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Construction Productivity Analysis, Using Work Sampling Technique, a Case Study in Afghanistan

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Abstract

In the construction industry, productivity is one of the most important key performance indicators and fundamental to project success. Productivity isn't everything, but it is pretty much everything in the long run. Improving construction productivity is therefore one of the priorities of the construction industry in many countries around the world. Productivity cannot be managed or improved without being measured, so it must first be measured and analyzed, and then productivity weaknesses identified and corrected. This paper aims to measure labor productivity in the construction industry and assess the percentage distribution of productive, semi-productive, and non-productive activities by observing construction work. The work sampling method was used to find out how labors spend their time during an eight-hours working day, and to identify percentage of the productive, semi-productive and nonproductive tasks on a working day. The required number of the observations was calculated, the procedure for making observations was determined, and data were collected through observations made on a construction project as a case study. based on this study, it is found that generally about 32.02% of laborers' working time is spent on productive (direct) work, 36.70% on semi-productive (supportive) work, and 31.28% was spent on nonproductive (delayed) work.

Keywords: Construction Productivity, Work Sampling, Productivity Analysis

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1. Introduction

The construction industry is vital to today's economy as it accounts for a significant portion of any country's economic output [1]. As in other developing countries, the construction sector in Afghanistan is one of the key sectors which provides one of the main sources of income for Afghans [2]. The construction sector has created employment for at least 30% of Afghanistan's workforce. Afghanistan's construction sector has risen in value from 8.7 billion Afghanis (AFN) in 2002-03 to 124.28 billion AFN in 2015-16, accounting for more than 10% of Afghanistan's economy. The contribution to GDP in 2013-14, 2014-15, and 2015-16 was 7.84, 8.89, and 10.03 respectively [3]. However, the important issue is the manner of implementation and management of the construction projects.

Productivity isn't everything, but in the long run it is almost everything. Krugman [4] has stated that higher productivity levels have a direct impact on long-term improvements in a country's standard of living. For every business Improving the productivity of team members should be a priority, because high productivity not only leads to quality results but also helps customers deliver on time [5]. Pan has argued that Although productivity plays such an important role, construction is still a low-productivity level industry, and this remains a problem not only in developing countries but also in more developed countries [6]. Therefore, increasing construction productivity is one of the priorities for construction sectors in many countries around the world.

In a construction project organization and management of those inputs which has a high-level correlation with each other such as materials, labor, and capital greatly affect the success of the project, Therefore, it is more difficult to control and manage these correlated inputs from project workers due to the different nature of people in each country and region [7]. The construction industry is a labor-intensive, craftsman-driven industry, so people's behavior has a significant impact on project performance. With this in mind, it is important to determine the extent of labor productivity and the factors that affect productivity to effectively manage the workforce. Therefore, organizational management must focus on labor productivity analysis and its improvement strategies.

Productivity cannot be managed or improved without being measured, so it is necessary to first analyze and identify low productivity points and correct them [8]. There are many different methods of measuring construction productivity, each with its own strengths and weaknesses. A more appropriate method of measuring construction productivity, which is also used in this study, is the Work Sampling method. The current situation in Afghanistan needs to usher in an improved construction management framework with efficient design and appropriate legal, administrative and pricing systems with appropriate construction materials. Until project managers are able to lead projects to success and assert themselves in a highly competitive environment. Achieving this requires a lot of attention to academic research to uncover weaknesses and suggest possible solutions. It is clear that the number of scientific studies in Afghanistan's

construction sector in general and productivity analysis in particular is very low. Therefore, construction productivity measurement was chosen as the topic of this paper. This research will be useful in this field and will contribute to the literature in this area.

2. Theoretical Framework and Literature Review

Construction is one of the most important economic sectors in every country. Therefore, the planning, implementation, monitoring, and control of construction projects must be done with extreme caution. The performance of construction projects should be checked continuously to know how a project is going. Will it finish inside the constraints? Will it succeed or fail? So, the top management can take appropriate action. Measuring project performance is therefore one of the most important topics in project management, and several factors go into measuring project performance: Efficiency, Effectiveness, Schedule, Quality, Productivity, and Safety. Productivity is not only a measure of project performance, it has special meaning in the construction industry as it contributes to the growth and vitality of the industry [9].

