Planning Fallacy: A Case of Task Planning in IT Project Support Services

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Abstract

Schedule and effort slippages are measures that practitioners in the Information Technology (IT) industry are all too familiar with. While we accept the fact that these slippages are realities of our day-to-day life, we put continual efforts to overcome or reduce the impact of these deviations. Our propensity to lose sense of time-taken and become over optimistic and thereby skew our planning is termed as planning fallacy.

This research is to study the planning errors, the reason for such behavior, its ubiquity in IT industry and how remedial actions may reduce planning errors. The intent is to approach the problem from a behavioral economics point of view, on the irrational approach followed by individuals that lead to planning fallacy. The research methodology adopted was experimental design with random samples chosen as control and treatment group. The results of the study and experiments establish the g presence of planning fallacy in many areas of task planning. Our results on the treatment group demonstrate that this judgment bias could be reduced to a large extent by periodic monitoring and facilitation.

Introduction

Research on issues and attributes relating to planning fallacy has gained importance in recent years. Few of the reasons ascribed are obstacles to using past experiences, underlying process towards task prediction, actor-observer differences in prediction, type of deadlines and underestimation of tasks (Buehler et al., 1994; Forsyth and Burt, 2008).Plans can fail in spite of good intentions and right attitude. The tendency to be over optimistic about the outcome of planned actions, to overestimate the likelihood of positive events, and to underestimate the likelihood of negative ones leads to planning fallacy (Lovallo and Sibony 2010). These errors in judgment are described as isolation errors by Kahneman and Lovallo (1993), where people base their judgments on scenarios of success in the future, without taking into account past failures or possibilities of delays(Mangan, 2007). Behavioral Economics brings to light the irrationality of individuals that leads to planning fallacy. The rationality assumption of neo-classical economics that assumes farsighted rationality (Colander, 2000) is in direct contrast to the underlying beliefs in behavioral economics. The fundamental assumptions in rationality include: (a) People have rational preferences among outcomes, (b) Individuals maximize utility and firms maximize profits and (c) People act independently on the basis of full and relevant information (Samuelson and Nordhaus, 1985). This rationality assumption underlying economic theory assumes unbounded rationality, modeling economic agents as having unlimited information processing capabilities. The rational-choice framework assumes that individuals know what is in their self-interest and act accordingly (North, 1994).

This standard economic framework of human behavior that promulgates unbounded rationality has been contested and the alternatives arose from the limitations of brain power and time. Herbert Simon (1955) put forward 'bounded rationality' that describes a realistic conception of human

problem solving capabilities. According to this, it is unreasonable to expect decision makers to exhaustively compute options expected utilities (Kahneman and Frederick, 2005). As per, Mullainathan and Thaler (2000) it is eminently rational for people to adopt rules of thumb as a way to economize on cognitive faculties and the standard model ignores these bounds and hence the heuristics commonly used. The heuristics and biases as developed by Kahneman and Tverskyare characterized by the limitations in cognitive process that are a departure from rationality and described by heuristics of judgment and framing operations (Kahneman, 1991). These heuristics though useful sometimes may lead to severe and systematic errors and can occur to even experienced researchers (Tversky and Kahneman, 1974). Illustrative examples on how judgment diverges from rationality are overconfidence, optimism, anchoring, extrapolation, availability and representativeness heuristic (Mullainathan and Thaler, 2000).

Studies have been conducted on the overly optimistic predictions for real world tasks that lead to planning fallacy. Variations were done to the characteristics of the target task, procedure of eliciting predictions and criterion measures. The results show that people anticipate that they will finish their own tasks earlier than they actually do (Buehler et al., 1994). Experiments were done to the effect of task segmentation (segmentation effect) on planning fallacy bias on a set of students and results establish an approach to reducing the possibility of planning fallacy bias (Forsyth and Bias, 2008).

