Strategies for safety and productivity improvement

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Abstract— the aim of this paper is to study the connection between occupational health and safety (OHS) and increasing employee productivity in construction industry from the point view of contractors in Gaza strip. This has been done by identifying strategies that effectively promote both safety and productivity during a construction task. In this study, a quantitative research was adopted as the main statistical component. The survey approach (descriptive and analytical survey) has been chosen and has been conducted through some face-to-face interviews and a written closed and semi closed questionnaire for a chosen sample with a size of forty three people from the construction population. After making validity test, relia-bility test, and descriptive analysis, the test of the relative importance index (RII) has been conducted to determine the relative importance of various factors. Strategies that can be followed to effectively affect safety and productivity were resulted from the survey feedback. These strategies fall under five major groups; planning, training, monitoring, communication skills, and inspection. Results indicated that "*Training workers to carry out works properly, especially in the new types of work*" factor has been ranked in the 1st position with regard to its importance in sustaining safety and productivity of project. This factor belongs to the "*training group*". The research is only confined to the safety and productivity relationship in the public construction environment in Gaza strip, but not the west bank. The small sample size of the survey would probably not be indicative of the general population of contactors in Gaza strip, although the most of the results were reasonably accepted and were related to the literature review. More research is needed to understand the topic since literature on safety and productivity in Palestine and surrounding region is very limited. Construction companies need to substantially improve OHS as well as improving construction productivity and reducing costs. Contractors need to plan for a strategy to achieve that, and need to move from strategies to implementation. In other words, contractors are recommended to act strategically to protect workers by continuously identifying hazardous conditions and by training and monitoring.

Index Terms— Construction, Safety, Productivity, Strategy, Safety plans.

I INTRODUCTION

To successfully complete a modern construction project, managers must ensure that the facility is delivered on time and under budget while meeting specified quality requirements and acceptable safety standards [1]. Productivity is one of the most important factors affecting the overall performance of any organization, large or small [2]. At the same time it can be said that productivity of various trades in construction is the basis of arriving at estimates for time and cost required to complete a construction process [3]. Siriwardana and Ruwanpura [4] said that improving labor productivity is an effective approach to improve the overall productivity of the industry. For example, it is vital for construction managers and engineers to understand how safety and productivity are interrelated [1]. A manager in Turkey, who has a long and extensive international experience, expressed the view that workers in Mediterranean countries are especially unlikely to take the required safety measures, even if management insists that they do so.

In contrast, a site manager of a company that has a joint venture with an American firm stated that their site engineers do successfully control the safety situation by random stops and checks of work operations throughout the day [2].

It must be known that construction accidents are the major element of many human tragedies, demotivate workers, disrupt site activities, delay project progress and adversely affect the overall cost, productivity and reputation of the construction industry [5]. The relationship between safety and productivity is clear [6]. If the workplace is poor in health and safety, it will affect the individual, the workplace and the community. It will reduce productivity [7].

Therefore it is important to develop working cultures in a direction which supports health and safety at work, which promotes a positive social climate and smooth operation, and enhance the productivity [8]. The objective of this paper is to identify strategies that effectively promote both safety and productivity during a construction task.

II LITERATURE REVIEW

Project objectives are: to get a production in high quality, on time, on budget and with zero accidents. These objectives

are not easy as construction sites are busy places where time pressures are always present and the work environment ever changing [9]. Hallowell [1] said that: cost, schedule, quality and safety are in conflict in the most of time. Leaders around the world increasingly recognize that a well-managed safety system provides an operational strategy to improve overall management. In recent years a significant number of major organizations have discovered that applying the tools and techniques of good safety management gives them not only reduced injuries and illnesses but also measurable improvements in efficiency, quality, and productivity [10].

Roberts [11] argued that there is must be a strategy makes significant increases in productivity and efficiency whilst reducing accidents and creating strong awareness of safety in the workplace. It drives also to cost reduction and overall greater profitability. Some factors such as distractions in the work environment and human error have a negative impact on safety and productivity while other factors, such as planning, communication and teamwork, have a positive impact on both safety and productivity [1]. Chapman and Butry [12] said that management practices affect productivity over the life cycle of a construction project in a number of ways, which are including: planning; resource supply and control; and supply of information and feedback.