Many studies have been conducted to demonstrate the importance of productivity. A study conducted by [10] explored the importance of productivity in project management and concluded that productivity is the cornerstone of successful projects. Dixit conducted another study explaining how project management can improve productivity [11]. In this article, researchers discussed why project management leads to increased productivity. Another research which has carried out by Hamza [12] to address the ways to accelerate productivity with project management software.

Productivity is one of the most crucial issues in construction project management in recent years and it can be defined in numerous ways. Simply put, productivity is a measure of the output you receive for the inputs you use in your process. Being productive means getting more output from the same or less input [13]. Productivity does not just characterize the volume of output, but output gotten in relation to the resources employed [14]. There are two main categories of productivity: Partial Factor Productivity (PFP) and Total Factor Productivity (TFP). In PFP, there is only one input such as labor, materials, and machines. But TFP has multiple inputs [15]. In the construction industry, productivity is usually understood as labor productivity, and that is, the units of work created or produced per man-hour. Depending on the case, it may be used in reverse, and man-hours per unit, this form is also often used [16].

In order to manage construction productivity, it must first be measured [17]. Labor productivity ignores equipment and material costs. These are difficult to change in the short term. Additionally, labor costs are affected by factors such as craftsmanship, experience, and project location. For this reason, labor productivity also ignores actual labor costs and instead considers the number of hours to produce a unit of production [18]. This is indicated in the following equation number 1.

$$\text{Labor Productivity} = \frac{\text{Unit of physical output}}{\text{Labor hours}} \text{.....} \text{...(1)}$$

Choosing the right measurement technique is an important topic in productivity analysis. There are many methods that can be used to measure labor productivity. Each method has its own advantages and disadvantages. The current study used the work sampling method to measure labor productivity in a construction project as a case study. Randolph Thomas, a leading authority in the field of construction work sampling, defined the method as "a productivity measurement technique used to quantitatively analyze the activities of people and equipment with respect to time [19]. This method estimates the percentage of time craftsmen spend on activities like plumbing, installing materials, plastering, brick masonry, pouring concrete, etc.[20].

Work sampling is one technique used to measure productivity. This method has been used by several researchers to analyze productivity in various industries. A study used a labor sampling method to assess labor productivity in semi High-Rise building construction projects in Pakistan [21]. This study used the Work Sampling technique to evaluate labor productivity and to determine the proportion of productive, semi-productive, and, nonproductive activities. As a result of this research, it has found that semi-productive activities have a large percentage following productive activities and nonproductive activities.

The work sampling technique used by many [22]–[26] researchers to analyze labor productivity in construction. According to the above publications, the work sampling technique is an effective tool for determining the proportion of workers' productive, semi-productive, and unproductive tasks on the working day of a construction project. Regarding the previous discussion, it is pointed out that there are many studies around the world that analyze labor productivity in the construction industry. However, there are no studies in Afghanistan that analyze and measure construction productivity.

3. Research Scope and Methodology

The work sampling method is used to find out how the laborers spend their time during an eight-hour working day and measure the percentage of productive, semi-productive, and nonproductive work on a working day. The required number of observations was calculated, the procedure for making observations was determined and the data were collected through the observations which were made on a construction project as a case study.

In the application of the work sampling technique, sufficient numbers of observations must be taken at random to achieve reliable results. In this method, errors are likely to occur but increasing the number of observations can reduce the error. To calculate the number of observations required for achieving the desired accuracy, the following formula is used [27]:

$$n = \frac{z^2.p(1-p)}{(s.p)^2} \quad \text{.....(2)}$$

n= Sample size (number of observations)

z= number of standard deviation from mean for the desired level of confidence, for example, z=1.96 for a confidence level of 95%.

s= standard error for example 5%

P= percentage of occurrence of an activity or delay, expressed in decimal e.g. 30%=0.3

3.1. Procedure for Work Sampling Study

Following steps was taken to conduct the Work Sampling study

i. Defining the Problem.

ii. Obtaining the approval of the responsible manager of the project in which study was to be made. For this purpose, the researcher personally visited the responsible manager of the pre-selected project to obtain their approval to conduct the study, moreover the researcher visited the project staff and workers prior to starting the study in order to inform them about purpose of the study and to obtain their co-operation.

