THE DECREASE OF WHITE-COLLAR OVERTIME AS A RESULT OF "SIX SIGMA" PROJECT

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Metoda Six Sigma este o alternativă pentru detectarea defectelor prin prevenire, considerată mai degrabă o atitudine proactivă spre rezolvarea problemei decât una reactivă. Scopul său se bazează pe identificarea şi excluderea variaţiei la locul de muncă. Avantajul folosirii „Six Sigma" este orientarea către o dezvoltare continuă care stimulează avantajul competitiv prin creşterea eficienţei şi scăderea costurilor. Proiectele „Six Sigma" sunt exemple ale creării de efecte măsurabile prin creşterea satisfacţiei clientului şi atragerea de beneficii financiare. În concluzie, „Six Sigma" conduce către o perspectivă standardizată a procesului prin toate funcţiile şi departamentele care promovează lucrul în echipă.

The "Six Sigma" method is an alternative for defect detection by prevention, considered to be more of a proactive attitude towards problem solving than a reactive one. Its purpose resides in the identification and exclusion of variation at the workplace. The advantage of using "Six Sigma" is the orientation towards continuous improvement, which enhances competitive advantage by increasing efficiency and decreasing costs. "Six Sigma" projects are examples of creating measurable effects by increasing customer satisfaction and bringing financial benefits. All in all, "Six Sigma" leads to a standardized view of the processes throughout all functions and departments that promote working as a team.

Keywords: Six Sigma, customer satisfaction, defect detection, measurable effect, financial benefits

1. Introduction

1.1. The "Six Sigma" Concept

"Six Sigma" is a philosophy which offers to organizations, irrespective of the activity object, a series of statistic processes and tools contributing to the increase of quality and return. "Six Sigma" is a long-term process, which generates and supports continuous improvement. [1] The "Six Sigma" approach requires perseverance, focus and commitment.

The "Six Sigma" techniques contribute to the decrease in variability, which consequently generates the decrease in the number of defects and

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operational costs. The purpose of the "Six Sigma" method is to improve process performance up to the point where the defect rate is 3.4 per million or less. Being an extension of total quality management, the "Six Sigma" method designates an innovative way to pursue a high level-quality:

- it promotes a mental structure that focuses on continuous improvement;
- it helps gain competitive advantage by increasing efficiency and decreasing costs;
- all "Six Sigma" projects create a measurable effect, increase customer satisfaction and bring financial benefits;
- it helps standardization of the processes throughout all functions and departments;
- it trusts that scientific thinking is capable and fit to transparent decisions;
- "Six Sigma" projects promote working as a team;
- it increases employee satisfaction.

According to Goetsch and Davis (2010) [1], the central core of this method is represented by a six step protocol for process improvement, as follows:

- identifying the product characteristics wanted by customers;
- classifying the characteristics in terms of priority;
- determining if the classified characteristics are controlled by part and/or process;
- determining the maximum allowable tolerance for each classified characteristic;
- determining the process variation for each classified characteristic;
- changing the product's design, process or both in order to achieve a "Six Sigma" process performance.

"Six Sigma" is a total quality strategy for achieving what all the other total quality strategies attempt to achieve: superior and continually improved performance.

The "Six Sigma" projects can also be implemented in any field: for example, in HR or marketing, by increasing customer fidelity, which in the end helps reach the Company's objectives.

1.2. The roadmap of DMAIC (**D**efine, **M**easure, **A**nalyze, **I**mprove and **C**ontrol**)**

The nucleus of "Lean Six Sigma" aims to define, measure, analyze, improve and control, otherwise known as DMAIC roadmap [3]. For each phase, there are associated tools and outputs, presented as follows:

- Define – What is the source of the problem?
- Measure – What is the process capability?
- Analyze – Where/when do the defects occur?
- Improve – How do we reach the six sigma level?

- Control – How do we control the sustainability of the results?

The recommended road map consists in following five steps: (1) appointing a champion; (2) selecting a cross-functional team; (3) establishing quantifiable goals; (4) developing an implementation plan that establishes training, addresses data collection, and includes a maintenance plan; and (5) coordinating the road map. [4]

2. Case Study

ABC Company is among the 50 largest private companies in Romania, a prominent local market leader in the field of appliances, holding a market share of about 60%. During 2003-2011, turnover at ABC Company doubled, reaching over 350 million euros.

