International Journal of Engineering and Technical Research (IJETR)
ISSN: 2321-0869 (O) 2454-4698 (P) Volume-7, Issue-11, November 2017

Impact on the Health of the Workforce for the Work in Extras Hours in the Construction

Gonzalo José Francisco Pérez-Gómez-Martínez, Luis Fernando Botero-Botero, Facundo Cortés-Martínez, José Gerardo Prince-Ríos

Abstract— **Due to the interest, to use as a strategy the extra hours within the constructive processes, the purpose of this investigation was to identify the causes and effects, on the health of the workers by this measure. The methodology used was qualitative and transversal by means of surveys applied to builders and craftsmen. The results of the first ones indicated that it is not a good measure. While the artisans expressed the convenience of working them, the consequences on their health due to the lack of rest and the loss of their abilities were not ruled out. The main conclusion establishes the possibility that overtime can be used as long as it is planned, scheduled, alternated, no more than two a day and integrating breaks, in addition to its use as a motivating agent.**

Index Terms— **Construction industry, Labor, Occupational health, Overtime.**

I. Introduction

Within any constructive process, there are many factors that influence its success, but undoubtedly the most important, in the search for quality, is the workforce. For Arboleda (2014), the workforce is the one that really crystallizes a project, and according to Navarro (2008) it represents an important percentage of the cost of operation, even more if one considers the heterogeneity of this resource, and its itinerant occupation in various locations.

As in any industry, construction should have full knowledge of all its processes and resources, to optimize them in the pursuit of productivity (Mayorga, 2014). Martínez and Ros-Mar (2010) establish that productivity is more the will of the people than a technique. Therefore, labor now plays a fundamental role in increasing productivity. According to Kazaz, Manisali & Ulubeyli (2008), construction is an industry better known for its traditional methods, for its extreme conditions and low productivity.

Excessive work rhythm is the cause of the appearance of "Burn out Syndrome" that manifests itself in the increase in physical and emotional wear and tear due to work-related stress, in the words of Dr. Carlos Marcos Siwady, specialist in Occupational Medicine. The aforementioned syndrome can be triggered by several factors such as those cited by Koman & Parsons (2010): overtime, work overload, job uncertainty, budgetary pressures, among other aspects. According to Brummel (2012), work-related stress in this industry combines the demand for construction with the pressure of the administration and the physical environment of work. So it is clear that the efforts in the construction companies seem to only focus on remediation, not prevention (Godwin, 2008).

For Cabrera, Ledezma and Rivera (2011) productivity in construction is the key variable to achieve the success of a project, but without labor there is no production, then human resources becomes the concept of production par excellence (Monzón, 2009). Then the question is how to achieve greater productivity of this resource, with the implementation of scheduled overtime, without this strategy having repercussions on a decrease in workers' health. Without forgetting that the builder's commitment to meet the needs of users can be achieved by establishing a stable company, constantly improving and theoretically lasting (Suárez, 2008).

Given that the cost and time, play a preponderant role to be able to anticipate the value of the budget, Botero (2002) mentions that the planning phase plays a fundamental role to establish how the performance of the workforce will improve the productivity of the construction. The various areas of the construction company must collaborate to ensure the greatest cost-benefit, avoiding the flight of resources (Lozano, 2012). And due to the short-term vision, very common in the construction companies, they demand that the yield allows a quick rotation of the invested capital to maximize the economic benefit, which sacrifices the health and the quality of life of the employed labor force (Botero, 2009).

The objective of this study is the identification of the causes and effects to health, suffered by construction workers, to work constantly and outside the program: overtime.

II. Methodology

When considering the implementation of overtime, as a strategy to generate a reduction in the sale price of a building, and to offer an economically more attractive product to the user. It is necessary to first know in what circumstances both the construction companies and the workforce, are in need of occupying this measure, and then identify what kind of consequences are present in the health of human resources.

To achieve the objective, a joint research was carried out in several cities of Mexico and Colombia, of a qualitative and transversal type, with the Likert scale of measurement. Looking to open the panorama on the problem and know how it is addressed in each of the countries. In addition, the work in

Gonzalo José Francisco Pérez-Gómez-Martínez, Sustainable Viability of the Building, Autonomous University of Coahuila / School of Architecture / Academic Body, Torreón, Coahuila, México, 871-720-2083/ 871-735-3146.