iii. Determine the desired accuracy of the final results in the form of standard error or percentage. An accuracy of 5% was accepted for this study.

iv. Indicates the 95% confidence level accepted for this study.

v. Make a preliminary estimate of the percentage occurrence of the activity or delay to be measured for one day. To do this, researcher visited the project and calculate percentage of the delay of the labors at the project site which was 30%. It means that labors were delaying 30% of all the working hours.

vi. Designing the study. In this step of the study, the following activities were executed:

   a. the Number of observations has been determined, this is one of the most important points in this research. the required number of observations was calculated with formula 3. In this study 'z' was equal to 1.96 for the confidence level of 95%, 's' or a standard error was equal to 5%, and 'p' was 30% according to the calculation which was done during the site visit before start the study, then the number of observations “n” was founded as below:

$$n = \frac{z^2.p(1-p)}{(sxp)^2} = \frac{1.96^2 \times 0.3(1-0.3)}{(0.05x0.3)^2} = \frac{3.8416 \times 0.3 \times 0.7}{0.000225} = 3585 \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

   Therefore, at least 3585 observations were required to obtain reliable data. This may seem like a large number, but in a real application, every glance at the work in progress is an observation, so, 3585 observations are not excessive.

   b. The number of days required for the survey was calculated based on the number of the laborers at the project site and observation rounds per day. The number of workers at the time of the survey was 50, and observations were made 10 times a day. Therefore, it was calculated

that it took at least 8 days to complete 3585 observations. However, in order to obtain reliable data, the project was visited for ten days and about 5000 observations were made.

c. An observation form was designed to collect the data.

1. The observations were made randomly and data recorded. To ensure that the observations are in fact made at random, a random table was used.

The project selected for applying the work sampling method was a public building construction project in Jalalabad city. The case study project was selected based on available resources, ease of access, and suitability. The total duration of the project was one calendar year, and five months had passed since the start of the project at the time of data collection, but the completion rate of the project was less than 30%. The main ongoing activities observed were backfilling, bricklaying, steel fixing, formwork and concrete placement.

In work sampling study ten rounds of observations were recorded on daily bases for 10 days. The author randomly noted labors at different paths on site for each round by observing them, recording their activities into standard mention categories and denoted it by a mark in the corresponding portion. Thus 10 rounds were repeated for each day and the number of ticks at the end of the day was recorded to display the number of labors corresponding to each category. The same exercise was repeated for the days of observations for 10 days and eventually summed up to reveal the total observations in accordance with the standard work sampling procedure.

Furthermore, according to the [27] task type does not play role as the observation is restricted to the mentioned categories which are generalized and are common in all types of activities. So, the focus is not on what the person is doing, but on the specific categories that fall into each moment of observation. However, as already mentioned, observations were limited to common types of backfilling, bricklaying, steel fixing, formwork and concrete placement. The recorded observations are therefore related to the task types mentioned in light of the standard categories. Some project information, operational details, and data have been removed to respect stakeholder confidentiality and their confidentiality requirements.

Extensive data was collected to understand the patterns in which workers spend their time during working hours. Other information physically observable at the project site is recorded to aid in data analysis and related results. The extra key information that impacts project productivity, such as weather conditions, working environment, safety conditions, skills and expertise, construction phases, and ongoing activities recorded as well. Table 1. Shows the number of observations made each day during the survey.

Table 1: Number of the observations made each day during the study

Day	*Observation Numbers*
1	480
2	490
3	510
4	500
5	500
6	510
7	500
8	510
9	500
10	500
Total	5000

4. Results and Discussion

After data collection, the observations were classified into the seven categories mentioned above, as shown in Table 2. In this table, percentages for each work category are recorded for each individual day, with the last column showing the average percentage for each category.

Table 2: Percentages for each work category

	Days										**Average %**
Activity type	1	2	3	4	5	6	7	8	9	10	
Productive work %	28.9	29.5	33.1	30.5	33.4	33.9	32.6	32.5	33.1	32.7	32.02
Semi-productive work %	37.4	37.6	35.9	37.2	36.4	36.5	33.8	36.4	37.1	38.7	36.7
Non-productive work %	33.7	32.9	31	32.3	30.2	29.6	33.6	31.1	29.8	28.6	31.28
total %	100	100	100	100	100	100	100	100	100	100	100

Table 3. shows the percentage of three categories of work: productive, semi-productive and nonproductive for every single day of the study period. As evident from the table below that direct work is negatively correlated in some extent with supportive work and delays.