Human resources practices are important to project and safety management. These include: giving out incentives based on an individual's safety performance; meting out punishment; providing safety training; maintaining close communication and feedback; allowing workers to participate in safety matters; management commitment; evaluating workers based on their safety performance; and providing welfare benefits [13]. AlTabtabai studied the general concept of safety culture, and indicated that the most important factors in construction site accidents were management policies (such as safety meetings, training, and supervisory attitudes and messages) and risk acceptance by workers [14]. The weekly work plan meeting promotes two-way communication and team planning to share information on a project in an efficient and accurate way. It can improve safety, quality, the work flow, material flow, productivity, and the relationship among team members [15]. HSE [7] insisted that Health and safety should be treated as an integral part of productivity, competitiveness and profitability. Hammad *et al.* [16] concluded that the most effective ways to improve productivity and safety are analyzing the entire construction process in detail; providing better planning to mitigate the impact of work changes and to eliminate the loss of time that results from imprecise planning; training for supervisors and the crew; regular meetings; and safety planning. Each construction project has unique problems and challenges, so that planning should lead to improved safety performance to ensure high production. To achieve that, managers should identify in advance any special equipment, tools, or safety devices to do job efficiently and safely should be taken in mind. In addition to that, detailed planning help to reduce accidents by eliminating crisis situations which can occur when a crew is suddenly confronted with an unplanned for situation [17].

III METHODOLOGY

Forty three questionnaires were distributed to randomly selected contractors to get their opinion, on a five point Likert scale, about the strategy that should be taken to improve safety and productivity in Gaza strip. All questionnaires were returned and completed for quantitative analysis. A well-designed questionnaire was developed for the study with mainly closed ended questions and some open questions. The questionnaire was built on three sections that cover the main questions of the study. The first section is related to the demographic information about respondents and company profile. Second section is related to extent of importance of safety topic in the company and it also includes some questions about labor productivity. Third section is related to strategies that can be followed to effectively affect both of occupational safety and increasing productivity. It includes 5 main groups with 26 factors. The five groups are *planning, training, monitoring, communication skills and inspection*. These have been developed from the interviews and the factors that have been mentioned by (Hallowell [1]; Volkman [18]; Chapman and Butry [12]; Lai *et al.* [13]; Whiting and Bennett [10]; Walshl and Sawhneyz [14]; Salem *et al.* [15]; Levitt and Samelson [17]; HSE [7]; Roberts [11]; Hammad *et al.* [16]; National Business Group on Health [19]; Peng *et al.* [20]).

Before the distribution of the questionnaire, a face validity of the questionnaire was conducted by discussing a draft of the questionnaire with a group of professors and experts as well as a statistician. After that a pre-test for the questionnaire was conducted with five respondents of colleagues and key decision-makers (site engineers and project managers). At its core, pretesting was conducted to make sure that people can understand the questions, and to verify the completeness of questionnaire. Many improvement changes were implemented on the questionnaire after the feedback from the pre-test. The respondents have recommended to change the answer options in the questions of section two beside modifying some wordings of some questions in sections two and three to clarify some confusion and ambiguity which were reported by them. After the pre-test, a pilot study was conducted with fifteen respondents. It was done to discard questions that are not providing useful data and to make final revisions of the questionnaire. The results of the pilot study were reliable. Accordingly, the pilot study sample were included under the full main sample.

Research population includes contractors in the public construction sector as a target group. They have a valid registration by the Palestinians contractors unions (PCU) in Gaza strip. They classified in the first class. Contractors were selected from the first class because they usually work in large

projects and thus supposed that occupational safety is part of their work plan. Sample was selected randomly. Sample size was chosen to provide adequate information on reliability and a certain degree of validity. Forty three respondents as a sample were included in this study. Although the sample size of the survey would probably not be indicative of the general population of construction industry in Gaza strip, but the most of the results were reasonably accepted and were related to the literature review as will be shown.

The relative importance index (RII) test was adopted for similar studies to determine the relative importance of various factors. The RII test adopted for this study to determine the relative importance of the factors in part three by depending on responses from contractors. The five point scale ranged from 1 (very low important) to 5 (very high important) was adopted and transformed to relative importance index. The RII was used to rank the strategies that will improve both productivity and occupational safety in construction from the point view of contractors in Gaza strip.

IV RESULTS AND DISCUSSION

A. Respondent's general information

The respondent's general information is shown on table (1).