Currently, 60% of production refrigerators is exported in 40 European, African and Asian countries, with Germany and France as the most important markets. In Romania, the Company's products are available in more than 2,000 appliance stores around the country.

To provide added value to its customers, the ABC Company has set up a counseling centre where, through its representatives, it provides information about maintenance and the efficient use of already purchased appliances. The Company counts for 3,600 employees. In the Company's production facility, one of the largest manufacturing facilities in the region, there are over 80% of the blue-collar employees. It is a modern factory, operated according to European standards.

ABC Company implemented a project using the "Six Sigma" concepts, its purpose being to decrease the white-collar personnel overtime by 10%. It is a way of approaching the process of activity improvement within the entire Company.

2.1. Overtime Analysis Components

According to the Labor Code, work performed outside the normal weekly working time is considered overtime. The normal duration of working time (for employees aged over 18) is 8 hours per day and 40 hours per week, achieved through a 5 day-workweek.

The maximum legal length of working time should not exceed 48 hours per week, including overtime.

There are special situations and jobs where, given the particularity of the activity per se, it is impossible to have an ordinary, daily-work schedule. In these cases, the Company establishes the Internal Rules (developed by the Administration along with the Trade Union), and specific forms of organization of the working time, such as split or program shifts, such as daily shift schedules.

In case the employers request it, additional work can be performed only with the employee's consent. There are also situations when additional work is

done without consent from the employee: for example, in cases of force majeure or urgent work meant to prevent accidents or to cover an accident's consequences in some exceptions. As far as compensation for overtime is concerned, this is achieved through paid overtime within the following 30 days or by ensuring an appropriate number of days off.

Collective labor agreement at national level for 2007 – 2010 no. 2.895 / 2006 provides, in art. 41 par. (2c), that the hours not properly compensated with time off are paid as a bonus, representing 100% of the base salary. Going further with the analysis, the fact that employers should apply the rule which favors the employees is widely acknowledged. Therefore, overtime is paid with an increase of 100% from the base salary.

Assuming that an employee works 8 hours/day, 5 days a week and has a total amount of overtime of 10 hours/month, a calculus can be made from the following information:

Number of working days per month: 20
Additional work hours: 10
Monthly Pay: 4,000 RON
The following steps are completed:
Step 1. Calculating the number of overtime worked in a month:
20 days x 8 hours / day = 160 hours
Step 2. Calculating work hours:
4,000 RON: 160 hours = 25 RON / hour
Step 3. Calculating amount of overtime compensation:
10,00 x 25 RON / hour = 250 RON
100% overtime bonus: 250 RON
Step 4. Calculating gross salary:
4,000 + 250 + 250 = 4,500 RON

The reasons why production employees have to work overtime are:

- overtime is incurred when there are not enough people to cover a shift;
- when an employee works additional time after his shift, it is called shift extension;
- if they are called in for work in order to fill a short position, this is called shift coverage;
- overtime is also incurred for appearances in court, training and other callouts, as well as grant work.

This analysis's objectives are:

- to determine when and how employees earn overtime;
- to elaborate an overtime management system;

- to determine and decrease the amount of overtime each employee earned.

Within the audit methodology, the payroll records for all employees are used, as well as financial statements and documents deployed by several departments so as to support overtime.

2.2. The performance analysis of overtime management system

Over the last 12 months, cost of personnel has increased by comparison to last year's overtime. The organizational white-collar procedure for registering work time is to punch their cards, thus the system submits a report in order for the managers to give approval.

At this stage, the Human Resource (HR) department, as owner of the process, is confronted with a lack of information regarding the reasons for over timing: direct manager gives approval for the number of overtime without being aware of the reasons that cause it.

The "Six Sigma" project begins with identifying the reasons for overtime and ends with calculating the payment of overtime. We estimate that three months are necessary to accurately monitor the performance of improvement.