This is a similar scenario in the corporate setting. Missed project deadlines are common in the Information Technology (IT) & Information Technology Enabled Services (ITES) industry. Delay in public infrastructure projects is observed despite meticulous preparation. Customers get their products / services late. This is the state of affairs, despite most of these businesses being exposed to the latest methodologies in quality management and project management. While there is myriad of reasons for this, we wished to limit our study into the domain of behavioral economics to seek answers.

All task delays need not be due to planning fallacy. For example, public projects / programs though have numerous examples of planning fallacy, not all of them will fall into the behavioral domain. There may be tendencies to purposely underestimate due to deceit, political favors, sales pressures, immediate gains (Buehler et al.,2010) and if entirely done based on these examples, may mask the real underlying characteristics.

As we will see in our review that in most of the research, the experiments have been carried out on university students and a few on shoppers/consumers (Buehler et al., 1994; Forsyth and Burt, 2008; Spiller and Lynch, 2009).Our attempt and emphasis was on IT support services to understand this (planning fallacy) behavior, where there are multiple stakeholders with diverse expectations as put forth by resource dependency theory, stakeholder theory, agency theory, stewardship theory, institutional theory and managerial hegemony (Hung, 1998).In the experiments that we carried out, we set out to seek if erroneous planning exists despite the awareness and training that people in this industry are exposed to.

The remainder of the paper is organized in the following way. In the next section we are reviewing the planning fallacy literature that provides the width and depth of the literature. The review also identifies various experimental set up on which the planning fallacy is justified. In section three, we describe the methodology and design of the experiment to test the validity of the propositions. Subsequently, we discuss the results of the experiment, the expected and actual and its analysis. In the ensuing discussions, we extend this interpretation to IT / project management and strategic planning based on the results of our experiment and propositions.

Planning Fallacy: AReview

The phenomenon of planning failures at an individual / personal level are mostly due to the fact that humans tend to have excessive belief in their current capabilities oblivious of the failures of the past (Buehler et al.,1994). A fundamental axiom of planning fallacy is that the future is perceived to be rosier than the past; realistically pessimistic lessons from the past fade from a planner's attention in light of optimistic plans of the future (Kahneman, 2011).

According to Kahneman (2011) humans tend to have 2 levels of thinking, System 1 (experiential) and System 2 (cogitative). The System 1 thinking is the one in action while we are on auto-pilot – the activities that we do without even realizing, almost effortlessly. It is fast and frugal / quick and dirty. Most of our day-to-day activities are carried out at this level of mind processing – popular examples walking, brushing our teeth etc. The System 2 thinking is the more structured, thoughtful level and slow(Kahneman, 2011). Typically System 2 thinking is open to reflection and slow decision making.

Nassim Nicholas Taleb in his popular book, 'The Black Swan' claims that the trouble with human nature resides in its inability to use much of System 2. The mistakes and biases that we bring to our plans and decision making are the result of System 1 level thinking.

As per Roy et al., (2005), people tend to think that past situations took shorter time than they truly did (Mangan, 2007). People have the tendency to underestimate the external factors and overestimate the factors that are under their control. Shorter tasks are typically overestimated and longer duration tasks underestimated and hence if subjected to task segmentation the longer duration tasks (that are prone to planning fallacy) may reduce the bias (Forsyth and Burt, 2008).

Our decision making process is a toss-up between personal base rates founded on own past experiences, that is singular information (internal perspective) versus population base rate founded on experience of others, that is distributional information (external perspective). In a scenario where stakes are high, it is better to go for a combinational thinking and decision making. But the presence of failures and delays suggest that people tend to go for the internal perspective and base their estimates and predictions (Buehler et al., 1994).

