

Abstract Number: 025-0690

**CHALLENGING ONE OF THE MOST DETRIMENTAL EFFECTS IN
PROJECT MANAGEMENT: THE HARMFUL MULTITASK**

Author information:

Mr. Chen, Yen-Tsang

Escola de Administração de Empresas de São Paulo (EAESP)

Fundação Getúlio Vargas

Av. 9 de Julho, 2029 - Bela Vista - 01313-902 - São Paulo - SP - Brazil

E-mail: yentsang@gvmail.br

Prof. João Mário Csillag

Escola de Administração de Empresas de São Paulo (EAESP)

Fundação Getúlio Vargas

Av. 9 de Julho, 2029 - Bela Vista - 01313-902 - São Paulo - SP - Brazil

E-mail: joao.mario.csillag@fgv.br

Mr. Ronaldo Gomes Dultra-de-Lima

Escola de Administração de Empresas de São Paulo (EAESP)

Fundação Getúlio Vargas

Av. 9 de Julho, 2029 - Bela Vista - 01313-902 - São Paulo - SP - Brazil

Tel: +55.11.8163-7284

E-mail: ronaldo.lima@gvmail.br

Mr. João Luis Corradini Quaglia

Escola de Administração de Empresas de São Paulo (EAESP)

Fundação Getúlio Vargas

Av. 9 de Julho, 2029 - Bela Vista - 01313-902 - São Paulo - SP - Brazil

E-mail: joaoluiscq@gmail.com

Mr. Daniel Galelli

Escola de Administração de Empresas de São Paulo (EAESP)

Fundação Getúlio Vargas

Av. 9 de Julho, 2029 - Bela Vista - 01313-902 - São Paulo - SP - Brazil

E-mail: daniel.galelli@gyvail.br

POMS 23rd Annual Conference

Chicago, Illinois, U.S.A.

April 20 to April 23, 2011

ABSTRACT

Projects are means through which organizations implement their strategies. Despite relying on the support of countless management tools, project managers are still challenged with high failure rates. This study, through experiments, demonstrates the harmful effect of the multitask at the resource allocation and proposed how to switch this effect off

1. INTRODUCTION

It is well known by the academics and practitioners that projects are the means by which a company implements its strategies looking for competitive advantages, such as, new products development, manufacture capacity expansion or implementation of new product assembly line. From this perspective, projects assume a strategic importance in the organization, then, it is normal to expect that an efficient project management bring positive results for the companies. However, the projects performance indicators have demonstrated that the majority of the projects do not comply with the delivery dates neither the budget previously established.

These problems at the PM are normally attributed to absence of a proper planning, lack of risk mitigation, leadership or project cost control process. To fight these problems, prescriptive rules and project best practices have been presented to the managers; however, the assumptions of these best practices do not take into account the human behavior according to the behavioral researchers. For example, according to Gino & Pisano (2008), overconfident managers might underestimate the risk of failures and overestimate success, and thus fail to undertake appropriate risk-reducing activities and expenditures. Overconfidence might also lead project managers to select too many projects for the company to work on.

Another common practice in the project management is attributing several tasks to one employee and assuming that he can split his time doing the tasks using 100% of his capacity. It is not unusual to see in the project planning one resource being designated to split 20% of

his time to perform task A, 20% to perform task B and 60% to perform task C in the same day, as can be seen in the Figure 1. This phenomenon is known as multitasking when a person should perform within a limited period of time, by interleaving, switching from one task to the other (Kushleyeva, Salvucci, & Lee, 2005; Logie, Law, Trawley, & Nissan, 2010).

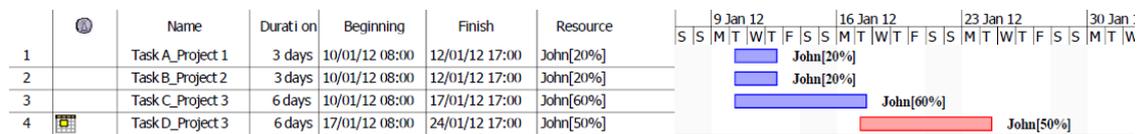


Figure 1 - Example of a resource allocation in the project management

The multitasking is a common phenomenon in the project management, however, the behavioral effect of the multitasking is always ignored by practitioners and operations managements researchers (Konig, Oberacher, & Kleinmann, 2010). Many employees are asked to work on more than one task during a typical work day and the excessive multitasking may results in the decrease of performance (Mangelsdorf, 2008, 2011); however, the employees are expected to deliver a performance as the switching task is having “zero cost” considering their cognitive aspect. This high expectation always induces the project managers to underestimate the project duration or make him overconfident being the outcomes not necessarily desirable.