Table 1

SIPOC Analysis

Project no.	1	Project Name	Decrease white-collar overtime	
Project leader		Date	Version	1

SUPPLIERS	**INPUTS**	**PROCESS**	**OUTPUTS**	**CUSTOMERS**
Documents responsible	Documents showing reasons for overtime	Doing overtime	No. of hours of overtime	General Manager
White-collar departments	Card punching by white-collars		Percentage of hours of overtime	Budgeting & Controlling Manager
	Reasons for overtime		Average hours of overtime / white-collar	Treasury Department
	Documents showing number of overtime hours approved		Cost of white-collar overtime	HR Manager
	White-collars		Percentaje of cost of white-collar overtime in total salary expenses	Cost Reduction Manager
	White-collars managers		Average cost of white-collar overtime / white-collar	White-collars
	Timekeeper Program			
	Cards			

The most relevant steps in designing a product or process in "Six Sigma" methodology are Project charter, Financial Benefit, a detailed process map, and SIPOC (see Table 1). SIPOC is a "Six Sigma" tool, and the acronym stands for Suppliers, Inputs, Process, Outputs, and Customers.

The purpose of the SIPOC Analysis Sheet is to paint a clear picture of how the suppliers and processes interact, and how to define the inputs of a process so customers receive consistent outputs. Thus, Table 1 illustrates the SIPOC analysis, which depicts the relationship between suppliers, inputs, processes, outputs and customers.

A Pareto analysis is also applied in order to understand the reasons for white-collar overtime: we investigate which are the departments or the employees that are characterized by overtime. The tree/fishbone diagram used to write down potential causes of overtime constitutes another important element of the project. The Pareto principle is often described by the "80/20 rule". This rule says that, in many situations, roughly 80% of the problems are caused by only 20% of the contributors. The Pareto Principle implies that we can frequently solve a problem by identifying and attacking its "vital few" sources.

One of the direct consequences of this is that the costs of overtime and restrictions on its use are avoided, as long as basic working time is not exceeded on average over the reference period. Employers are therefore strongly in favor of these types of solutions, while trade unions, usually hostile to begin with, have often come to accept them as trade-offs for safeguarding jobs and/or reducing working time. It seems that the existence of a wide variety of options for varying working hours has not driven employers to stop using overtime, especially when such variation goes hand-in-hand with a reduction of average working time.

2.3. Decrease of overtime cost in ABC Company

In ABC Company, the objective of this quality improvement method is to minimize the total loss of the Company, as follows:

- Project Importance: Decreases the cost of overtime in Company
- Strategic Alignment: Decreasing personnel costs
- Project Target: 10% decrease of overtime

The Board, along with the Trade Unions, elaborated a very strict procedure for monitoring and payment of overtime through free time or salary increase. These stipulations can be found in the Company's Internal Regulation.

Thus, if the employees do not benefit from free time or paid free hours within 30 days after overtime, they should receive double the amount they gained by working. Furthermore, working during the weekend must be paid a total amount of 100% of the employee's regular salary.

Fig. 1 represents the Pareto Chart, which indicates the number of overtime by cost centres (CC).

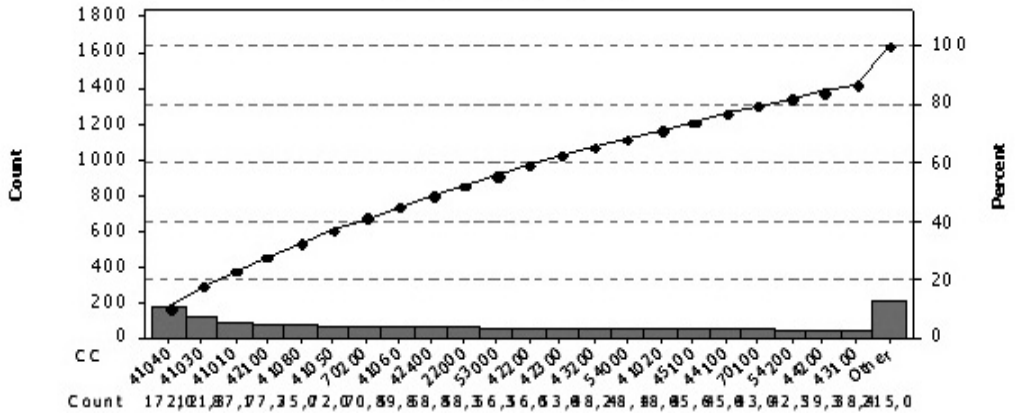

Fig. 1. Pareto Chart, by departments or cost centres

The ratio between the total number of overtime hours per department, divided by total numbers of white-collar employees, is calculated right at the beginning of the analysis, and the results are represented in Table 2.