Practicing managers are entrusted the task of taking decisions and plan in their respective areas of work. While they may have access to past data and planning techniques, there is still a large amount of decision making that is dependent on the decision-makers' cognitions of the world (Bateman and Zeithaml, 1989) and managerial decisions are affected by this. While forecasting the outcomes of risky projects, managers make decisions based on delusional optimism rather than weighing of gains, losses and probabilities. They overestimate benefits and underestimate costs. They overlook the distributional information around the possibility for mistakes and miscalculations. As a result, managers pursue initiatives that are unlikely to come in on budget or on time – or to ever deliver the expected returns (Lovallo and Kahneman, 2003).

We studied the delays in IT / project management, public infrastructure works and widely available information about strategy. All these domains are complex and hence involve vast resources and numerous stakeholders. Mostly professionals are involved in the origination, planning and execution stages with, Quality, Cost and Time being the primary drivers for successful completion (Atkinson, 1999). For the time function, the aspects that are important are the overall deadline and the other being the synchronization of activities; the bigger the complexity of the activity, the higher the importance (Söderlund, 2002). Research on planning fallacy by authors in the past cited well publicized delays, as given in Table 1.

Table 1: A synoptic review of Studies on Planning Fallacy

Domain	Findings	Author(s) / Sources
IT / Project Management	IT Projects in the US that are unsuccessful (challenged or impaired/cancelled) – 83.8%	Chaos, 1994
IT / Project Management	Building of Euro fighter had over two decades of technical glitches and cost doubled to approx. $ 45 billion	Lovallo and Kahneman, 2003
IT / Project Management	On average, large IT projects run 45 percent over budget and 7 percent over time, while delivering 56 percent less value than predicted	Bloch et al., 2012
IT / Project Management	NASA's 10 out of 13 projects have time and cost overruns	Buehler et al., 2010
Public Infrastructure	Channel tunnel between Britain and France – Planned date: June 1993; Actual: May 1994	Buehler et al., 1994
Public Infrastructure	Montreal Coliseum – Planned: 1976; Actual: 1989	Buehler et al., 1994
Public Infrastructure	Transcontinental railway at British Columbia – Planned: 1881; Actual: 1884	Buehler et al., 1994
Public Infrastructure	Sydney Opera House's construction cost $AUS 102 million (£60 million) – the original estimated cost was $AUS 7 million (£4.1 million) and a delay of about 6 years	Taleb, 2010
Public Infrastructure	Denver's Stapleton International Airport project opened 16 months later than planned a cost of at least 2 billion over budget	Buehler et al., 2010
Strategy	A vast majority of efforts to enter new markets end up being abandoned within a few years	Lovallo and Kahneman, 2003
Strategy	More than 70% of new manufacturing plants in North America, close within their first decade of operation	Lovallo and Kahneman, 2003
Strategy	Three quarters of mergers and acquisitions never off – the acquiring firm's shareholders lose more than the acquired firm's shareholder gain	Lovallo and Kahneman, 2003
Strategy	In a McKinsey Quarterly Survey of 2207 executives, only 28 percent said that the quality of strategic decisions in their companies was generally good	Lovallo and Sibony, 2010
Strategy	60 to 80 percent of companies fell far short of the targets expressed in their strategic plans	Kaplan and Norton, 2008

Further, the experiments that were carried out to test the hypothesis involved random sample selection, control group and treatment group, and post-tests (Buehleret al., 1994; Forsyth and Burt, 2008; Spiller and Lynch, 2009).

At an individual level there have been numerous experiments done and reported on Christmas shoppers, unpacking assignment, take home task turn-around times, word puzzle tasks, origami tasks, writers book completion times that corroborate the reality of planning fallacy (Buehler et al., 1994; Forsyth and Burt, 2008; Spiller and Lynch, 2009; Jaehoon and Jongwon, 2009;Taleb, 2010). These experiments were designed and carried out such that individuals are randomly chosen as control and treatment group and involves post-test. The segmentation effects were also studied at the individual level and tests proved its effect on tasks that are unrelated as well as when the tasks are more behaviorally linked to a single overall objective (Forsyth and Burt, 2008).

Proposition

Followingare the propositions we attempt to study through our experiment.