Focusing on the problem stated above, this research aims to explore how multitasking effect can decrease the employee’s performance in the project management. To achieve the purpose, this study will employ a controlled experiment as research strategy.

To guide the development to the current work, this paper is structured in: 1) Introduction, 2) Theoretical background 3) Research design and methods; 4) Results and discussions 5) Final Considerations, 6) References.

2. THEORETICAL BACKGROUND

Project management

According to Barney (1991), a firm is said to have competitive advantage when it implements a value creating strategy that is not possible to be imitated nor implemented simultaneously by other firms. At this concept, it is clear that the competitive advantage of the firm depends first on the value creating strategy conception and then put it into operation. The conception of the strategy is much more related to the analysis of the industry matched with the resource based view (Barney, 1991; Peteraf & Barney, 2003; Porter, 1979), while the second step is related to the process of implementation.

These implementation processes involve temporary endeavor with a defined beginning and end undertaken to meet unique goals and objectives. The way how these processes are organized is usually known as project. For example, new product development, manufacturing plant capacity expansion, building new manufacturing plants in a desired market or establishing a new business unit in unexplored market.

Analyzing the importance of the project basing on the strategic lenses, projects assume an essential role at the survival of the companies among the others, and then it is normal to expect an efficient management of the projects and also the achievement of the established goals. To assure the accomplishment of the projects, several tools and prescriptive techniques have been developed such as PERT planning techniques, Work Breakdown System technique, Critical Path planning process, Resource allocation analysis and, during the last decade, the famous Project Management Body of Knowledge (PMBOK).

Despite all the recommended techniques, tools and best practices, the Chaos Report produced by the Standish Group (2008) has shown that only 12% of the project are delivered on-time and on-budget. Among those that have failure, 13% was associated to incomplete requirements, 10,6 to lack of resource and 8,1% was associated to the lack of planning.

According to Gino & Pisano (2008), the high failure rate of the project management is associated to the exclusion of the human behavior factors at the prescriptive management practices. One of the example mentioned by those authors are the overconfident of the managers that can lead to an underestimation of the tasks durations, then causing delay of the project. Their critiques are not unsupported, once according to the Chaos report, 12,4% of the failure are due to the lack of user involvement and 9,9% are related to unrealistic expatiations.

Multitasking effect and project management

Multitasking effect is not a new phenomenon in the project management; however managers and top managers normally ignore it. In a competitive and cost cutting environment, companies usually adopt policies that maximize the usage of their resources and assuming that it is synonym of efficiency. It is not rare to see in the scheduling employees 100% fully allocated in several projects.

According to popular press (Rosen, 2008) and academic researches (Appelbaum, Marchionni, & Fernandez, 2008), multitasking is a myth that managers still do want to believe. According to Rosen (2008) and Appelbaum et al, (2008) multitasking increases the stress, loss of focus and the performance declines. A person that switches constantly the tasks at work, his performance will be similar to a person that suffers of Attention Deficit Disorder (Appelbaum et al, 2008).

The multitasking manifests at the project management, mainly, through the resource allocation. As mentioned previously, it is common to find in the project planning that the same employee is allocated to execute several different tasks in several different projects. For example, 20% of the time of John is allocated to execute the task A of the project Alpha then at the same day, 20% is allocated to execute task B of project Beta and 60% to execute task C of project Gama.

However, when the work load of the same employee increase, his working memory capacity will not be able to handle the constant switching of tasks (Colom et al, 2010), then the limited resource of the employee will suffer of an effect similar to a traffic jam to process all the information's, then, the performance will decrease when the switching of task increase. (Appelbaum, et al., 2008; Clapp et al, 2011; Mangelsdorf, 2011).

With these rationales, it is possible to suggest the following hypothesis to be verified:

Hypothesis 1: Performance will decrease when employee is submitted to a multitasking situation.

When multitasking is not possible to be avoided, prior studies have shown that working memory capacity or training can improve the ability of a person to handle the multitask situation and make him perform better.(Colom, et al., 2010; Maclin et al., 2011). According to Maclin et al (2011), videogame is a useful tool to train and improve the ability to deal with multitasking once it enhances the designated area of the brain for the multitasking.

Following the suggestion of Maclin et al (2011), this study proposed the hypothesis 2 to be verified:

Hypothesis 2: Participants that play regularly videogame will present better performance than those that do not play.

