Defining, measuring and monitoring IT service goals and strategies: preliminary results and pitfalls from a qualitative study with IT service managers

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Project   MPS.BR Program, coordinated by SOFTEX (from 2004-2014 I was the executive coordinator of this program) View project

Defining, Measuring and Monitoring IT Service Goals and Strategies

Preliminary Results and Pitfalls from a Qualitative Study with IT Service Managers

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ABSTRACT

Background: Aligning IT to business goals is a top priority for CIOs. However, managers in the IT Service Industry face difficulties to define and monitor IT service goals and strategies aligned to business goals. Goal: We carried out a study to investigate how IT service managers define, measure and monitor IT service goals and strategies, and the difficulties they have faced in this context. Method: We interviewed five IT service managers from four service provider organizations and used coding procedures to analyze the collected data. Results: We obtained information about how organizations define, measure and evaluate IT service goals and strategies and, from the difficulties reported by the managers, we identified 19 pitfalls. Conclusions: By analyzing the relations among the pitfalls, we defined five hypotheses: *(i)* lack of awareness and transparency on the relationship between strategies and goals may harm the achievement of IT service goals and strategies, *(ii)* lack of proper support to execute measurement inhibits reevaluation and adjustment of strategies and indicators related to IT service goals, *(iii)* lack of motivation can jeopardize decision-making by IT service managers, *(iv)* conflicts between strategies may harm IT service goals achievement, and *(v)* lack of proper support to execute IT service management initiatives may harm IT service goals achievement.

CCS CONCEPTS

• **General and reference~Measurement** • General and reference~Empirical studies • **Applied computing~Business-IT alignment** • **Applied computing~IT governance**

KEYWORDS

IT Services, IT Service Goal, IT Service Strategy, Measurement, Qualitative Study, GQM+Strategies

1 INTRODUCTION

Service industry has dominated the U.S.A. and other established economies for decades. Manufacturers and IT companies have been more and more focused on services as growth and profit engines [18]. A service delivers value to customers by facilitating results they want to achieve, without requiring them to own specific costs and risks [2]. IT service management (ITSM) is a set of specialized organizational capabilities for providing value to customers through services. ITSM practice has increased due to the continuous adoption of IT management service-oriented approaches for software, infrastructure and processes [2].

Measurement is a key process to support organizations in managing and improving processes, products and services to achieve customer satisfaction [3]. Establishing a measurement program using measures aligned to business goals can help managers to monitor strategies, projects and processes executed to deliver IT services. Although the literature states measures should be used to monitor the alignment of IT to business goals by providing useful information for decision-making, managers in IT service industry face difficulties when dealing with measurement initiatives [28] and monitoring results to keep alignment between IT services and business goals [15] [31].

Considering the importance of establishing and monitoring IT service goals and strategies aligned to business goals, we carried out a study in which we investigated how different IT service organizations define, measure and monitor IT service goals and

strategies. We also investigated difficulties IT managers have faced in this context.

We interviewed five IT service managers from four different organizations. We used coding techniques based on Grounded Theory procedures [7] to analyze transcript data. Interviewed managers explained how they define, measure and monitor IT service goals and strategies and reported several difficulties they have faced in this context, such as lack of discipline to provide measurement data, need to constantly reevaluate measures definition, lack of a holistic view of strategies and goals, and lack of a unified terminology for IT service management. From the difficulties reported in the study, we identified a set of 19 pitfalls. IT service practitioners can use the study results to have insights about how to define, measure and monitor IT service goals and strategies and avoid pitfalls that can negatively impact on goals achievement and strategies success.

We present goals and indicators' types that can inspire other organizations on how structuring their set of goals and indicators. Managers responsible for defining IT service measurement processes can use information about how indicators targets are defined, how and when indicators and strategies results are evaluated, and how strategies to achieve goals are cascaded in projects or operational activities. Moreover, we identified factors that can influence the team motivation for working on strategies and measurement initiatives. Organizations can consider these factors to reduce the risk of failing in goals achievement. Furthermore, the study results can also be useful for researchers to identify practical issues to be addressed in future researches.

This paper presents the study and its main findings. The paper is organized as follows: Section 2 provides the background for the paper; Section 3 presents the study planning, execution and obtained results; Section 4 focuses on the identified pitfalls of defining, measuring and monitoring IT service goals and strategies and discusses some hypotheses in this context; Section 5 addresses the study limitations and threats to validity; and Section 6 presents our final considerations.