Luis Fernando Botero-Botero, Construction Management, EAFIT / Department of Civil Engineering / Research Group, Medellín, Colombia/ 311-707-4853.

Facundo Cortés-Martínez, Modeling and Technological Development, Juarez University of the State of Durango / Faculty of Engineering, Sciences and Architecture / Academic Body, Gómez Palacio, Durango, México/ 871-221-0984.

José Gerardo Prince-Ríos, Thesis, Autonomous University of Coahuila / School of Architecture / Torreón, Coahuila, México/ 871-734-6948.

overtime is a measure that occurs with some regularity in the building.

In the first instance, a survey was carried out on the work overtime of construction professionals, in the two locations of the study, addressing a total of seventy-one construction companies with the following questions:

C-1: Have you suffered delays in your works?
C-2: Have arrears decreased your profits?
C-3: Has the arrears generated losses?
C-4: Have the arrears generated fines?
C-5: Have you shortened the times at the customer's request?
C-6: Have you financed the work?
C-7: Have the arrears generated extra time?
C-8: Does overtime increase waste?
C-9: Does extra time reduce yields?
C-10: Does the extra time affect the worker's health?
C-11: Has the extra time caused accidents?
C-12: Has the extra time been forced?
C-13: Has the extra time been a good measure?

In a second moment, a survey about the work in overtime was done to the artisans of the construction, also in the two locations of the study, addressing a total of one hundred and seventy-eight workers, who develop diverse specialties within the work with the following questions:

A-1: Have you worked overtime?
A-2: Has the decision been your own?
A-3: Was the overtime to recover lost time?
A-4: The overtime was to advance work?
A-5: The decision was of the construction company?
A-6: Are you paid the extra time?
A-7: Have you agreed?
A-8: Was the measurement very tired?
A-9: Has the measure affected your health?
A-10: Has the measure decreased its performance?
A-11: Has the extra time been a reason for errors?
A-12: Has extra time been a cause of accidents?
A-13: Have you worked overtime under pain of being run?

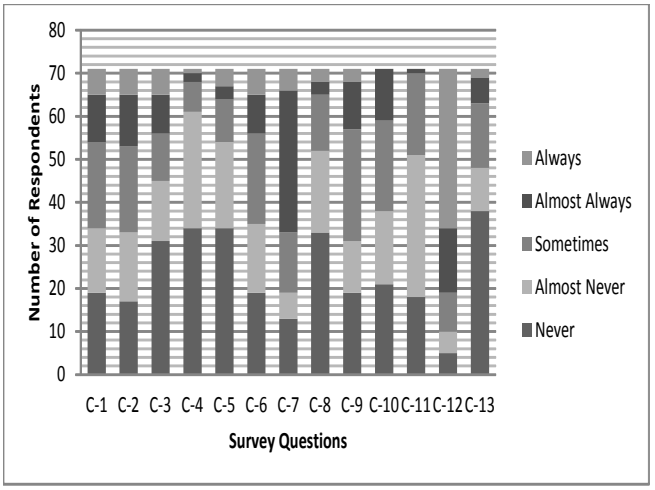
Finally, it was addressed to health professionals from various specialties, to be able to identify in a supported manner, the causes and effects caused by constant work in overtime. Considering that the answers from both the builders and the workers, allowed us to identify that this is a fairly used strategy, it is recommended to collect this information, which was achieved through the following questionnaire:

• What effects does it have on the health of a construction worker, to work overtime on a constant basis?
• What effects does it have on the pace of work in construction, working overtime on a constant basis?
• What effects does it have on the concentration to the construction work, to work overtime constantly?
• What diseases are related to the constant development of extra-time work in construction?
• What suggestions do you give for the constant development of construction work in overtime?
• Medically, how many extra hours per week is not a risk to the health of workers?