3. RESEARCH DESIGN AND METHODS

Overview and Design

This study was designed to examine the performance of the employees to complete same amount of activities with and without multitasking. Time spent to complete the activities is used to measure the performance of the employees and the multitasking was consisted in continuous switching of activities. The manner how the activities were continuously switched was based on the commonly used resource allocation techniques found in the project management.

Participants were 80 Business Administration undergraduate and graduate students in São Paulo, Brazil. At the first part of the study, all participants were exposed to a multitasking situation and then asked to complete a set of activities and the time spent served as the dependent variable. At the second part of the study, the participants were asked to perform the same set of the task without the multitasking phenomenon.

Three pretests were conducted to validate the experiment instrument (form to be filled out) and the multitasking sequences. The pretests were applied to the 20 undergraduate students of Management Accounting and 40 graduated students in Business Administration. As results, the original form were adapted to eliminate uneven distances among the rows and columns of the form and the sequence of the multitasking were adjusted to eliminate movements bias when filling out the cells.

The expected results were lower performance when under multitasking situation as practiced within the project management. If this result is confirmed, the study can demonstrate that the way how the project planning and resource allocation might contain inconsistency when ignore the human behavior.

multitasking effect that occurs normally in the project management, once in the real life an employee is allocated to several activities of different projects and the switching among activities is really often, just like the example that this study has mentioned at the Figure 1.

Without multitasking effect

At the second part of the study, the participants were asked to execute the tasks without the multitasking effect (constant switching). To eliminate the multitasking, the participants should fill out all the sequential numbers from 1 to 60, then they should fill out at the first column of the figure with triangle symbol, then the second figure column with square symbol and the last one with circle. At the end, the participants will have drawn 20 triangle, 20 squares and 20 circles (Figure 3).

| SEQ. | Figure | SEQ. | Figure | SEQ. | Figure |
|------|--------|------|--------|------|--------|
| 1 | △ | 21 | □ | 41 | |
| 2 | △ | 22 | □ | 42 | |
| 3 | △ | 23 | □ | 43 | |
| 4 | △ | 24 | □ | 44 | |
| 5 | △ | 25 | □ | 45 | |
| 6 | △ | 26 | □ | 46 | |
| 7 | △ | 27 | □ | 47 | |
| 8 | △ | 28 | □ | 48 | |
| 9 | △ | 29 | □ | 49 | |
| 10 | △ | 30 | □ | 50 | |
| 11 | △ | 31 | □ | 51 | |
| 12 | △ | 32 | | 52 | |
| 13 | △ | 33 | | 53 | |
| 14 | △ | 34 | | 54 | |
| 15 | △ | 35 | | 55 | |
| 16 | △ | 36 | | 56 | |
| 17 | △ | 37 | | 57 | |
| 18 | △ | 38 | | 58 | |
| 19 | △ | 39 | | 59 | |
| 20 | △ | 40 | | 60 | |



 Direction to fill out the form

| Time Spent |
|------------|
| |

Figure 3 - Procedure to fill out the form without multitasking

The experiment room for the second study was also equipped with a (1,80 x 1,80) m projected stopwatch screen to show the time for the participants once they fulfill the tasks.

4. RESULTS AND DISCUSSIONS

The main purpose of this study is to verify if the multitasking effect found at the regular project management is really detrimental for the project performance; to capture this effect, a ANOVA test were employed to check if there were any statistic difference of performance when a person is under multitasking. The result in the Table 1 show that the average time spent to fulfill the task, for those without multitasking (120,24 s) , is approximately, 22% better than those with multitasking (147,27 s) and the difference between them is statistically significant (p-value < 0,001) as demonstrated by the ANOVA test Table 2.

Table 1 - Performance of activities with and without multitasking

| Descriptives | | | | | |
|-----------------|-----|--------|----------------|---------|---------|
| | N | Mean | Std. Deviation | Minimum | Maximum |
| No Multitasking | 58 | 120,34 | 24,91 | 84,00 | 200,00 |
| Multitasking | 59 | 147,27 | 26,54 | 94,00 | 224,00 |
| Total | 117 | 133,92 | 28,98 | 84,00 | 224,00 |

Table 2 - ANOVA of the performance with and without multitasking

| ANOVA | | | | | |
|----------------|----------------|-----|-------------|--------|------|
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 21205,54 | 1 | 21205,54 | 31,996 | ,000 |
| Within Groups | 76216,76 | 115 | 662,75 | | |
| Total | 97422,31 | 116 | | | |

The lower performances of the participants under multitasking effect confirm the hypothesis proposed and it is also consistent with the suggestions of Mangelsdorf (2008, 2011). The additional point introduced by the present study was the multitasking effect based on the resource allocation techniques found in the project management planning.