B. Occupational safety practice in construction sites

1. Occupational safety and company's policy

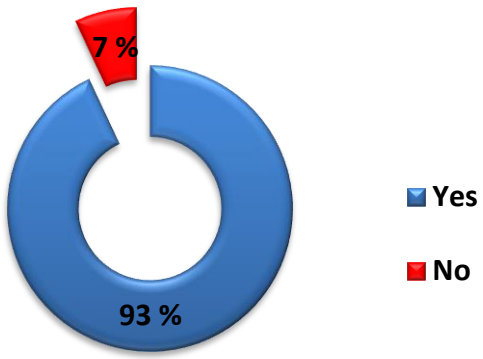

Figure 1: Occupational safety and the company's policy

Table 1: Profile of the respondent and the company

Profile of the respondent and the company	Frequency	Percentage %
The Title position		
Executive Director	3	6.9
Project manager	11	25.6
Site engineer	22	51.2
office engineer	1	2.3
Supervisor engineer	1	2.3
Safety engineer	1	2.3
Foreman	3	6.9
procurement engineer	1	2.3
Years of experience in the field of construction?		
less than 1 year	6	14.0
1 to 3 years	14	32.6
4 to 6 years	2	4.7
7 to 11 years	6	14.0
12 to 15 years	4	9.3
More than 15 years	11	25.6
What is the number of projects implemented over the past three?		
Less than 10	22	51.2
10 – 20	19	44.2
21 – 30	2	4.6
More than 30	-	-
What is the value of the projects implemented during the last three years ($)?		
Less than 40000	2	4.7
40000 – 100000	4	9.3
More than 250000	-	-
1 to 3 million	3	7.0
4 to 6 million	8	18.6
More than 6 million	26	60.5

Figure (1) shows that majority of respondents (93%) of the sample mentioned that occupational safety forms a part of company policies, while the rest of the study sample (7%) believed otherwise, and expressed that occupational safety does not form a part of company policy. The result is a good sign for construction companies that classified as first class in Gaza strip, as this evidence of increased awareness of the importance of occupational safety in construction. Even though that many companies which safety forms a part of its policies do not apply such safety policy. A written health and safety policy helps to promote an effective occupational safety and health (OSH) program. Such a policy should reflect the special needs of the company in terms of safety and should be regularly reviewed and updated.

2. Safety program

As shown in figure (2), on a question about if the company has a safety program for each project or not, (62.8 %) of respondents stated that their companies designed a safety program for each project. On the other hand, (37.2 %) replied negatively with respect to this question.

Safety program should be written in a manner that takes into account both the safety and productivity. Companies that do not have a safety program said that the availability of the safety program for each project depends on the request of supervision or owner (financier of the project), and there are those who said that each project manager is responsible for the safety of the site and therefore no need for a special safety program. There was also a saying that all construction projects are similar, and therefore would not require each project to a special safety program. Furthermore, they have considered that safety program is useless and costly in view of worker compensation and injury treatment. Results showed that most of companies are realizing that safety pro-

gram is not only beneficial for the employees. It is also a way to gain a competitive edge over the competition level.

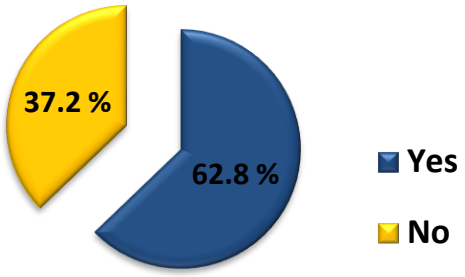

Figure 2: Safety program for each project

The reason of why many companies in Gaza strip started to consider safety programs is that most of projects are funded by international or regional donors. The international donors come from regions where construction safety occupies top priorities of construction industry. In developed countries, it is usual and obligatory to provide safety programs by contracting companies according to project and company size. Thus, when donors started to fund construction projects in Palestine, they required that contractors should provide safety program for the projects.

3. Safety training

Figure (3) shows whether company provides employees in each project a safety training courses or not. (60.5 %) replied positively while (39.5 %) mentioned that project employees didn't join any kind of safety training. This result shows that companies which provide safety training to the project employees are more than those who don't provide.

It reflects that companies appreciate the important role of safety training in construction. All employees are required to attend safety training from manager to worker.

