**Construction Workforce Management Strategies to Reduce Absenteeism:**
**A Survey Study**

M. Ghayth Lattouf¹, F. Jordan Srour², and Issam M. Srour³

¹ Graduate Student, Engineering Management Program, American University of Beirut, P.O. Box 11-1486, Beirut, 1107-2020, Lebanon; PH (+961)3894715; email: mml05@aub.edu.lb

² Assistant Professor, Information Technology and Operations Management Department, Lebanese American University, P.O. Box 13-5053, Beirut, 1102-2801, Lebanon: PH (+961) 1786566; email: Jordan.srour@lau.edu.lb

³ Assistant Professor, Engineering Management Program, American University of Beirut, P.O. Box 11-0236, Beirut, 1107-2020, Lebanon; PH (+961)1350000; FAX (+961)1744421; email: is04@aub.edu.lb

**ABSTRACT**

Strategic workforce management decisions (e.g., hiring, training, and staffing) have a direct impact on the cost, schedule, and quality of work. This paper presents the preliminary findings of a survey of construction/site managers representing a set of building construction projects in Lebanon. The survey serves to capture current workforce conditions and management practices in an environment that is dominated by residential construction projects and a transient or migrant workforce. Despite the international location of the survey, the results indicate a worker demographic similar to that found in the Southwestern United States and other areas with significant residential construction. The results also serve to highlight the significance of basic management techniques in reducing absenteeism: adopting training programs to increase the skill level of workers, providing incentives to increase the tenure of workers on site, and arranging the working schedule to favor less overtime.

**INTRODUCTION AND LITERATURE REVIEW**

The majority of construction workforce management strategies are designed and tested for industrial projects. While the value of each industrial project may warrant this emphasis, the cumulative value of residential projects in some communities is significant. For example, Texas alone accounted for 16% of all new housing permits in the United States (Workers Defense Project 2013). With so much value tied up in the residential construction sector, there is a need for a set of management tools dedicated to addressing the unique residential workforce. Before designing such tools, it is, however, important to study the exact nature of a predominately residential labor pool. What are the demographics of this workforce and what managerial levers exist for the management of the residential workforce?

We undertook a study of the labor pool in Beirut, Lebanon to address these questions. While the location may seem like one of convenience, it serves the purpose of this study quite well: the Lebanese construction sector is dominated by residential construction projects; the transient, migrant labor pool is similar to those found in the Southern United States, while also bearing similarities to the industrial sector labor pools found on projects throughout the Arabian Peninsula; and finally, the steady
The growth of the Middle Eastern construction industry warrants the development of tailored, workforce management tools.

The construction industry in the Middle East has been growing steadily over the past few years. The amount of planned construction work in the region is estimated at around $2.4 trillion (GCC 2010). In 2002, the construction industry in Qatar grew by 3.6% contributing about $750 million to the overall GDP (Abdulaziz et al. 2012). Furthermore, labor costs can be as high as 50% of a project’s overall cost (Kazaz et al. 2008). This makes strategic workforce decisions a key in determining whether projects are successful (Koehn and Mehta 2000, Srour et al. 2006a).

The scope of projects coupled with a shortage of workers in these regions has, however, led to a dependence on a transient workforce. For example, construction workers in many parts of the world are not officially employed by contractors and are often un-documented. Karjanen (2011) found that undocumented workers make up a sizeable portion of the US construction industry. Due to their situation, these workers are not official “employees” of the company and are, therefore, likely to leave their jobs without prior notice (Karjanen 2011). In addition to posing managerial issues, it also makes judging the presence of a systemic labor shortage difficult. Nevertheless, one can use the failure to appear at work without prior notice or absenteeism as a proxy measure.

Several papers have tackled the problem of absenteeism and its effect on the project. An analysis by Hanna et al. (2005) found that an absence rate of 6% to 10% decreases productivity by as much as 25%. They also investigate the factors that might have an effect on absenteeism. One of the most important factors was the lack of interest of workers. This factor plays an even bigger when the construction workforce is mostly transient (i.e. employed for a short period of time). One reason for this is that migrant workers are more likely to have work-related injuries since they have the most dangerous jobs, relatively low or nonexistent safety training, and different attitudes toward risks (Meardi et al. 2012). Additionally, most of the workforce will have a limited interest in the project because they tend to work on several projects in a short period of time (Makulsawatudom et al. 2004).

Beyond issues of absenteeism, there are other factors that affect the productivity of workers and consequently the overall success of a project. For example, Abdulaziz et al. (2012) studied the different factors that negatively affect the productivity of workers in Qatar and found that the skill level has the biggest impact. Attracting sufficiently skilled workers to complete the planned construction activities in the Middle East is a major challenge. Another factor that can affect productivity is the number of change orders. Love and Li (2000) studied the causes and costs of rework in the Australian construction industry. They found that changes initiated by the client and end-user were the primary causes of rework, which in turn increases the cost of a project by 3%. Change orders are common in projects done in developing countries because those countries lack the technologies and strategies that help in reducing or even eliminating change orders. A study done in Malaysia showed that change orders were the third most important factor that affects productivity following skill level and amount of building material available (Kadir et al. 2005).