2 BACKGROUND

2.1 IT Service Quality and Measurement

Service quality is an abstract concept due to the nature of the term "service", which is intangible, non-homogeneous and its consumption and production are inseparable. Service quality can be understood as a measure of how well a service level meets customers' requirements and expectations. The intangibility of services makes it difficult to understand how customers perceive and evaluate service quality. Service Level Agreements (SLA) are contracts usually signed between service provider and client to clearly define quality service attributes and acceptance criteria for the service being hired. Availability, capacity, performance, security, confidentiality, scalability, adaptability and portability are examples of quality attributes [1].

In order to be able to offer quality services, providers must continually assess how services are being delivered and what customers expect in the future. Customers will be dissatisfied with IT service providers who at times overshoot expectations, and at other times undershoot. Providing consistent quality is one of the most difficult aspects of the service industry [3].

In order to assess and improve service quality, providers need to evaluate service-related processes and monitor goals achievement. Measurement plays an important role in this context [16]. It can quantitatively indicate quality and support providers to increase the probability of delivering IT services that meet the quality requirements expected by the client [26]. The basic element for measurement is measure, which quantifies aspects of entities to characterize them. When information provided by a measure can be used to monitor goals achievement, the measure plays the role of indicator [37].

Measurement must be aligned to organizational goals. In the literature there are some approaches that deal with this issue, such as COBIT Goals Cascade [9], Balanced Scorecard [8], and GQM+Strategies [4]. COBIT Goals Cascade [9] provides a catalog with 17 enterprise goals and IT-related goals and more than 100 indicators that can be used to monitor goals.

Balanced Scorecard (BSC) [8], in turn, applies measurement to verify if activities performed by an organization meet its goals with respect to its vision and strategy, addressing perspectives to derive measures from higher levels of an organization. BSC does not provide a list of measures and it should be used to facilitate translating strategies into actions [11] [10]. In this paper, we used some concepts as adopted in GQM+Strategies. Thus, this approach is introduced in the following.

2.2 GQM+Strategies

The GQM+Strategies approach [4] is an extension of the Goal-Question-Metric paradigm [12] for goal-oriented measurement. It supports deriving, linking and disseminating goals and strategies across several organizational levels, and helps control the success or failure of strategies and goals by using a measurement system. In GQM+Strategies, strategies refer to projects, actions or initiatives performed to achieve goals. They represent a planned and goal-oriented line of actions to be executed to achieve the goals defined at the respective organizational level.

GQM+Strategies provides a model that relates goals and strategies at several organizational levels. One or more strategies can accomplish the same goal. Context factors and assumptions influence goals and strategies. Context factors represent known organizational environment variables. Assumptions are predicted, estimated or guessed unknowns, which can impact interpretation of measurement data, associated goals and strategies [4].

GQM+Strategies provides a mechanism not only to identify goals and strategies at several organizational levels, but also to consistently define measurement aligned with business goals and to interpret and compile measurement data at each level [4].

A Goal-Question-Metric [12] model consists of a measurement goal, associated questions, measures, and supplementary interpretation models. In GQM+Strategies, GQM models are associated to strategies. Therefore, at each organizational level, for each goal, a Goal-Question-Metric model is used to measure goal achievement considering the related strategy [4].

A GQM+Strategies element includes an organizational goal, respective strategies, context and assumptions that influence them. GQM+Strategies elements and related GQM models are represented in a GQM+Strategies Grid, making goals and strategies explicit, as well as measures related to them, providing a transparent correlation between goals, strategies and measurement initiatives [4].

GQM+Strategies has been applied mainly in software scenarios [4]. However, the method was also applied in companies with different business models and working in different domains, such as space industry [32], military sector [19] and IT services [13] [15].

3 RESEARCH PLANNING AND EXECUTION

In this section we present the study goals, research questions and participants (Section 3.1), data collection and analysis procedure (Section 3.2), and the main obtained results (Section 3.3).

3.1 Study Planning

The study *goals* were to investigate (i) how IT service goals, strategies are defined and measured to achieve business goals, (ii) how the strategies results have been monitored, and (iii) what difficulties have been faced in this context. Aligned with this goal, we defined the following *research questions*:

RQ1: How do organizations define IT service goals?

RQ2: How do organizations measure the achievement of IT service goals?

RQ3: How do organizations elicit and monitor strategies to achieve IT service goals?

RQ4: What difficulties are faced when defining, measuring and monitoring IT service goals and strategies?