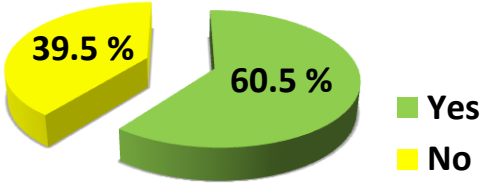

Figure 3: Companies safety training

Safety training gives employees opportunity to identify hazards and the best practices to avoid such hazards at workplace. Safety training programs should be offered to meet the current demand of the construction industry. There was a clarification from the companies that do not provide a safety training program for staff by saying that most projects do not pose a threat to the lives of workers. In addition to that, they think that safety training is costly and takes from the time of the project.

4. Planning activities in accordance with the standards of occupational safety

Figure (4) describes respondents' responses when they have been asked whether project is planned and implemented according to safety measures. It is shown that (55.8 %) of respondents replied with yes, while only (4.7 %) replied with no. (32.6%) of respondents said that projects, in sometimes, are planned and implemented according to safety measures and (7%) said that it depends on the request of donors. Projects that are planned by taking into account safety are projects that cost less and are performed well. In other words, when safety is included into project planning, compensation will reduce, productivity will increase and quality will increase too. Compensation will reduce because

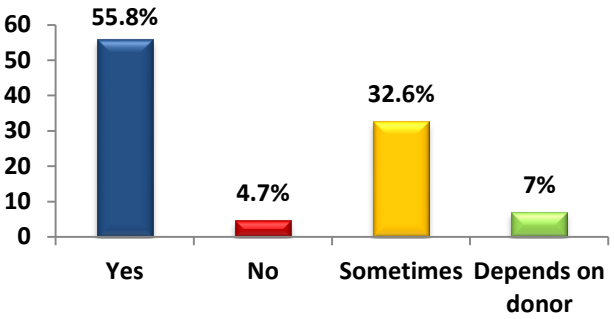

Figure 4: Planning activities in accordance with the standards

planning for safety means that project employees and workers will be less exposed to expected hazards and thus accidents and its inherent compensations will decrease.

Thus, as found through the literature review, Hammad *et al.* [16] said that safety planning is an important element for increasing the productivity at construction sites. Also, Saurin *et al.* said that effective planning for health and safety is essential if projects are to be delivered on time, without cost overrun, and without experiencing accidents or damaging the health of site personnel [9]. Respondents who said that project sometimes is planned and implemented according to safety measures may don't have enough experience to know the meaning of safety planning.

The word "sometimes" could have different meanings in this questionnaire; respondents may refer to some projects that planned by taking into consideration safety measures in accordance with the conditions of the contract, while some of them may have thought that all projects are planned with regard to safety measures, but not 100%.

They might also have thought that company applies safety

measures while planning in different levels of importance according to the size, cost, and importance of the project.

5. Safety meetings between owner and contractor

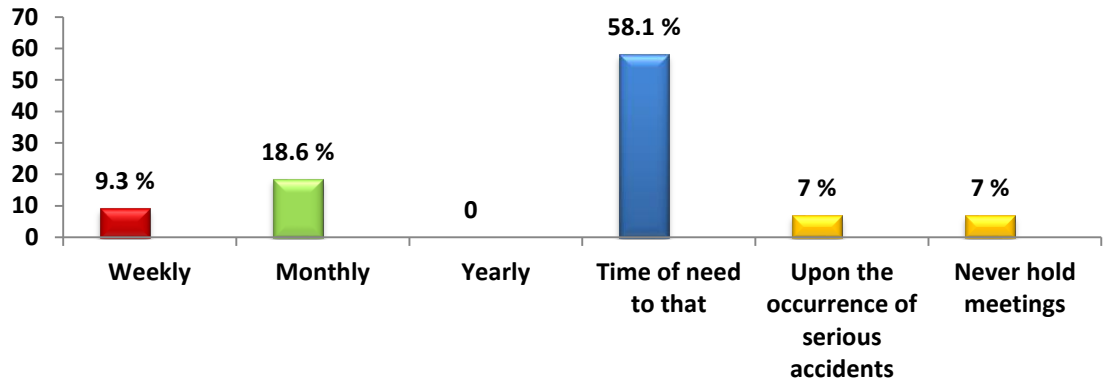

Figure 5: Safety meetings between owner and contractor

Figure (5) shows that (9.3%) of the study sample holds safety meetings with owner of the project every week, and (18.6%) holds safety meetings with the owner every month. The majority of respondents (58.1%) holds safety meetings with the owner only when they need to that, and (7%) of the respondents said that holding safety meetings with owner depends on the occurrence of serious accidents. Also, figure (5) shows that (7%) of the respondents never hold meetings with the owner.