Table 3: Percentages for each work category

Activity type		Days										Average %
		1	2	3	4	5	6	7	8	9	10	
Direct work %		28.9	29.5	33.1	30.5	33.4	33.9	32.6	32.5	33.1	32.7	32.02
Supportive work %	preparatory work and instruction	10.3	8.9	10.4	11	10	10.5	12.1	10.2	11.2	11.1	10.57
	travelling	9.7	8.7	9.6	10.1	9.2	7.1	7.3	8.2	9.1	8.2	8.72
	tools & equipment	8.6	11.4	8.5	8.8	5.9	6.4	5.3	8.4	8.3	9.3	8.09
	materials handling	8.8	8.6	7.4	7.3	11.3	12.5	9.1	9.6	8.5	10.1	9.32
Delays %	personal	19.4	20.3	19.5	17.4	21.1	19.8	17.6	18.4	16.9	17.3	18.77
	waiting	14.3	12.6	11.5	14.9	9.1	9.8	16	12.7	12.9	11.3	12.51
Total %		100	100	100	100	100	100	100	100	100	100	100

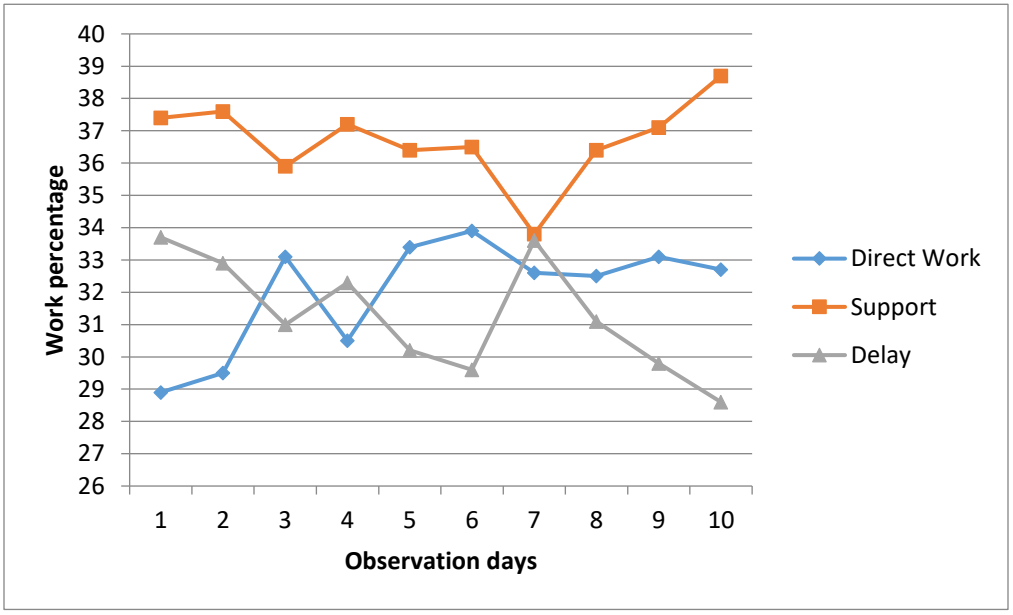


Fig 1: Percentages of each work category

To generalize the results of the study and measure labor productivity, all observations over 10 days are shown in Table 4. Each figure represents a characteristic of observed worker behavior, categorized into seven different types, which are further grouped into

three main classes: direct (productive) work, support (semi-productive) work, and delay (non-productive) work.

Table 4: Percentages for each work category

Activities			%
Direct Work			32.02
Support	preparatory work and instruction	10.57	36.7
	travelling	8.72	
	tools & equipment	8.09	
	materials handling	9.32	
Delay	Personal	18.77	31.28
	waiting	12.51	

As shown in table 4. Supportive (semi-productive) activities were the largest number with 36.7%, following the direct (productive) work with 32.02% and the last one delay activities with value of 31.28%. First, the main categories of activity were analyzed in detail, and then the subcategories (secondary activities) in percentages were fully explored. According to Table 4, preparatory work and instruction shares the largest portion in support category, whereas in delay category, personal activities have the largest portion. It can be observed that secondary activities holding larger percentage after direct work are personal, preparatory work and instruction and waiting. Therefore, streamlining and managing these activities is necessary to increase direct work. Additionally, other related activities should be minimized as well because reducing them ultimately increases productive activities, which ultimately leads to increased construction labor productivity and increased project success.