III. Results and Discussion

The results obtained in the surveys were poured into graphs for a clearer and faster understanding of the data. The main objective is to find the statistical median, given that this variable indicates the highest frequency of each of the questions posed to both builders and craftsmen.

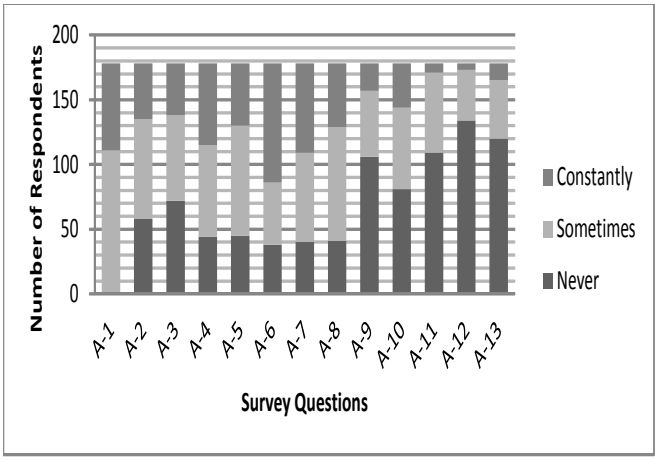
The answers given by the constructors are consigned within graph 1, and attend to the frequency in which they have been bordered to each of the situations that are questioned.



Graph 1: Extra Time Constructors (Own Source)

From the survey the values of the median of each questioning are rescued: for C-1 it is sometimes, C-2 is sometimes, C-3 is almost never, C-4 is almost never, C-5 is almost never, C-6 is sometimes, C-7 is almost always, C-8 is almost never, C-9 is sometimes, C-10 almost never, C-11 almost never, C-12 is always and C-13 is never.

In relation to the answers given by the artisans, they are recorded in graph 2, in response to the frequency in which they are bordered by each of the situations that are questioned.



Graph 2: Extra Time Artisans (Own Source)

From the survey the values of the median of each question are rescued: for A-1 is Sometimes, A-2 is Sometimes, A-3 is Almost Sometimes, A-4 is Sometimes, A-5 is Sometimes , A-6 is Constantly, A-7 is Sometimes, A-8 is Sometimes, A-9 is Never, A-10 is Sometimes, A-11 is Never, A-12 is Never and A-13 is Never .

Considering the responses of both builders and workers, it was possible to identify that working overtime is a fairly used strategy, so gathering information on health effects is

recommended. This was achieved by means of the questionnaire indicated in the methodology, and whose consensual results of the doctors are recorded below:

• Regarding the effects on the worker's health, it was expressed that it causes greater fatigue, more physical exhaustion, traumatisms, fractures, low back pain, accidents, risks, apathy, less rest and coexistence, affectations to the immune system, locomotor system, the spine, to the joints, Burn Out syndrome.

• Regarding the effects on the work rhythm, it coincides with the fact that it produces greater muscular fatigue, mental fatigue, risk, loss of efficiency, capacity, interest, performance, rest, increase of professional, emotional, psychological illnesses, possible use of drugs.

• With regard to concentration at work, it is defined that it is reduced with work in long hours, drowsiness, decreased physical efficiency, greater mental fatigue, tedium.

• When talking about related diseases it was highlighted that the existing ones are potentiated, sleep disorders, cramps, muscle aches, Burn Out syndrome, chronic tiredness, psychological consequences, biological, joint, spinal, back pain, disc hernias, dizziness in height , ulcers, gastrointestinal, hypoacusis, pulmonary, coronary, sclerosis, dermatitis problems, perforation of the nasal septum, conjunctivitis, fleshy eyes, skin cancer, heat stroke and dehydration.

• Medical suggestions regarding overtime were to have prior knowledge of workers' health, include rotations, breaks, safety equipment, light work and staggering, avoid monotony, program it, reinforce behavior, and include preventive measures.

• How many extra hours do not constitute a risk to health, it was expressed that one or two a day, including alternate rest, varying activities and with flexible days regarding its duration.