The study *participants* were five IT service managers from four companies. The participants selection was made considering organizations and managers who had demonstrated interest in future results of this research. The first author of this paper works in IT industry for 20 years and contacted by e-mail some friends who are currently working as IT service managers in several organizations. Considering managers do not have a long time to read e-mails, she summarized her current research project in a short text on IT service measurement and process improvement, and asked if they were interested to participate on the current study. The five people who had immediate availability to be interviewed also said we could contact them again for case studies or action researches we intend to carry out in the future, when we will use the results from this and other studies to propose a method, tool, framework or other mechanism to support alignment between IT services and business goals. They stated that they can benefit from advances in this area and that they are willing to collaborate with our research.

Understanding the context in which data is collected is crucial for interpreting gathered data in any empirical study [17]. Thus,

next we present information about the study participants and the organizations they work in.

IT service provider is an organization that supplies IT services to one or more internal or external customers. Internal customers are departments (or other organizational units) of the same company as the IT service provider. External customers, in turn, represent other companies. IT service providers need to continually stand out with competitive advantages from alternatives that customers may have [2].

In order to study both internal and external IT service providers, we investigated four companies: a global mining company, where IT services are internally provided to customers by IT service departments and outsourcing contracted companies; and three global large IT companies whose business is to sell IT services, software products and software development to other companies (external customers), but also provide IT services internally to the own company. All participants are IT service managers. Names of the companies and interviewees are omitted for sake of confidentiality. Table 1 gives an overview of the companies.

Table 1: Participants and Companies involved in the study

Part.	Role	Org. Sector	Provider
1	IT service measurement and financial manager	Mining	Internal
2	IT service datacenter operations manager	Cloud infrastructure	External
3	IT service hosting operations manager	Cloud infrastructure	External
4	IT service customer and partners satisfaction director	Software development	External
5	Executive director of products, software and service teams	Software development	External

Organization A is a large global mining company operating in over 30 countries, with offices, operations, exploration and joint ventures across five continents. Employees need to achieve measurable goals derived from business goals in order to receive the annual salary bonus. The bonus also depends on the company to achieve a profit target. The organization encourages all departments to define their own strategies to achieve the established measurable goals. Participant #1 works at the IT service infrastructure department and is responsible for the measurement of the strategies, which involves indicators definition, data collection and results communication (by means of reports). He has a bachelor's degree in Computer Science and has been working at Organization A for 18 years.

Organization B is a large global IT company that provides a global platform of datacenters and interconnections to approximately 9,500 customers, including 200 datacenters in 48 markets around the world. The main goal of the IT service

departments is to achieve customer satisfaction and contractual service level agreements. Participant #2 has been working at Organization B for five years. He is the datacenter operations manager, responsible for handling incidents opened by clients, controlling access to datacenters and managing hardware equipment. He has a bachelor's degree in Computer Science. Participant #3 has worked at Organization B for nine years as the hosting operations manager. He is in charge of the first contact with clients (for platform and software incidents, service requests and problems), availability monitoring, and proactive service management. He has a bachelor's degree in Computer Science.

Organization C is a large global IT company with presence in 191 countries that delivers IT solutions, including cloud infrastructure, software products, cybersecurity and services to customers. Technical teams provide IT services related to the solutions offered by the company. Participant #4 has been working at Organization C for 16 years. Currently, he is customer and partners satisfaction director. He has a bachelor's degree in Mathematics.

Organization D is a large global IT company with 8,500 employees that provides infrastructure services, customized application development, SAP, big data, analytics and Internet of Things solutions, end-user workplace and means of payment management and cybersecurity. Participant #5 has been working at Organization D for 21 years. Currently, he is the executive director of products, software and service teams. He has a bachelor's degree in Computer Science.

3.2 Study Execution: Data Collection and Analysis Procedures

Data were collected in interviews. We used warm-up questions to understand the organization context and the participant role (for example: "How long do you work in this company?", "How many employees to you manage?") Then, we used four observation questions based on the four research questions. When asking the research questions, we changed the subject to turn the questions more personal, so that the interviewees would tell us their real experiences, even when they were different from the organizational standards. For example, in RQ1 we asked, "How do you define IT service goals?". After understanding the process of defining goals, measuring achievements and monitoring strategies results, we used a wrap-up question asking the participants to talk about difficulties faced during when defining, measuring and monitoring IT service goals and strategies. We similarly adapted RQ2, RQ3, and RQ4.

Interviewees were told to feel free to talk as much they wanted to. Each manager was interviewed individually. Sessions took from 30 to 60 minutes. The interviews were recorded and transcribed. Transcripts were validated with each participant.