Through the results, it was clear that splitting the time of a same employee to execute different tasks of different projects is not the best way to optimize the performance. In practice, many companies require their employees to have a productivity of more than 90% of the time when they are in the companies, then the internal policies of resource allocation is to allocate the employees at much projects as possible. This way, the managers are sure that more than 90% of the time the employees are supposed to be working. However, the same managers normally ignore the losing of performance when the employees switch from task to task.

According to Colom, et al (2010), the performance of the multitasking is related to the Working Memory Capacity (WMC), however, within a dynamic project management environment there are so many tasks to be executed, and is still quite difficult to predict how this capacity should be extended or improved to make the multitasking possible. In this scenario, it is still possible to assume that the multitasking as the way how project planning adopted is detrimental for the project performance. To make an analog comparison, the switching of the machineries at the production line to produce different type of products required a minimum setup time for each change, then, it is possible to assume that the employees will also need a setup time for each change of the task.

Prior studies advocate that ability to handle with multitasking could be trained and improved through video game (Maclin, et al., 2011), however, the present study has verified that, under multitasking, those participants that play videogame regularly (average time = 146,1s) did not present better performance statistically (p -value = 0,866) than those that did not play (average time = 150,5s) – Table 3

Table 3 - ANOVA for the performance with multitasking for participants that play and do not play video game regularly.

| ANOVA | | | | | |
|----------------|----------------|----|-------------|------|------|
| | Sum of Squares | df | Mean Square | F | Sig. |
| Between Groups | 33,2 | 1 | 33,2 | ,030 | ,866 |
| Within Groups | 15758,2 | 14 | 1125,6 | | |
| Total | 15791,4 | 15 | | | |

This study speculates that the ability to handle with multitasking can be trained; however, the increase of performance in the daily activities that require a high intellectual production is still imperceptible, once activities in a project might require high concentration, structured thinking or detail execution. Despite of not finding better performance under multitasking for those that play videogame, this study cannot conclude that these tools could not bring benefits for the employee training, once the present research did not control the stress level of the participant at the multitasking.

At the project management, each activity is unique in spite of the similarity with the others, then, the training to make an activity execution into a habit is quite impossible. In this case, the better solution to deal with multitasking is to manage it in order to be less detrimental as possible and one of the techniques could be the Critical Chain planning.

Another important point related to the multitasking is the involved stress. According to several studies (Wetherell, Hyland, & Harris, 2004; Wickens, 2002), multitasking increases the stress level of the employees and jeopardize their wellbeing, consequently it is also not recommended. According to Wetherell et al (2004), the source of the stress is associated to the mental workload, once the competing tasks could demand attention that can exceed the employee's limited resources.

5. FINAL CONSIDERATIONS

Some tasks seems possible to be executed together, such as taking a bath and singing; however, some could not be combined such as car driving and phoning and again some seems to be quite impossible to be simultaneous such as writing a document and talking to a college (Borst et al, 2010). In a project, it is quite impossible to execute two tasks simultaneously like write two product specifications by the same employee once the cognitive construct overlapping is almost 100% (Borst et al, 2010). The impossibility to perform the tasks simultaneously forces the employees to constantly switch among them, and this is called multitasking.

The origin of the multitasking in the project management is associated with the resource allocation in the project planning, once it is common to split the same resource to several different projects.

This study has demonstrated that the way how the project manager splits the same resource with several projects might decrease the overall resource performance because the constant switching of the task might slow down the employee. To deal with this type of problem, the project manager should avoid allocating the same resource into several different projects at the same period of time.

Another way to deal with the detrimental effects of the multitasking is to reduce as much as possible the demand of task changing for the same employee and also once the employee has started his task, try to not interrupt him with others activities. As suggestion, a useful techniques of resource allocation and project planning that can reduce the multitasking is the one employed by the Critical Chain (Goldratt, 1997)

The present study has not found evidences that could support findings of Maclin et al (2010) that the videogame could improve the multitasking performance in the project management; however, this study did not deny the previous studies finding.