While assessing the responses of builders and artisans and the opinion of health professionals, it should not be forgotten that the low productivity of the workforce is a cause of cost overruns and mismatches (Attar, Gupta & Desair, 2012). For Cha & Kim (2011) builders must seek to reduce these effects while ensuring the quality of work. According Dozzi & Abourizk (1993) through good planning and communication ensure the success of construction. The previous thing talks about administration, by means of which the effort and the talent of all can be led, towards the expected results (Garza, 2008).

IV. Conclusion

The builders mentioned in a wide margin that they have suffered delays in their works, which leads to a decrease in profits and to a lesser extent losses and fines. As a consequence, frequent recourse is used to remedy the delays in the use of extra time with the consequences of low performance, health effects and greater probability of personnel accidents, and a relative increase in waste. And since the extra time is almost always obligatory, the measure is not classified as good.

As for the artisans it is not strange that they work overtime, sometimes being their decision and sometimes the company, both to recover time and to advance work. Although you can understand that the measure suits them. According to his words, the aforementioned measure has not been decisive in affecting his health or causing accidents. They feel that overtime does not diminish their performance or that they do not lead them to make mistakes, and finally, although to a lesser degree, they have been threatened if they do not work overtime.

Medical considerations are irrefutable because they are based on experience. The work in overtime in a constant and unscheduled, affects health in many different ways, there are psychological, mental, physical, biological, social, syndromes of fatigue and fatigue, and existing diseases are potentiated. Understanding that all the above is derived from a shorter period of rest and coexistence.

But in spite of the exposed by the parties, the work in overtime duly planned, varied, with light work, maximum two hours a day, taking care of the legal and health restrictions, used as a motivator, with cordial handling, can be considered as a no-harm and profitable strategy for all involved.

References

[1] S. A. Arboleda, "Analysis of productivity, performance and consumption of labor in construction processes, a fundamental element in the planning phase" Master's thesis, Medellín, Colombia, 2014, Available:http://s3.amazonaws.com/academia.edu.documents/37493322/ANALISIS_DE_PRODUCTIVIDAD__RENDIMIENTOS.pdf?AWSAccessKeyId=AKIAJ56TQJRTWSMTNPEA&Expires=1476919771&Signature=AQkmGpAMiywGx5Xke6RaXK9Wpes%3D&response-content-disposition=inline%3B%20filename%3Danalisis_de_productividad.pdf .

[2] A. Attar, A. K. Gupta & D. B. Desai, "A study of various factors affecting labour productivity and methods to improve it" *IOSR Journal of Mechanical and Civil Engineering*. ISSN 2278-1684. India, 2012, pp. 11-14. Available: http://s3.amazonaws.com/academia.edu.documents/43001858/3.pdf?AWSAccessKeyId=AKIAIWOWYYGZ2Y53UL3A&Expires=1485325746&Signature=gu8hRNlKsrO3HQ81ivKDMmPNEZE%3D&responsecontentdisposition=inline%3B%20filename%3DA_Study_of_Various_Factors_Affecting_Lab.pdf .

[3] L. F. Botero, "Analysis of performance and consumption of labor in construction activities" *EAFIT University Journal*. ISSN 0120-341X. Colombia, 2002, pp. 9-21. Available: http://publicaciones.eafit.edu.co/index.php/revista-universidad-eafit/article/view/843/751.

[4] L. F. Botero, "Corporate social responsibility in the construction sector" *Administer Journal EAFIT University*. ISSN 1692-0279, núm. 14. Medellín, Colombia, 2009, pp. 105-123. Available:publicaciones.eafit.edu.co/index.php/administer/article/download/264/265.

[5] J. Brummel, "Environmental stress in the correctional workplace" Master´s Thesis, Washington, U. S., 2012. Available: http://cedar.wwu.edu/wwuet/187.

[6] A. R. Cabrera, M. T. Ledezma and N. L. Rivera, "The impact of the rotation of personnel in the construction companies of the state of Nuevo León" *Context Journal*. Monterrey, México, 2012, pp. 83-91. Available: https://dialnet.unirioja.es/descarga/articulo/4156774.pdf.