After validating transcripts, data was structured and analyzed using Grounded Theory procedures [7]. We identified relevant codes to answer the research questions, categories to group the identified codes, and relationships between codes. The first author did the open coding, analyzing transcripts from interviews and defining codes to label parts of the text. After codes were created, categories were defined to group similar data. All collected data were analyzed along with the second and fourth authors, who reviewed and analyzed quotes, codes and categories. We asked participants to validate the obtained results. We used ATLAS.ti (https://atlasti.com/) as a support tool.

3.3 Study Results

Next, we present findings related to each research question, showing quotes from participants accompanied by our observations.

RQ1: How do organizations define IT service goals?

All participants reported that IT service goals are cascaded from business goals at higher organization levels. In some cases, cascaded goals and respective targets to be achieved are already defined and are communicated to IT service managers, who have no autonomy to discuss or adjust them. Thus, the managers' responsibility is limited to define strategies for the teams to work on and implement actions to achieve the goals. In other cases, IT service managers receive business goals and, then, they need to cascade business goals in IT services goals and define strategies to achieve the IT service goals. In these cases, managers reported they have some flexibility to define targets, as long as they are aligned to business goals and are able to support their achievement. In both cases, managers cannot discuss business goals with higher levels of the organizations.

Figure 1 presents part of the coding related to RQ1. Transcripts from interviews were extracted as quotations and open codes were created to represent their meaning. For example, in Figure 1, when Participant #4 said *"All IT service departments receive their goals from the Organization",* we coded as "Organization defines and notifies IT service managers about their goals". When Participant #2 said *"I receive an annual sales target from the Organization, and I can define my own goals to achieve it"*, we coded as "Organization informs business goals and IT service managers have autonomy to define their associated IT service goals".
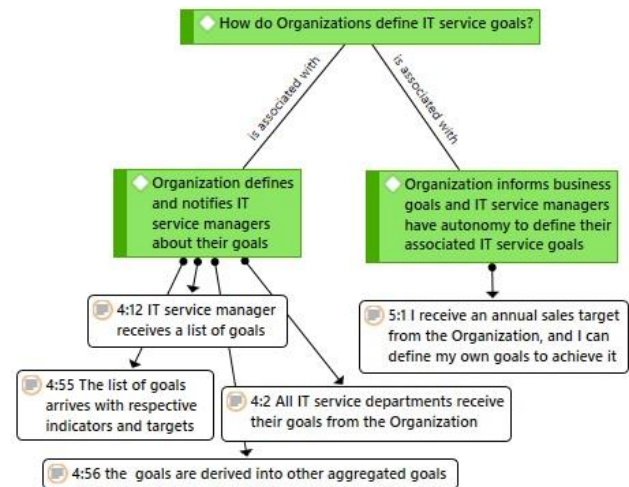
Figure 1: Extract of codes and quotations related to RQ1 showing how IT service goals are defined

When participants were asked to describe how they define service goals, participants #1, #4 and #5 mentioned that categories are used to classify goals. Thus, considering the areas they relate to, we identified the following goal types: Quality Goals, Human Resource Goals, Financial Goals and Contractual Goals. This set of goals contains only the types identified from quotations of the interviewees. Therefore, the list is neither extensive nor complete. Moreover, goal types are not disjunctive, meaning that a goal might be categorized into multiple types. Table 2 presents the codes generated from the participants' quotations. For example, when Participants #5, #4 and #2, respectively mentioned goals related to "*survey results of customer satisfaction*", "*delivery goals that measure the quality in deliverables*" and "*zero failure in operations*", we coded as Quality Goals. In addition to the goals categorization by area, participants #1 and #4 mentioned that some goals can be intrinsic or inherent ("*we don´t have to think too much to understand, they need to exist*"), i.e., goals considered natural, obvious or not needed to be formally documented. This is an orthogonal classification to the previous one (e.g., an intrinsic goal can also be a quality goal).