The problems of productivity and absenteeism in the construction industry have led to an increased interest in strategies that can handle these problems. Several
workforce management strategies have been proposed. These include: 1) Increasing the self-regulation among workers. Ahn et al. (2013) proposed that managers should consider how to raise the workers’ feeling of attachment to their work; 2) Using incentives to reduce absenteeism. Banerjee and Duflo (2006) proposed increasing wages to provide an incentive for workers to work harder and hence be less absent; and 3) Decreasing the distance that the workers must travel to get to the workplace. Hinze et al. (1985) found that contractors who offer housing units to their workers have lower rates of absenteeism, since those units are usually located near the project.

The objective of this paper is to examine the characteristics of the construction workforce that is active in Lebanon, while also studying the relationship between the worksite environment, worker demographics, and absenteeism. Lebanon is a developing country with a substantial number of foreign construction workers, primarily from the neighboring country of Syria (UNDP 2013). The use of migrant labor is largely due to the economies of the region. Also, uncertainties in the Lebanese construction industry are relatively high for other reasons. For example, recent political instabilities in the region have affected the availability of workers, both skilled and unskilled, because many workers are fleeing Syria towards Lebanon in search for a job. Given the transient nature of the workforce and the residential nature of the construction projects, Lebanon served as a good location to identify, via a survey, the managerial levers that may exist to manage such a workforce.

SURVEY AND METHODOLOGY

The construction workforce of Lebanon was surveyed using a survey tool that was specifically designed to ascertain the demographics of the labor pool, their rates of absenteeism, and the nature of the work environment. We followed a typical survey design and administration procedure; see e.g. Zikmund et al. (2013). Specifically, we first identified our goals and objectives in order to guide our selection and wording of questions. In addition to our goal of capturing the labor pool demographics, we specified the following four hypotheses as part of our survey objective: 1) The rate of absenteeism (i.e., failure to appear at work) is higher for unskilled workers than skilled workers [H1]; 2) Working in longer shift schedules is associated with higher rates of absenteeism [H2]; 3) Projects with a high percentage of workers who have been working with the same company for long periods have a lower absenteeism rate than projects with higher worker turnover [H3]; and 4) High number of change orders lead to a delay in the project [H4a], and high rates of absenteeism cause delays in the project [H4b].

The first part of the survey aimed at quantifying and characterizing the workforce demographics. The second part focused on identifying the different uncertainties that could affect local projects, and quantifying their effects on project performance. Several questions were targeted at quantifying absenteeism, variation orders, and the project schedule to validate the hypotheses. We asked about the rate of absenteeism per week for unskilled, skilled, and foremen. We also formulated questions about the workshift schedule (the respondents had to give the number of working days and hours), and the percentage of unskilled, skilled, and foremen who were working for the same company for the past 9 months. We selected a tenure of 9 months as Wang et al. (2010) noted that a 35 week (9 months) timeframe is the time...
needed for construction workers to be considered long term employees. The respondents were asked to estimate the frequency of variation orders (weekly, every 2 weeks, monthly, yearly). Finally, a question about the project schedule was asked to measure the effects that change orders or absenteeism might have on a project performance.

The survey was conducted by means of personal interviews. This method was chosen because internet based surveys tend to have a very low response rate and suffer significant bias. Moreover, some of the respondents might have an inquiry about some of the questions; and therefore, it is essential that an interviewer be present. A telephone based survey was also infeasible since it is almost impossible to get the numbers of the sample population due to a lack of resources and information. A typical interview lasted anywhere from 20 to 60 minutes, depending on the availability and the attentiveness of the respondents. The interviewer would walk to the site and ask for the project/construction manager. If they were not available, then the interviewer would talk to the site engineers who were responsible for the site.

**Pilot testing and sample size**

Before administering the survey to a full sample of construction sites, a pilot test was carried out with two experts from the construction industry. One of the experts was a senior construction manager with over 35 years of experience, who serves as an area construction manager for a prominent construction contractor. The other expert was a lead project engineer with 10 years of experience who works for another prominent contractor in Lebanon. The subjects provided some valuable insights on questions that seemed ambiguous or misleading. Based on the feedback, modifications were made to the survey.