[7] H. S. Cha & Ch. K. Kim, "Quantitative approach for project performance measurement on building construction in South Korea" *KSCE Journal of Civil Engineering*. ISSN 1976-3808, num. 8. South Korea, 2011, pp. 1319-1328. Available: http://link.springer.com/article/10.1007/s12205-011-1323-5.

[8] S. Dozzi & S. Abourizk, *Productivity in construction*. NRC Construction. ISBN 0-662-21134-0, Ottawa, Canada, 1993. Available: http://web.mit.edu/parmstr/Public/NRCan/nrcc37001.pdf.

[9] J. G. Garza, *Contemporary Administration*. McGraw Hill. ISBN 978-970-10-2662-5, México, 2008.

[10] I. Godwin, "Health and safety management effort as correlates of performance in the Nigerian construction industry" *Journal of Civil Engineering and Management*. ISSN 1392-3605. Lagos, Nigeria, 2008, pp. 277-285. Available: http://dx.doi.org/10.3846/1392-3730.2008.14.27.

[11] A. Kazaz, E. Manisali & S. Ulubeyli, "Effect of basic motivational factors on construction workforce productivity in Turkey" *Journal of Civil Engineering and Management.* ISSN 1822-3605. Turkey, 2008, pp. 95-106. Available: http://www.tandfonline.com/doi/pdf/10.3846/1392-3730.2008.14.4?needAccess=true.

[12] R. Koman & J. Parsons, "Pressure, layoffs and long hours generate post-traumatic construction disorder" *Engineering and News-Record.* ISSN 0891-9526. Volume 264 (issue 9). U. S., 2010, pp. 24-26. Available:http://web.a.ebscohost.com/ehost/detail/detail?vid=4&sid=75ba6589-2221-4809-bc1a3d4bb55e7875%40sessionmgr4008&bdata=JnNpdGU9ZWhvc3QtbGl2ZQ%3d%3d#AN=50874842&db=a9h.

[13] E. Lozano, "Discrepancy in the classification of costs in the construction industry: A comparative study between the regulation of the law of public works and related services to them, for the state and municipalities of Guanajuato and the financial information standards" *Legal Science Journal.* Núm. 2. Guanajuato, México, 2012, pp. 63-81. Available:http://go.galegroup.com/ps/i.do?p=IFME&u=pu&id=GALE|A377289370&v=2.1&it=r&sid=summon&userGroup=pu&authCount=1.

[14] M. Martínez and R. Ros-Mar, "From the quality of working life to psychosocial risks: Evaluation of the quality of working life" *Social Actions and Investigations Journal.* ISSN 1132-192X. España, 2010, pp. 5-55. Available: https://dialnet.unirioja.es/servlet/articulo?codigo=3610086.

[15] M. Mayorga, "Measurement of labor productivity in the construction sector, in the metropolitan district of Quito" Bachelor thesis, Quito, Ecuador, 2014. Available: http://repositorio.puce.edu.ec/handle/22000/11074.

[16] R. G. A. Monzón, "Estimation of labor productivity losses in compensation of costs in a construction project in the province of Llanquihue" Bachelor thesis, Valdivia, Chile, 2009. Available:http://cybertesis.uach.cl/tesis/uach/2009/bmfcim816e/doc/bmfcim816e.pdf.

[17] E. Navarro, "Revision of the motivation of construction workers: 1968-2008" *Construction Journal*. ISSN 0717-7925. Santiago, Chile, 2008, pp. 17-29. Available: http://www.redalyc.org/articulo.oa?id=127612584002.

[18] C. Suárez, *Administration of Construction Companies*. Limusa. ISBN 978-968-18-1189-1, México, 2008.

Pérez-Gómez-Martínez, Gonzalo José Francisco. Master of Science in Civil Engineering, PhD student in Civil Engineering Sciences, professor-researcher, 13 publications, 14 research projects.

Botero-Botero, Luis Fernando. Master of Science in Administration, author of articles and books on construction administration and Lean Construction, business consultant on the same topics.

Cortés-Martínez, Facundo. Doctor in Engineering, author of articles and books on sanitation, optimization and mathematical models, professor-researcher.

Prince-Ríos, José Gerardo. Student-Thesis of the degree in architecture, article published on performance of labor.