Finally, beyond the resource allocation at the project planning, any type of the interruption along the main activities execution can be considered as multitasking, once the employee should switch the task, for example, notification of the e-mail arrival, answer unnecessary e-mails, break to chat with the colleague, unexpected meeting or phone calls. These daily small interruptions seems harmless, however, under the perspective of the multitasking, they can undermine the expected efficiency of an employee.

The limitations of this study are related basically to the little information concerning the videogame variable to get deeper into the relation between videogame and multitasking. Adding to the previous limitation, this study did not also test another possible multitasking in the project management where an employee is assigned to execute a complex task; however this task is decomposed into several small simple task, then performance of this constant switching among these small simple task is still unexplored.

Based on these limitations, this study suggests as future researches a better control of the videogame habit in the multitasking performance and proposed to test the effect of the multitasking previously described.

REFERENCES

- Appelbaum, S. H., Marchionni, A., & Fernandez, A. (2008). The multi-tasking paradox: perceptions, problems and strategies. [Article]. *Management Decision*, 46(9), 1313-1325. doi: 10.1108/00251740810911966
- Barney, J. B. (1991). Firm Resources and Sustained Competitive Advantage *Journal of Management*, Vol. 17(No. 1), 22.
- Borst, J. P., Taatgen, N. A., & van Rijn, H. (2010). The Problem State: A Cognitive Bottleneck in Multitasking. [Article]. *Journal of Experimental Psychology-Learning Memory and Cognition*, 36(2), 363-382. doi: 10.1037/a0018106
- Clapp, W. C., Rubens, M. T., Sabharwal, J., & Gazzaley, A. (2011). Deficit in switching between functional brain networks underlies the impact of multitasking on working memory in older adults. [Article]. *Proceedings of the National Academy of Sciences of the United States of America*, 108(17), 7212-7217. doi: 10.1073/pnas.1015297108
- Colom, R., Martinez-Molina, A., Shin, P. C., & Santacreu, J. (2010). Intelligence, working memory, and multitasking performance. [Article]. *Intelligence*, 38(6), 543-551. doi: 10.1016/j.intell.2010.08.002

- Goldratt, E. (1997). *Critical Chain*., São Paulo, Nobel.
- Konig, C. J., Oberacher, L., & Kleinmann, M. (2010). Personal and Situational Determinants of Multitasking at Work. [Article]. *Journal of Personnel Psychology*, 9(2), 99-103. doi: 10.1027/1866-5888/a000008
- Kushleyeva, Y., Salvucci, D. D., & Lee, F. J. (2005). Deciding when to switch tasks in time-critical multitasking. [Article; Proceedings Paper]. *Cognitive Systems Research*, 6(1), 41-49. doi: 10.1016/j.cogsys.2004.09.005
- Logie, R. H., Law, A., Trawley, S., & Nissan, J. (2010). MULTITASKING, WORKING MEMORY AND REMEMBERING INTENTIONS. [Article; Proceedings Paper]. *Psychologica Belgica*, 50(3-4), 309-326.
- Maclin, E. L., Mathewson, K. E., Low, K. A., Boot, W. R., Kramer, A. F., Fabiani, M., & Gratton, G. (2011). Learning to multitask: Effects of video game practice on electrophysiological indices of attention and resource allocation. [Article]. *Psychophysiology*, 48(9), 1173-1183. doi: 10.1111/j.1469-8986.2011.01189.x
- Mangelsdorf, M. E. (2008). What Makes Information Workers Productive. [Article]. *Mit Sloan Management Review*, 49(2), 16-17.
- Mangelsdorf, M. E. (2011). How Too Much Multitasking at Work Can Slow You Down. [Article]. *Mit Sloan Management Review*, 52(3), 96-96.
- Peteraf, M. A., & Barney, J. B. (2003). Unraveling The Resource-Based Tangle. *Managerial and Decision Economics*, Vol. 24(No. 4), 15.
- Porter, M. E. (1979). How Competitive Forces Shape Strategy. *Harvard Business Review*, 57(2), 137-145.
- Rosen, C. (2008). The Myth of Multitasking. *The New Atlantis*, Spring 2008, 6.
- Wetherell, M. A., Hyland, M. E., & Harris, J. E. (2004). Secretory immunoglobulin A reactivity to acute and cumulative acute multi-tasking stress: relationships between reactivity and perceived workload. [Article]. *Biological Psychology*, 66(3), 257-270. doi: 10.1016/j.biospycho.2003.10.008
- Wickens, C. D. (2002). Situation awareness and workload in aviation. [Article]. *Current Directions in Psychological Science*, 11(4), 128-133. doi: 10.1111/1467-8721.00184