Proposition 1: People commonly underestimate their task completion time estimates thereby committing planning fallacy.

Proposition 2: The skew (planned vs. actual) in planning task completion times can be brought down if there are regular interventions during the planning process.

Methodology and Design of the Experiment

The organization that we carried out the experiment is primarily in the business of developing embedded systems software for its customers, both domestic and overseas. Based out of India, it employs about 3500^{+} employees with a bulk of them having professional training / qualifications. The group that was identified for the experiment supports this software development / IT business unit. This support group has its members continuously working for the project teams in order to assist them in their customer deliveries. The nature of the tasks that is being carried out by the support group is in the sphere of infrastructure and facility support. This support group employs specialists and skilled staff with specialized experience and domain training. They undergo regular performance appraisals and professional training on time and project management. The members in the support group have access to standard office applications for planning and managing. The team's profile is given in Table 2.As the support group has members that are trained and experienced, it was expected that there will not be planning bias as well as any difference in their output / performance irrespective of the monitoring that they are/are not subjected to. This activity was spread between September and November 2014.

Table 2 – Team Profile

Group	Total Years of Experience (Average)	Years of Experience in the current organization (Average)
Control Group	10.8	7.2
Treatment Group (regular monitoring)	13.7	2.6

A priori knowledge about the team members and their past performance was not sought at the time of picking the teams. Two teams were chosen with six members each in consultation with the department head (HOD). One group was to be the control group and the other, the treatment group. The decision on the team that will be control group and treatment group were chosen by the researcher at random without any bias. The control group had to estimate the time duration an activity takes and record the planned end date. After the task is completed this group updates the log and records the actual end date. In the treatment group, the process of logging of the planned end date and actual end date was similar to the control group. The only difference was that the treatment group was subjected to daily meetings that had discussions on these tasks, and their current status. The teams were managed by their HOD during the time of these experiments. The HOD was briefed the following, (a) select the 2 groups at random, (b) allocate the tasks to the teams that are non-regular or in other words, not the daily tasks, (c) make them capture the planned end date of these tasks in a log sheet, (d) conduct daily meetings only with the treatment group and ask for the task status and, (e) log the actual end date of the tasks. The HOD and the team members were not briefed about the purpose of this segregation or study so as not to influence their natural behavior.

For this research an experimental design was chosen to test the propositions 1 and 2, which we have put forth. The duration of the experimentation was for a period of 3 months. During this period of 3 months, the two groups recorded the tasks, planned task completion date and the actual task completion date. Based on these log sheets, we later computed the gap in the planning (slippages = 'planned task completion date 'minus' actual task completion date') for each of these tasks during this period. We made use of STaTa®, a data analysis and statistical software package to analyze the results.

Results of the Experiment

As our experiments were being carried out on among professionals in the IT support function and the fact that they had the freedom to decide their own completion times, we expected the bias to be non-existent / negligible. It was more so, in the case of the treatment group that had daily meetings. It was anticipated that the true nature of planning fallacy will appear as these experiments were carried out over a longer period of 3 months. The analysis was carried out at the end of the entire experiment period so as not to prejudice the experiment groups' by giving intermediate feedback, though they had the logs of their performance all along. The data was collated. The planned and actual completion timelines were recorded as dates. The analysis that we carried out are,

(a) Study individual entries for difference in planned and actual dates
(b) Collate the group-wise data and carry out descriptive statistics for mean and standard deviation for the 2 groups
(c) Compare the results of the 2 groups for deviations to check for means and standard deviations for (a) closer to zero, (b) similarity in outcomes and (c) divergence in results

The summary of results is tabulated in Table 3.

The control group performance and treatment group performance in terms of planning deviations ("planned task completion date" minus "actual task completion date") were studied for the following characteristics:

(a) If mean is zero or closer to zero that means there is negligible difference in the planned and actual timelines.
(b) A value in the mean other than zero meant that there have been deviations with respect to planned schedules.
(c) If the standard deviation is small, it means that high proportion of data points lie near the mean value indicating higher precision.