Table 2 shows an overtime report for each department and it contains the total amount of overtime/employee, broken down to each day of the week and weekends.

Table 2

Overtime report / department

Matricol	Name	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total 100%, from which:	Overtime Saturday	Overtime Sunday	Saturday & Sunday	Monday - Friday
12	Stancu	4	4	4	4	4	12	8	4	4	4	4	4	12	8	4	4	4	4	4	12	8	4	4	4	4	4	12	8	4	4	4	172	48	32	80	92
13	Ioan	4	4	4	4	4	12	8	4	4	4	4	4	12	8	4	4	4	4	4	12	8	4	4	4	4	4	12	8	4	4	4	172	48	32	80	92
14	Necula	4	4	4	4	4	12	8	4	4	4	4	4	12	8	4	4	4	4	4	12	8	4	4	4	4	4	12	8	4	4	4	172	48	32	80	92
15	Tache	4	4	4	4	4	12	8	4	4	4	4	4	12	8	4	4	4	4	4	12	8	7	4	4	4	6	12	8	4	4	8	181	48	32	80	101
16	Pirvu	4	4	4	4	4	12	8	4	4	4	4	4	12	8	4	4	4	4	4	12	8	4	4	4	4	4	12	8	4	4	4	172	48	32	80	92

Fig. 2 is an example of an automatically issued report via card system software, connected with the terminals situated at production facilities entrances. Which explains the fact that they are electronically reported: employee name and surname, position, department and the corresponding working hours.

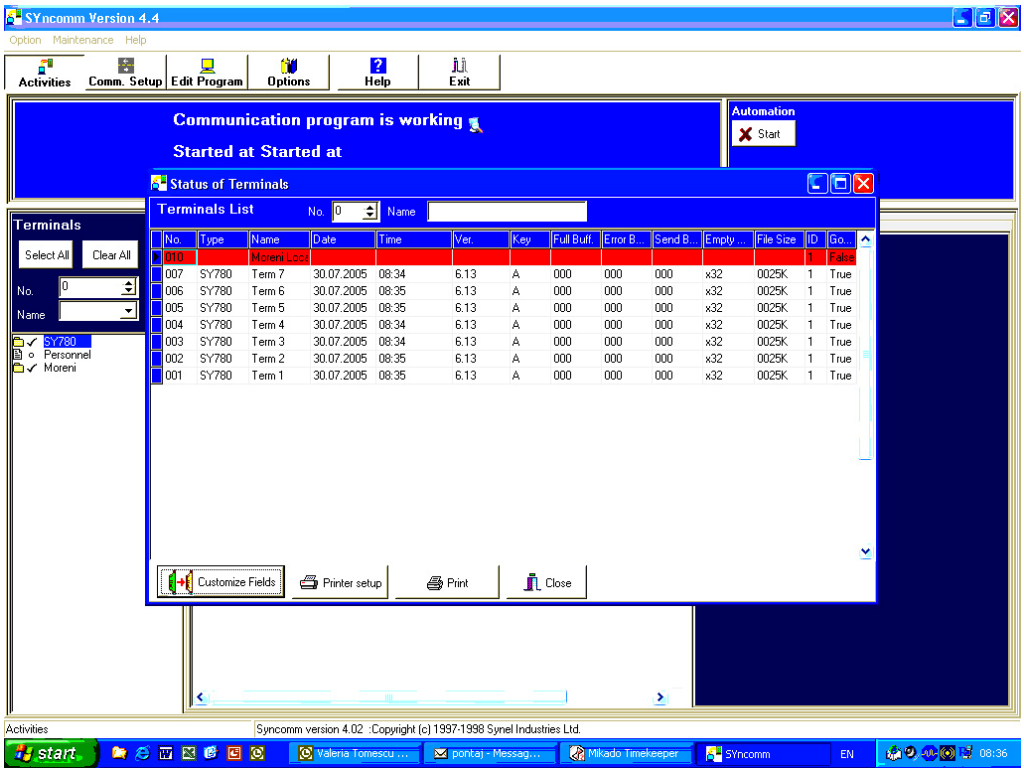

Fig. 2. Report automatically issued by card system

From this report and using the methods set out in paragraph 2.2, the number and final cost of overtime performed is calculated with great precision. This calculation takes into account both the employee wage and the particularities of the days when the additional work was performed.