Intuitively, to increase the overall productive (direct) work rate, areas of lower productivity should be minimized/avoided as much as possible throughout the project. And, this can be done by identifying factors that lead to decreased productivity during the project. Some of the reasons for the low percentage of direct (productive) work in case study project are lack of skills, lack of tools and equipment, improper use of scaffolding, unsuitable plywood for formwork, Improper planning, poor safety, design errors, etc. In addition, site management and responsible are encouraged to instruct the worker to work at appropriate times rather than starting work late or leaving the project site early.

5. Conclusion

By controlling costs in different parts of the project, construction companies become more profitable and they can compete in the market. These include labor costs, material costs, and overhead costs, of which labor costs differ the most. And this ultimately related to labor productivity, which needs to be managed and controlled strictly to ensure success of the project. This study is primarily focused on evaluating labor productivity in building construction project in Afghanistan.

The objective of the study was to analyze labor productivity on a construction project in Afghanistan. To analyze and measure productivity, a building construction project in

Jalalabad city, Afghanistan was selected as a case study. To find out how the laborers spend their time during working hours on a day and to measure the percentage of productive, semi-productive, and nonproductive work the Work Sampling technique was used. Which was the most relevant techniques identified in the literature. The required number of observations has been calculated. Procedures are established for conducting observations. Data were collected through observations made on a construction project selected for case study.

The study revealed that supportive (semi-productive) activities were the most common at 36.7%, followed by direct (productive) work at 32.02%, and delayed (nonproductive) activities at 31.28% accordingly. In addition, it was found that preparatory work and instruction share the largest portion in the supportive activities category, whereas in the delay category, personal activities have the largest portion.

For the success of the project, the labor productivity should be at the highest possible level, and this needs continuous monitoring of the site and determining the reasons for low labor productivity. The main reasons for the low percentage of direct (productive) work in case study projects were lack of skills of labors, lack of proper tools and equipment, improper use of scaffolding, unsuitable plywood for formwork, Improper planning, poor safety, design errors, etc. These factors can be the reasons for low labor productivity in other construction projects in Afghanistan as well.

This study forms the basis for assessing labor productivity in construction projects in Afghanistan. The work-sampling approach is used in the current research and can be further improved in the future by increasing the number of projects to add value to the existing body of knowledge.

6. Acknowledgement

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7. Conflicts of Interest

All authors declare that they have no conflicts of interest to disclose.

References

[1] N. Wang, “The role of the construction industry in China’s sustainable urban development,” *Habitat Int.*, vol. 44, pp. 442–450, 2014.

[2] O. K. Hazrat and G. R. Kumar, “Construction Challenges in Afghanistan,” *i-Manager’s J. Manag.*, vol. 14, no. 2, p. 1, 2019.

[3] E. Grawert and F. Shirzad, “Conflict-sensitive employment in Afghan construction and transport companies,” 2017.

[4] P. Krugman, “Defining and measuring productivity,” *Age diminishing Expect.*, 1994.

[5] E. Dabla-Norris, G. Ho, K. Kochhar, A. Kyobe, and R. Tchaidze, “Anchoring growth: the importance of productivity-enhancing reforms in emerging market and developing economies,” *J. Int. Commer. Econ. Policy*, vol. 5, no. 02, p. 1450001, 2014.

[6] W. Pan, “Rethinking construction productivity theory and practice,” *Built Environ. Proj. asset Manag.*, vol. 8, no. 3, pp. 234–238, 2018.

[7] A. Kazaz and T. Acıkara, “Comparison of labor productivity perspectives of project managers and craft workers in Turkish construction industry,” *Procedia Comput. Sci.*, vol. 64, pp. 491–496, 2015.

[8] B. Vogl and M. Abdel-Wahab, “Measuring the construction industry’s productivity performance: Critique of international productivity comparisons at industry level,” *J. Constr. Eng. Manag.*, vol. 141, no. 4, p. 4014085, 2015.