(d) If the standard deviation is large, it means that high proportion of data points lie far from the mean value indicating lower precision.

The results in Table 3 show us that the control group that had no interventions estimated with greater bias (mean 7.18 days and standard deviation 10.90days) whereas the treatment group that had daily interventions had lesser bias (mean -0.04 days and standard deviation 4.82 days). The results show that there are deviations to the planning efforts in comparison to the actual completion timelines in the control group despite the participants' background and experience. The large standard deviation in the control group shows lower precision indicating systematic errors in judging planning efforts.

We observed the performance of the other (treatment) group where slight modifications to the conditions were done, to see if such tendency to skew can be controlled. At an individual task level there were deviations in the treatment group also, even though the proportion and magnitude of such deviations were less in comparison to the control group (Table 3). From an overall perspective, we found a negligible skew in planning resulting in a great degree of control if the participants are monitored on a regular basis. The standard deviation is relatively small thus showing higher precision.

Two Sample t Test - We then carried out the two sample t test to check if the control group 'slippage mean' is significantly less than or equal to the treatment group 'slippage mean'.Our hypothesis and the test results are given in Table 4.

Table 3 – Summary of Results

Description	Control Group	Treatment Group (regular monitoring)
Total number of tasks	16	25
Slippage Mean (in days)	7.1875	-0.04
Slippage Standard Deviation (in days)	10.90088	4.825971
Percentage of tasks that were on-time (zero slippages)	18.75%	32%
Percentage of tasks completed early	18.75%	44%
Percentage of tasks completed late	62.5%	24%
Minimum slippage (in days)	-17	-9
Maximum slippage (in days)	25	13

Table 4 – Two Sample t test (right tailed)

Null Hypothesis	H_0: $\mu_c \leq \mu_t$	the control group 'slippage mean' is less than or equal to the treatment group 'slippage mean'
Alternate Hypothesis	H_A: $\mu_c > \mu_t$	the control group 'slippage mean' is greater than the treatment group 'slippage mean'
Significance value (α)	0.05	
P Value	0.0109	

The P value is less than 0.05 and hence we reject the null hypothesis. The t test results indicate that statistically the control group 'slippage mean' is greater than the treatment group 'slippage mean'.

Discussions on the Study and Experiments

The part of human nature to incorrectly plan for the future was observed during our study and experiments that we carried out. It is a human fallibility that we may have to accept and bring in remedial steps depending on the situation and importance.

People have a tendency to wrongly plan (i.e., incorrect estimations) despite knowing that their actions have a day-to-day impact on the organizational activities. If reviewed and controlled, the amount of skew on the estimation vs. task fulfillment, gets drastically reduced.

We extend this interpretation to the impact that this planning fallacy may have into the areas on IT / project management and Strategy planning.

IT project management is a domain that is increasingly operated by experts and trained personnel. Despite these tall claims, there are reports that suggest that for every 100 projects that starts, there are 94 restarts (Chaos, 1994) and is a major cause for cost and time overruns. Notwithstanding tremendous progress that has been done in the way projects have to be managed (PMP®, PRINCE2®certifications), project delays continue. Under the economic model of planning fallacy it is contended that monetary incentives for accurate prediction ameliorate the planning fallacy while incentives for rapid completion aggravate it (Brunnermeier et al.,2008). The ways of overcoming the planning fallacy in IT management is bottom-up planning from short activities, use of burn-down chart for daily monitoring and these practices are prevalent in agile processes. The rise of agile methodology in IT/product development is to encounter such biases and failures. Research also indicates that smaller time frames, with delivery of software components early and often, will increase the success rate (Chaos, 1994). They call it as "growing software" as opposed to "developing software". By this approach they attempt to overcome the challenges that contribute to the failure of projects. It is suggested that there is a need for short delivery life cycle and break-down of all activities to fewer than 20 person days with a maximum duration of four weeks in order to reduce the planning bias (Bloch et al., 2012).We also have the case of $2.3 billion Delhi Metro where-in the projects (and phases) were completed ahead of time (Sreedharan, 2008) whose success is attributed to the relentless emphasis on communication and updates by means of frequent meetings, seminars and workshops (Lakshman, 2007). Thus in the case of IT / project management, we realize that having shorter tasks and periodic monitoring helps to reduce the bias / adherence to schedules.