The target population was the construction managers/field engineers working on construction projects in Beirut. Beirut is the capital city of Lebanon and has a population of 1.5 million and an area of 20 km². Most of the major construction projects are situated in Beirut, and hence most of the construction workforce is centralized in the city. The questions in the survey were mostly of continuous nature; and therefore, the sample size calculations were based on that fact. It was decided that alpha, the level of acceptable risk, should be set at 0.1 and a 3 percent acceptable margin of error was chosen. Before calculating the sample size, the population size was estimated by using data from the Order of Engineers and Architects (OEA) on the amount in m² of building permits in Beirut from March 2011 to March 2013 (2,256,805 m²) (OEA 2013). Then, this number was multiplied by a factor of 0.8 to account for the projects that were still not underway. To obtain an estimate of the number of projects that are currently underway, this number was then divided by 5,000 m² which represents a typical floor area of 500 m² multiplied by 10 (i.e., a ground floor, underground parking, and 8 floors). Hence, the population size was estimated to be about 361 projects assuming that every project has a construction manager and/or field engineer. Using the formulas suggested by Cochran (1977), the sample size was found to be 65. Since this number is greater than 5 percent of the estimated population, Cochran’s correction formula had to be used and the subsequent population size was found to be 54. To guarantee a fair geographical distribution of sites in the Beirut area, a total of 60 projects were surveyed. The Beirut
area was divided into blocks, and the sites were marked on the map. The site visits were done at random.

**RESULTS AND ANALYSIS**

Data entry was done in SPSS (IBM Corp Released 2011). Out of the respondents, 40% were site engineers, 37% project managers, 18% construction managers and 5% assistant project managers. Figure 1 shows the different project types and their respective shares which is typical for the local construction industry. Most of the surveyed projects were in superstructure or finishing phases (45% and 33% respectively). This is an expected result given that a typical 1.5 to 2.3 year residential project spends 2 to 4 months in excavation and shoring, another 2 to 4 months in substructure construction, 8 to 12 months in superstructure construction, and 6 to 8 months for finishing and commissioning.

![Figure 1. Project types](image)

Figure 2 shows the demographics of the local construction workforce. Almost 98% of the unskilled and 90% of the skilled workforce are non-Lebanese Arabs. However, 77% of the foremen are local, which means that higher positions are usually given to Lebanese nationals. Foremen are treated as regular employees by the contractors, and hence receive benefits such as healthcare and housing expenses. It is interesting to note that these figures are similar to those found in a recent study of the workforce in Texas where 81% of the workforce is reported as Hispanic or Latino, any race (Workers Defense Project 2013).

![Figure 2. Workforce demographics](image)
On average, unskilled workers are paid $18 to $19 per day while skilled workers are paid $30 to $31 per day. Daily wages range from $24 to $48 depending on the skill type of the worker. For example, elevator mechanics receive about $48 per day while carpenters receive $35 per day. On average, Foremen are usually given a monthly salary of about $1,500. Some of the foremen working in small projects get as little as $600. An interesting comparison to be made here is between the wages in Lebanon and the United States (US). A skilled carpenter, for example, working in the US receives $18 per hour or about $144 per day (Srour et al. 2006b, Workers Defense Project 2013).

Approximately half of the projects (26) had a 6 day, 10 hour per day work shift. This means that most of the construction labor works overtime; since the standard shift per Lebanese labor law is 8 hours. Again, this is in keeping with the construction conditions in Texas where 42% of the workforce reported working more than 5 days per week (Workers Defense Project 2013). However, there are no premiums given for overtime, i.e. workers get their daily wage divided by 8 for each hour of overtime work, while foremen get a bonus at the end of the year.

The trades involved in the surveyed projects are those most commonly found in residential building projects; trades usually found in industrial and heavy/civil projects are very rare. For instance, only 7 percent of the respondents used traffic operators and 47 percent did not have any fencing specialists. An overwhelming majority of the contractors did not offer any training to their workforce. A mere 3 percent offered basic safety training for their workers. This can be attributed to the fact that there are limited training opportunities in Lebanon, and most of the workers learned their trades while helping the skilled workers, i.e. on-job training. Interestingly, the lack of formal schooling found among the Lebanese workforce is consistent with the residential construction workforce of Texas where 85% had a high school or lower level of education (Workers Defense Project 2013).