[9] M. Jahangirian, S. J. E. Taylor, T. Young, and S. Robinson, “Key performance indicators for successful simulation projects,” *J. Oper. Res. Soc.*, vol. 68, no. 7, pp. 747–765, 2017.

[10] S. Dixit and K. Sharma, “An empirical study of major factors affecting productivity of construction projects,” in *Emerging Trends in Civil Engineering: Select Proceedings of ICETCE 2018*, 2020, pp. 121–129.

[11] S. Dixit, S. N. Mandal, J. V Thanikal, and K. Saurabh, “Evolution of studies in construction productivity: A systematic literature review (2006–2017),” *Ain Shams Eng. J.*, vol. 10, no. 3, pp. 555–564, 2019.

[12] M. Hamza, S. Shahid, M. R. Bin Hainin, and M. S. Nashwan, “Construction labour productivity: review of factors identified,” *Int. J. Constr. Manag.*, vol. 22, no. 3, pp. 413–425, 2022.

[13] A. Pekuri, H. Haapasalo, and M. Herrala, “Productivity and performance management–managerial practices in the construction industry,” *Int. J. Perform. Meas.*, vol. 1, no. 1, pp. 39–58, 2011.

[14] F. Barbosa, J. Woetzel, and J. Mischke, “Reinventing construction: A route of higher productivity,” McKinsey Global Institute, 2017.

[15] A. A. Tsehayae and A. R. Fayek, “System model for analysing construction labour productivity,” *Constr. Innov.*, vol. 16, no. 2, pp. 203–228, 2016.

[16] G. A. Bekr, “Study of significant factors affecting labor productivity at construction sites in Jordan: site survey,” *GSTF J. Eng. Technol.*, vol. 4, no. 1, p. 92, 2016.

[17] M. Abdel-Hamid and H. Mohamed Abdelhaleem, “Impact of poor labor productivity on construction project cost,” *Int. J. Constr. Manag.*, vol. 22, no. 12, pp. 2356–2363, 2022.

[18] S. Zheng, W. Sun, J. Wu, and M. E. Kahn, “The birth of edge cities in China: Measuring the effects of industrial parks policy,” *J. Urban Econ.*, vol. 100, pp. 80–103, 2017.

[19] M. C. Gouett, “Activity analysis for continuous productivity improvement in construction.” University of Waterloo, 2010.

[20] M. C. Gouett, C. T. Haas, P. M. Goodrum, and C. H. Caldas, “Activity analysis for direct-work rate improvement in construction,” *J. Constr. Eng. Manag.*, vol. 137, no. 12, pp. 1117–1124, 2011.

[21] N. A. Sheikh, F. Ullah, B. Ayub, and M. J. Thaheem, “Labor productivity assessment using activity analysis on semi high-rise building projects in Pakistan,” *Eng. J.*, vol. 21, no. 4, pp. 273–286, 2017.

[22] I. Loera-Hernández and G. Espinosa-Garza, “Labor productivity in projects of construction and industrial maintenance,” in *Key Engineering Materials*, 2014, vol. 615, pp. 139–144.

[23] I. Loera, G. Espinosa, C. Enríquez, and J. Rodriguez, “Productivity in construction and industrial maintenance,” *Procedia Eng.*, vol. 63, pp. 947–955, 2013.

[24] S. J. Motowidlo, W. C. Borman, and M. J. Schmit, “A theory of individual differences in task and contextual performance,” in *Oraganizational Citizenship Behavior and Contextual Performance*, Psychology Press, 2014, pp. 71–83.

[25] N. Antonyán, I. de J. L. Hernández, and G. E. Garza, “Increase of productivity through the study of work activities in the construction sector,” 2017.

[26] R. K. Akogbe, X. Feng, and J. Zhou, “Construction projects productivity in west african country of Benin: case of ground earthworks,” *J. Constr. Eng. Proj. Manag.*, vol. 5, no. 2, pp. 16–23, 2015.

[27] E. Oddone, M. Weinberger, A. Hurder, W. Henderson, and D. Simel, “Measuring activities in clinical trials using random work sampling: implications for cost-effectiveness analysis and measurement of the intervention,” *J. Clin. Epidemiol.*, vol. 48, no. 8, pp. 1011–1018, 1995.

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