Safety engineer is responsible for conducting safety meetings periodically with the owner to discuss different topics such safety rules, expected hazards, corrective actions, accident prevention, and reviews of accidents that have occurred recently. Such meetings should be held at least once monthly.

6. Inspection on occupational safety by the Ministry of Labor

Figure (6) shows that (7%) of the study sample mentioned that there is always an inspection on the sites by the ministry of labor. In contrast, there is (25.6 %) of respondents said that the construction sites never be inspected by the ministry of labor. While there was a saying by (39.5%) that on-site inspection was not fully disconnected, but occurred only in case the need to write a report about a particular accident. Also, there was (27.9%) of respondents said that the inspection visits occur intermittently.

Hassouna [9] explained in the analysis of the results of his questionnaire that (83%) of the respondents said that there was no governmental institution that follows up safety in constructions, enlightenment of the construction employees, in applying safety legislation, or help in improving safety performance in construction sites in Gaza strip.

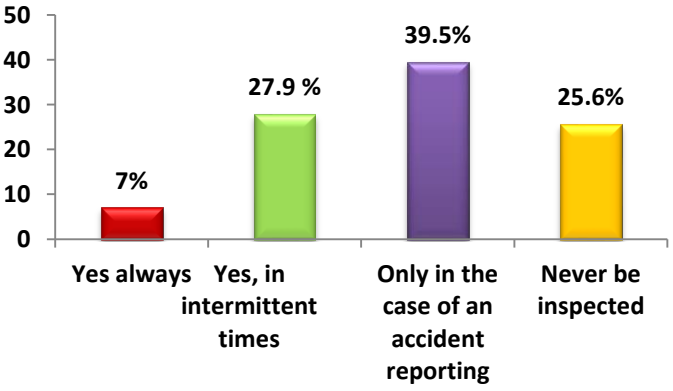

Figure 6: Inspection on occupational safety by the ministry of Labor

The other (17%) of his respondents noted a representative of the ministry of labor visits their sites, but in a much separated periods and without serious actions. The role of government towards construction safety in Gaza strip seems bad. There is an inherent need to activate the role of the government to enforce safety in our local construction industry.

7. Actions against the contractor in the case of non-compliance with health and safety procedures

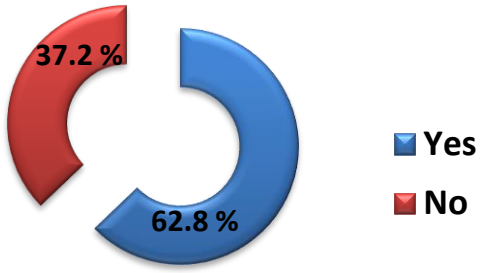

Figure 7: Actions against the contractor in the case of non-compliance with health and safety procedures

Figure (7) shows that (62.8%) of the study sample stated that there are strict actions against their companies in the case of non-compliance with health and safety procedures during project implementation, such as receiving a warning message, or the imposition of a penalty, and punishment may reach to suspension of work at the site until the contracting company is committed to the standards of safety. In the other hand, there are (37.2%) of respondents said that there are no actions against them if they don't work according to safety standards. There may be a great need to follow the style of imposing sanctions in case it is not commitment to safety standards, especially if the concept of the need to commitment to safety standards does not represent an essential part in the company's vision.

8. Accidents rate

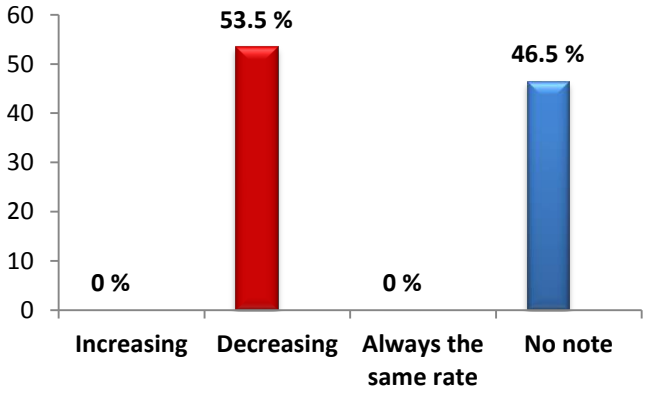

Figure 8: Accidents rate in the projects of company

Figure (8) shows that (53.5%) of the study sample believed that the accidents rate is decreasing in the projects of their company, but there were (46.5%) of respondents did not notice if the accident rate has increased or decreased. The second result gives a serious indicator of occupational safety at construction sites, where non observation of the accidents rate in the workplace means that the issue of the safety of the workers does not have any importance and does not be taken seriously. Although it has been reviewed previously among the literature review that incidents which lead to accidents and disasters require time and resources to be overcome, but even near-miss incidents will usually hurt productivity. Moreover, occupational injuries can harm the reputation of a company, decrease productivity, and result in huge costs [2].