Fig. 3 shows an even deeper analysis, achieved by calculating the number of overtime hours per employee. Thus, one can determine the employee position and analyze both the employee responsibilities and the tasks that he has to perform. Each cost centre is assigned to one department and may include employees working in different geographical areas. For example, in the cost centre with number 3,000, three employees are registered as working either in the production unit or at the Company's headquarters.

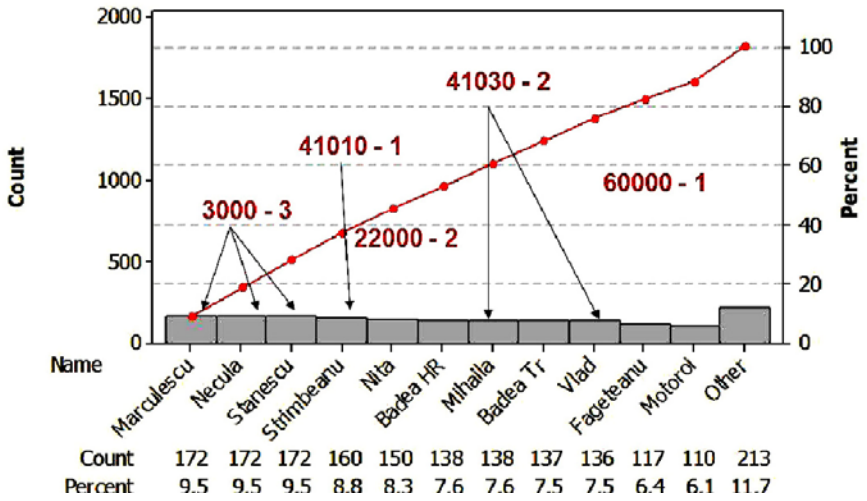

Fig. 3. Overtime by employee

Fig. 4 illustrated the cost of overtime per department, hence emphasizing that the department which has allocated cost centre number 41040 has the highest overtime costs incurred. This department coordinates the computer platform and maintenance of all production units.

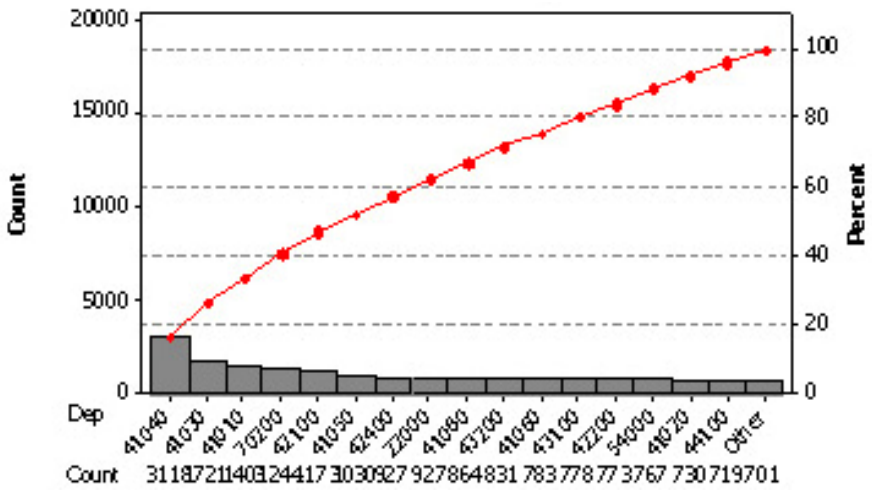

Fig. 4. The cost of overtime, by department

Starting from the previous analysis shown in Fig. 4, the next step will demonstrate the cost of overtime per employee (Fig. 5). It shows how an employee, known as NECULA and belonging to cost centre 3000, has the highest overtime costs.