In the case of corporate strategy, it is all about the future where past experiences may not be a true indicator of how the future is going to be. Here executives interpret the internal and external factors with a lot of intuition and judgment in order to arrive at their strategy plans. They tend to see the world that they believe they are seeing and that need not be the comprehensive view. Many times it is beyond the reach of the human imagination to foresee all of them at the outset (Lovallo and Kahneman, 2003). With planning fallacy as a human behavior, it is possible that the strategies tend to have a skew on the goals / timelines. Inaccurate completion estimates can have a debilitating effect on the organization and this in turn may result in arriving at the sub-optimal strategies that may impair the organizations' future growth. Erroneous planning(planning fallacy) is one among the many factors that affect strategy management. People end up with ambitious plans that have every potential to fail due to incorrect estimates. Irrational thinking doesn't just affect individual economic decisions; it affects corporate strategic planning as well (Dye et al., 2009). Every strategic plan has inherent risks and gambles by its very nature, yet very seldom we see such spelt out

probabilities. Strategic decisions are shaped by a variety of contextual influences arising from past events, present circumstances and perspectives of the future (Bateman and Zeithaml, 1989). The planners in their limited time, vision, data and experience evaluate the strategic advantages based on strengths and opportunities and strategic challenges based on weaknesses and threats. They arrive at the strategies for the organization based on their evaluation. Barnes (1984) summarizes in his research that these subjective judgments, if faulty may result in misdirected strategic plans. Barnes (1984) concludes that subjective sensitivity analysis may be a suggested method to elicit better judgments. Outside-view thinking by analyzing comparative data of similar companies / projects may reduce the cognitive biases in judgment (Lovallo and Kahneman, 2003). We should bring in a System 2 thinking to spot the System 1 errors in the plans and recommendations (Kahneman et al., 2011) by bringing in critical reviews / discussions that enquire about the plans' over-optimism, cognizance of history of similar work and the outside-view vis-à-vis the bottom-up (inside-view). Robust debate, an objective assessment of facts, and a realistic assessment of corporate capabilities can bring in satisfactory outcomes (Dye et al., 2009). Thus we conclude that the bias in strategies can be controlled by means of critical (outside-view) reviews, segmentation and identifying risks and probabilities. Having firmed up the strategy, one way of enabling the implementation is through control/review mechanisms. This will help to pull back the skew and enable compliance to the strategy plans.

Conclusion

Based on our study and experiment we brought out the issue of planning fallacy and errors in estimating time taken to complete tasks and how such errors could be reduced. We evidenced that task estimation errors take place even in professional settings i.e., support functions in the IT industry. We were able to demonstrate that such errors may be substantially controlled if there are regular interventions. We also brought to light the application of such remedial steps in the areas of IT / project management and strategy planning that may save resources in terms of time, effort and money.

However, our research is limited by the (a) number/type of experiments, (b) lack of task complexity determination, (c) differential interrupts and contingencies faced as a part of the organizations' day to day operations, (d) impact of the teams on longer time frames for fatigue or behavioral convergence, (e) effects, if the control and treatment group were interchanged,(f) the outcomes, if the team size were larger and (g) simplicity of the model. Also, we may derive greater insights if we do longitudinal studies as well as field studies in the areas of project management, public infrastructure ventures and strategy, and quantify the gains for the benefit of future practitioners.

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