9. Measures are taken to avoid the recurrence of incidents

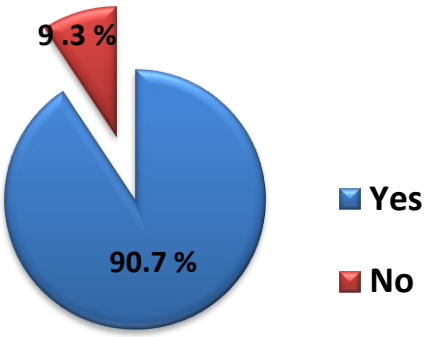

Figure 9: Measures are taken to avoid the recurrence of incidents

Figure (9) shows that there are (90.7%) of the respondents say that their companies have taken measures to avoid a repetition of the incidents that occurred at construction sites, such as searching for gaps regarding to measures of occupational safety and trying to treat the problem, in addition to raising awareness of the workers regarding safety standards, and ensuring the availability of all the necessary safety tools, as well as following-up and monitoring of workers and imposing sanctions on those who do not adhere to safety standards. In the other hand, there are (9.3%) of the respondents said that there are not any procedures to be followed by their companies to prevent the repetition of the incidents which occurred at construction sites. They say that there is no need for that because the number of injuries is too small and it is not affect the workflow.

C. Strategies that can be followed to effectively affect safety and productivity

Table (2) demonstrates the results from the survey feedback in the RII according to overall respondents. It is about strategies that can be followed to effectively affect safety and productivity. These strategies fall under five major groups; planning, training, monitoring, communication skills, and inspection. Results indicated that "*training workers to carry out works properly, especially in the new types of work*" factor with (RII = 88.15) has been ranked in the 1st position with regard to its importance in sustaining safety and productivity of project. This factor belongs to training group.

In terms of productivity, skillful worker is a productive one because he performs his tasks on time and with quality. Results of research prove that orientation of either newly hired workers or regular workers is essential especially for irregular job tasks. It helps avoiding discrepancies with safety regulations.

Table 2: Relative importance index (RII) and ranking for each item of the field: "strategies that can be followed to effectively affect safety and productivity"

Strategies that can be followed to effectively affect safety and productivity	RII %	Ranking	Group
Training workers to carry out works properly, especially in the new types of work	88.15	1	Training
Supervisor should be firm with the contractor in safety conditions because it will positively affect productivity	86.80	2	Inspection
Foreman should put daily and weekly work plans and define tools that should be used. This will increase productivity and ensure safety	86.53	3	Monitoring
Drug test for workers	85.60	4	Monitoring
Scheduling adequate number of workers to complete the heavy tasks, which helps to decrease injuries, as well as to foster a spirit of teamwork and increase productivity	85.20	5	Monitoring
Workers should be trained about dealing with changes in working conditions, such as extreme heat, rain and slippery surfaces to prevent injuries and to get excellent productivity	83.87	6	Monitoring
Necessity of coordination between the contractor and the ministry of Labor to apply occupational safety standards	82.27	7	Inspection
Workplace safety signs maintain facility and keep workers safe, healthy, and productive	81.48	8	Communication skills
Giving workers breaks time, and urges workers to take a rest when feel tired and fatigue, as well as not deprive of holidays	81.07	9	Monitoring
First aid training	80.20	10	Training
A safety engineer at site is necessary to prevent accidents and increase productivity	80.13	11	Planning
Managers, engineers and supervisors must be a good example for workers in compliance with the safety standards, such as wearing safety shoes, hats and etc., as this is considered an indirect message to workers to abide safety standards	79.73	12	Communication skills
Owners have to assess contractors before awarding the tender on the basis of the commitment to safety standards, where it affects the productivity and profit later	78.93	13	Planning
It is necessary to allocate a portion of project budget for the application of health and safety standards perfectly	78.93	14	Planning
Housekeeping is important in the workplace to get effective results with zero accidents	78.23	15	Planning
Planning each stage of work will help to adhere to the schedule with ensuring safety and productivity	77.87	16	Planning
It is important to assess workers in terms of commitment to safety standards and doing work properly, in addition to give incentives	77.87	17	Communication skills
Define any special equipment, tools, and safety devices to perform work efficiently and safely	77.87	18	Planning
Foreman or supervisor should have communication skills with workers to manage safety and to obtain higher productivity	77.60	19	Communication skills
Detailed planning for facing crisis situations that can occur helps to increase safety and productivity	77.47	20	Planning
Periodically safety meetings for managers, engineers and workers for discussing risks of activities to avoid accidents and to increase productivity	77.20	21	Communication skills