Absenteeism is one of the main sources of uncertainty in the local construction industry. Absenteeism is defined as the failure to appear to work, and can be of two types: excused and unexcused. Excused absence is when the workers ask their superiors for a fixed period vacation, while an unexcused absence is when the workers do not show up to work with prior notice. To test the first hypothesis [H1], we informed the respondents that their answers should be a combined rate of excused and unexcused absence. Next, we performed a paired sample t-test on absenteeism between unskilled and skilled workers. The t-value was calculated to be 5.5 which is greater than 2.0 (with a sample of 60 and a confidence level of 95%) making the two variables statistically different. The absenteeism rate for unskilled had a mean of 7% compared to 4% for skilled workers. The main reason for this difference might be that unskilled workers are usually more dispensable, and therefore have a higher chance of getting excused absence. Foremen have a very low absenteeism rate (0.6%) due to their vital role in construction (the work cannot commence if the foremen are absent). Interestingly, the absenteeism rate in Lebanon is lower than that in other parts of the world. For example, Alberta, Canada, has an average absenteeism rate of 15% (Salehi Sichani et al. 2011). A possible reason for this difference might be that workers in Lebanon are mostly foreign; and hence, they do not have many paid holidays. Another reason is that most contractors are strict
with absenteeism. Several respondents indicated that they fire workers if the absence is not excused. The respondents were also asked to rank the different factors that might increase absenteeism. Figure 3 shows the average relative importance of each factor, 5 being the highest effect and 1 the lowest effect.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Average Relative Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bad weather</td>
<td>2.3</td>
</tr>
<tr>
<td>Interpersonal relationships</td>
<td>1.8</td>
</tr>
<tr>
<td>Dangerous site conditions</td>
<td>1.5</td>
</tr>
<tr>
<td>Work-related injuries</td>
<td>2.0</td>
</tr>
<tr>
<td>Political Instability</td>
<td>3.8</td>
</tr>
<tr>
<td>Holidays</td>
<td>4.0</td>
</tr>
<tr>
<td>Competition from other sites</td>
<td>2.7</td>
</tr>
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**Figure 3. Factors affecting absenteeism**

As shown in Figure 3, holidays and political instability have the highest effect on absenteeism. It is also interesting to note that the external factors to the project (e.g., bad weather, political instability, holidays, and competition from other sites) have the highest effect while internal factors (e.g., interpersonal relationships, dangerous site conditions) have a relatively lower effect on absenteeism. The respondents were also asked to estimate the predictability of unskilled labor shortages, 1 being predictable and 5 being unpredictable, over 3 periods namely daily, weekly, and seasonally. The daily and weekly predictability was almost identical (2.7) while the seasonal predictability was much higher than the other two (3.5). This is an expected result as it is difficult for a contractor to forecast shortages in 3 or 4 months especially when factors affecting absenteeism are mostly external.

The second hypothesis [H2] that was tested was that projects that have longer work schedules have higher absenteeism rates than other projects. To do this, a frequency table was formulated where the mean absenteeism rate was calculated for each workshift schedule. Indeed, both skilled and unskilled workers in a 7-day 10 hour work shift schedule had a higher absenteeism rate than others who were working in a 6-day 8 hour work shift schedule (9% compared to 6% with a t-value of 5.72). As the number of work hours increases, workers are more likely to search for another job that requires less hours and offers the same pay since most of the contractors in Lebanon seem to offer identical wages for unskilled workers.

The third hypothesis [H3] was that projects that employ workers for long periods have a lower absenteeism rate than projects who frequently fire and recruit workers. To test this hypothesis, we used a bivariate correlation analysis between the longevity of work percentage and the absenteeism rate. The Pearson correlation factor was found to be -0.40 for unskilled workers and -0.14 for skilled workers. Therefore, there is a significant negative correlation between the number of workers who work for more than 9 months and the absenteeism rate. This is especially true for unskilled workers since they are less likely to endanger their job and are less likely to work for a competitor if contractors are offering a high level of job security.
Change orders are another source of uncertainty in construction projects. Hypothesis [H4a] states that a high number of change orders can have a negative effect on the project schedule. Most of the respondents stated that change orders occurred on a monthly basis (44%) and most of the projects were on schedule (62%). However, there was no correlation between the frequency of change orders and the project schedule. That was also the case for hypothesis [H4b] since there was no correlation between the rate of absenteeism and the project schedule. One reason for this is the reliability and robustness of the original project schedule. If the original schedule wasn’t realistic and/or did not account for contingencies, then there is bound to be some delay in the project regardless of the degree of uncertainty. Moreover, there might be some level of bias in the responses as many of the respondents might have felt that the project schedule question was asking for sensitive information that was an evaluation of their work.

CONCLUSIONS AND EXTENSIONS FOR FUTURE WORK

This paper presented a survey that captures the demographics and industry conditions of a predominately residential construction market in the Middle East. Four hypotheses were formulated and tested. The level of absenteeism is significantly related to several factors, namely level of skill, tenure of work, and the workshift schedule. According to the data collected, absenteeism and change orders do not seem to have a significant effect on the project schedule, but this may be due to the prevalence of bias associated with the survey question on project schedules. The data reported in this paper are based on a self-assessment by the respondents, which ideally should be cross-checked with actual project conditions. Nevertheless, these results highlight three managerial levers that can be used to curb absenteeism among largely transient residential construction sector workers: adopt training programs to increase the skill level of workers, provide incentives to increase the tenure of workers on site, and arrange the working schedule to favor less overtime. Ultimately, these findings can serve to buttress our understanding and modeling of residential sector workforce management decisions in order to help managers make better strategic decisions.

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