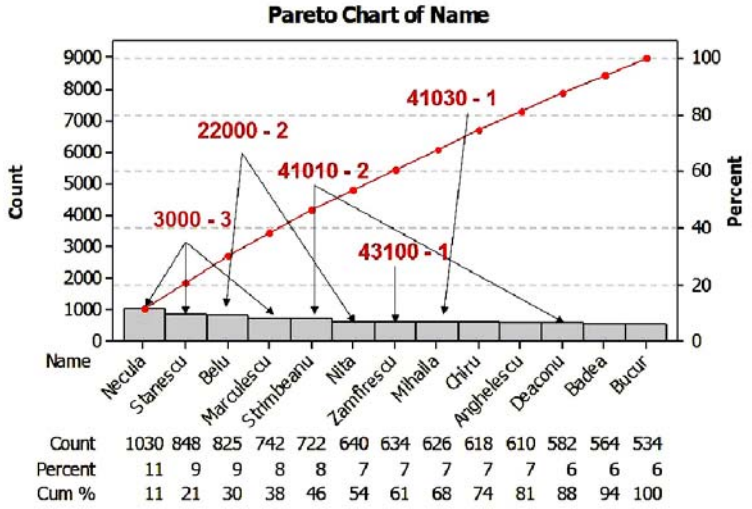

Fig. 5. The cost of overtime, by employee

4. Conclusion

A reason for overtime in the factory is the fact that the number of engineers used for supervising the activity is too low, which explains why the employees have to work overtime in here.

The two analyses represented by Figure 4 and 5 clearly highlight this aspect. For example, Figure 4 shows that the department 41040 recorded the highest cost that came along with overtime; in Figure 5, we see that the employee NECULA (an engineer) – recorded in cost centre number 3000 – had to do overtime and his costs were very high compared to the rest of employees.

After starting the job analysis process, specific detailed job duties and requirements will be identified, so as to determine the relative importance of these duties over a given position. Job Analysis is a process which supposes a lot of judgment regarding the data collected about the job. It is a systematic procedure for collecting, documenting and analyzing information about content, context and job requirements, which demonstrates that there is a clear relationship between the job tasks performed and the necessary skills to perform those tasks.

During this period, the ABC factory opens a new Assembly Line, a matter which forces most of the maintenance employees to stay and finish installing the line parts.

Another aspect is related to making a decision concerning work in the weekend in the production departments, which additionally means that maintenance employees will also have to work during the weekends, in order to ensure optimal work conditions.

The IT department's timetable was amended and employees had to follow a new schedule – from 7:30 until 17:30/18:00. When compared to the ordinary work schedule – from 8:30 to 17:00 – it is easily noticeable how the new one implied from 1.5 and up to 2 hours overtime for each employee, on a daily basis. A secondary issue is represented by the fact that the IT employees also represent some sort of maintenance people, except for the fact that they are more related to offices than production. Given this aspect, at least one employee has to work 8 hours overtime (meaning two shifts) by rotation inside the department.

Possible Solutions for department 41040

- Hire several new engineers; have them trained by actual experienced engineers and, after a period of time, incentivize them so as to remain and continue the work process, whilst ABC employees are sent back to the factory;
- Hire only a couple of engineers and have them be trained by others; consequently, all of them will remain in the subcontractor factory;
- If broken, repair the terminal and have even more terminals installed;
- Employees will be issued a decision to punch their cards;
- The employees are to be detached on subcontractor and will receive an increase in salary, but will not be paid overtime;
- Some of the blue-collar employees, for instance team coordinators, can be promoted or at least trained, having them take on new responsibilities, which can place them in the position where they will be able to replace the engineers in the second shift;
- Hire one or two new engineers, who can stay at the job for a few months, taking shift 1, where they can be well trained by others, which will render them potential substitutes in the second shift;
- Helpdesk employees can be put on new subcontractor (IT Company) and have them provide services for ABC Company (externalization of IT Helpdesk activity).

Overtime represents a current procedure in working time throughout Europe, as both employers and employees seem to benefit from it. On one hand, many employers see overtime as a vital element in achieving flexibility and, on

the other hand, employees regard it as an important source of income. This situation is a complex matter, as the regulation and use of overtime are prone to change in a large number of countries, due to the influence of EU legislation and policies, trade unions and the governments that aim at reducing working time. [5]

The following aspects are also taken into consideration: the regulation of overtime through legislation and collective agreements; the level of overtime working and the positions, strategies and debates in the industrial relation factors.

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