Strategies that can be followed to effectively affect safety and productivity	RII %	Ranking	Group
A safety program must be written to include all safety matters such as expected hazards and techniques to avoid hazards, training, equipment, tools and recording of injuries	76.40	22	Planning
Workers should not use broken tools or equipment, in addition to the need for tools maintenance	76.00	23	Monitoring
Workers should be trained to select and use of appropriate tools	75.12	24	Training
Training of managers and supervisors to define responsibilities and to cover any shortfall in awareness for occupational safety, and illustrate how important to be a good example for workers	70.80	25	Training
Workers should be trained on occupational safety techniques and wear appropriate clothing	69.47	26	Training

Results have also indicated that "*supervisor should be firm with the contractor in safety conditions because it will positively affect productivity*" factor has been ranked in the 2nd position with (RII = 86.80 %). This factor belongs to inspection group. This is due to the culture in Gaza strip. Also, results show that "*foreman should put daily and weekly work plans and define tools that should be used. This will increase productivity and ensure safety*" factor has been ranked in the 3rd position with (RII = 86.53 %). This factor belongs to monitoring group. This indicates that a worker and task allocation is major component of good safety and productivity management. "*drug test for workers*" is an important strategy which has been ranked in the 4th position with (RII = 85.60 %). It belongs to monitoring group. Substance abuse program is defined as a program that includes both pre and post-hiring testing for illicit drugs use. CII report on zero accident techniques research program pointed out that the studies showed that when random tests for drugs are conducted, better safety performance results are gained [21].

Also, results showed that "*scheduling adequate number of workers to complete the heavy tasks, which helps to decrease injuries, as well as to foster a spirit of teamwork and increase productivity*" factor has been ranked in the 5th position with (RII = 85.20 %). This factor belongs to monitoring group. When there are enough workers to help each other with heavy tasks, chances of exposing crew members to injuries will be reduced. *"workers should be trained on occupational safety techniques and wear appropriate clothing*" factor has been ranked in the 26th position with (RII = 69.47 %). This factor belongs to training group. This result is consistent with results obtained from a previous study which showed that engineers in Arab region almost receive no training.

In general it can be seen that the first five strategies, that have been selected based on the experiences of respondents, are already reflect the culture of the people to the importance of increasing productivity and ensuring occupational safety at the same time. Although the topic of the safety and productivity improvement is not embedded deeply in the mind of who works in the construction world in Gaza strip, but there are good things reflect this aspect.

Furthermore, after visiting several construction sites, and interviewing a number of experts, as well as referring to some previous studies that related to the same subject in Gaza strip, it was observed that the application of occupational safety only comes from fears of punishment and fears from the supervisor, especially if the project is huge and is funded by a foreign donor. Only then, there will be commitment to safety standards because of accurate monitoring and strict supervision, otherwise the punishment will be on the contractor according to the condition in the contract of the project. It may seem unacceptable when it is noted that the company that had committed to the standards of occupational safety in a project, which was funded by a foreign donor, has not committed to the same standards of occupational safety in another project. This is due to the presence of a clause in the contract about safety and the punishment if the company has not committed to that, and the lack of that clause in the contract of the other project. This confirms that the occupational safety standards do not represent an essential part of the culture of workers in the construction industry in Gaza strip.

This was matched with what Abo Mustafa found in his thesis research that safety is a new topic in the construction sector in Gaza strip, so contracting companies have a little awareness about the impact of safety factors on labor productivity. This was in the line with the study results of Kazaz and Ulubey [2], where they found that workers in mediterranean countries are especially unlikely to take the required safety measures. While when the company has a joint venture with an American firm, it was stated that the site engineers had successfully controlled the safety situation by random stops and check of work operations throughout the day.

