the garment industry in low-income countries: Experience of Asia and Africa (interim report)* (chap. 4). Chiba: IDE-JETRO.
- Munir, K., & Khan, U. (2011). *Fan industry in Gujrat and Gujranwala: An SME cluster study* (DPRC Working Paper). Lahore: Lahore University of Management Sciences.
- Nabi, I., & Hamid, N. (2013). *Garments as a driver of economic growth: Insights from Pakistan case studies*. Unpublished manuscript, International Growth Centre, Pakistan.
- Otsuka, A. (2008). Determinants of new firm formation in Japan: A comparison of the manufacturing and service sectors. *Economics Bulletin*, 18(5), 1–7.
- Paarsch, H., & Shearer, B. (2000). Piece rates, fixed wages, and incentive effects: Statistical evidence from payroll records. *International Economic Review*, 41(1), 59–92.
- Rosenthal, S. S., & Strange, W. C. (2010). Small establishments/big effects: Agglomeration, industrial organization, and entrepreneurship. In E. Glaeser (Ed.), *Agglomeration economies*. Chicago, IL: University of Chicago Press.
- Shearer, B. (2004). Piece rates, fixed wages and incentives: Evidence from a field experiment. *Review of Economic Studies*, 71(2), 513–534.
- Shi, L. (2010). Incentive effect of piece-rate contracts: Evidence from two small field experiments. *BE Journal of Economic Analysis and Policy*, 10, 1–34.
- Technopak. (2007, December). *Discussion and analysis: Piece rate vs. salary-based production system* [PowerPoint presentation].