Thus, training and then monitoring strategies are acceptable to be taken firstly to instill the concept of safety culture and its importance to increase productivity. It will be done through strict supervision, accurate monitoring and the use of incentives and sanctions with adopting respect in dealing

all the time with workers. On the contrary, It has been observed from HSE [7]; Roberts [11]; Hammad *et al.* [16]; Levitt and Samelson [17] that planning is the first strategy that can be followed in the United States and European countries and other developed nations in the construction industry, so as to increase productivity and ensure safety at the same time, where planners and managers put a plan for that and then individuals can easily be committed to that plan.

V CONCLUSION

This research studies the connection between OHS and increasing employee productivity in construction industry from the point view of contractors in Gaza strip. To achieve this aim, one main objective has been outlined which is identifying strategies that effectively promote both safety and productivity during a construction task. The study concluded that integration of safety management and productivity improvement are very important for achieving the strategies that developed by the company in the construction work.

After studying the literature review about the topic of research and by using the questionnaire survey approach, many important results were found from the respondents of the target group, which were the contractors from the first class in Gaza strip. For example, the strategies that can be followed to effectively affect safety and productivity fall under five major groups, which are; *planning, training, monitoring, communication skills, and inspection*. The strategies, in the descending order from the top to the lowest, are; training workers to carry out works properly, especially in the new types of work (under training group), supervisor should be firm with the contractor in safety conditions (under inspection group), foreman should put daily and weekly work plans and define tools that should be used (under monitoring group), drug test for workers (under monitoring group), and scheduling adequate number of workers to complete the heavy tasks, which helps to decrease injuries, as well as to foster a spirit of teamwork and increase productivity (under monitoring group).

Training and monitoring strategies are acceptable to be firstly taken for instilling the concept of safety culture and its importance to increase productivity. This is due to that the occupational safety standards do not represent as an essential part of the culture of workers in the construction industry in Gaza strip. It can be done through: training of new workers on company's safety policies and procedures before they start work; encouraging the buddy system by having new workers learn from experienced workers; training of workers to select and use the right tool for the job and correct them when necessary; and alerting workers about the changed working conditions such as extreme heat, rain, or slippery surfaces.

In addition to that, there is a real need for a strict supervision, an accurate monitoring and a use of incentives and sanctions with adopting respect in dealing all the time with workers. Beside some necessary elements required, such as a good level of cooperation between the management and employees, to ensure the success of an OHS in-tervention and the subsequent increases in productivity. On the contrary, planning was the first strategy that can be followed in the United States and European countries and other developed nations in the construction industry, so as to increase productivity and ensure safety at the same time, where planners and managers put a plan for that and then individuals can easily be committed to that plan.

VI RECOMMENDATION

Safety and productivity are interdependent. To achieve good safety is also important to achieve good productivity. All stakeholders for the project, including contractor, should come together to look into ways to enhance safety and productivity together. According to that, the study recommended companies to plan for a strategy to achieve that. It is important to develop working cultures in a direction which supports health and safety at work, and promotes a positive social climate and smooth operation, and thus enhance the productivity. After that, companies need to move from the planning phase to the implementation phase for the strategies. In other words, contractors are recommended to act strategically to protect workers by continuously identifying, evaluating, and mitigating hazardous conditions, as activities, work locations, and other conditions change in workplace. They should talk about safety in the same manner as about cost and schedule, use incentives with caution, and conduct regular safety meetings to discuss the safety issues in the construction sites.

Also, pre-planning and organizing each phase of a job can help in meeting schedules while making work safer and smoother. A detailed work plan will give an opportunity to deliver all materials and equipment which are necessary to perform each task safely. The plan also identifies all the danger tasks which help to take all the safety procedures during performing these tasks. In addition to that, contractors should prepare safety training programs which help personnel to carry out various preventive activities effectively. They should concern in training of the workers and teaching them the significance of using safety equipment, the good use of construction equipment, and the cooperation to identify hazards, the costs and results of injuries. As a foreman, or a site engineer, or any employee works in a key position in the workplace should help to increase company‘s work production while reducing injuries. To achieve that, training and orientation must be applied by an accurate monitoring with maintaining on respect in the dealing with the workers. Furthermore, contractors should utilize a self-inspection program even if the ministry of labor does not inspect construction sites periodically.

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