Table 2: Extract of codes and quotations related to RQ1 showing types of goals

Code	Quotation	Part.
Quality Goals	*"the main goal of my area is "zero failure" in operation"*	#2
	"goals related to customer satisfaction survey"	#5
	"delivery goals that measure the quality in deliverables"	#4
Human Resource Goals	*"goals related to employee climate survey"*	#5
	"we categorize goals into types including people	#4
Financial Goals	*"the first defined goals are financial"*	#4
	"we could be more productive with a strategy clearly related to a goal of reducing costs"	#5
Contractual Goals	*"goals are categorized by type, such as contract renewal goals"*	#4

In summary, managers did not report a clear process or method to define IT service goals. They provide pieces of information that can be considered when establishing a process or method with that purpose. Organizations can define the IT service goals and notify IT service managers, or organizations can give autonomy to IT service managers to define IT service goals from organizational goals. Goals can be *Intrinsic*, when representing natural, obvious or not needed to be formally documented goals. Orthogonally, goals can be classified according to the areas they relate to, such as Quality, Human Resources, Financial and Contractual.

RQ2: How do organizations measure the achievement of IT service goals?

When we asked the participants how they measure IT service goals achievement, Participants #3 and #5 mentioned indicators in use, which we coded as three types of indicators: Quality Indicators, Productivity Indicators and Financial Indicators.

Indicators targets are imposed by higher levels or calculated through prediction models. IT service managers can suggest adjustments, as long as they are justified or based on economic or political indexes that show that the defined targets are not feasible. Financial indicators results are evaluated per contract. They are monitored and reports are used as the basis for evaluation and communication to managers.

Evaluation is performed on a daily, monthly, annual and real-time basis. The communication occurs in meetings or through electronic reports and dashboards. They often use a green-yellow-red scale to present if indicator' target is being achieved (green), is close to not be achieved (yellow) or if the target is missed (red).

RQ3: How do organizations elicit and monitor strategies to achieve IT service goals?

When we asked participants how they define strategies to achieve IT service goals, participants #2 and #3 cited the use of causal analysis techniques to identify the issues the strategies should focus on. Participant #4, in turn, said that he conducts external meetings with his team (to avoid interruptions), uses brainstorming techniques to get ideas from the team, and organizes data in mind maps connecting goals, actions and the responsible for execution. Actions are further formalized as projects with complete planning and targets to evaluate success or failure. He informed that the responsible for the strategies is assigned taking the opinion of more than one manager into account and considering the soft and hard skills needed to execute activities related to each strategy. After creating a matrix including strategies and respective responsible, he presents it to the team and people can contribute. Participant #3 mentioned that strategies are defined based on deviations detected in measurement results. Participant #5 said that strategies are defined as action plans to remediate situations when a given contractual service level agreement is not achieved. He informed that individual indicators and targets are created to evaluate the contribution of each person to goals achievement.

In a previous study [15], we observed two different behaviors in terms of from whom the strategies arise. Strategies can be defined by team leaders and cascaded to team members (what we called a top-down approach), or team members can actively participate in strategies definition suggesting them to the team leaders (what we called a bottom-up approach). In the present study, both Participant #1 and Participant #4 said that the strategies definition starts with the managers, but team members can contribute or collaborate. Participant #1 said that "*general manager creates strategies but also ask team members to contribute or complement.*" Participant #4 said that "*each team manager is responsible for understanding goals, defining strategies to his team, presenting goals and strategies to the team agree with*

strategies and targets or propose adjustments". We consider both as bottom-up approaches.

We also gathered information about how strategies results are evaluated. Participant #1 said that results evaluation is a very informal, rudimentary and subjective process. Managers call or send email to ask the responsible for each strategy if it is on time according to the schedule. Then, the manager manually marks the status of each strategy in a dashboard that includes colors to distinguish if the strategy schedule is on track (green), needs attention because possibly will be not concluded on time (yellow) or is already late (red). When a strategy is marked as red, the IT service director is communicated and the strategy responsible needs to formally present an action plan to recover the elapsed time and adjust the strategy. As the classification schema is very subjective, managers try to avoid classifying a strategy as "red" because they consider a negative exposure of their work to the director. This behavior masks the real status of strategies and obscures the correct evaluation of the strategies results. Participant #4 mentioned "*strategies are decomposed into projects and each project has a person in charge of execution and an executive sponsor to control project status*". He said that control does not only include checking indicators targets, but also a qualitative evaluation that is presented by the strategy responsible in status report meetings. Participant #5 said strategies completion is measured by indicators that are classified by colors in a dashboard, as Participant #1 mentioned. However, this participant also said "*those indicators are used only because the organization institutionalized that they need to record numbers*". Both participants said that there is no mechanism to check if the strategy contributes to goals achievement.

Although we have not directly asked questions about the team motivation, when talking freely, participants #4 and #5 mentioned that there are factors that can influence people motivation for working on the strategies and measurement initiatives. Participant #4 stated "*if you do not know the activity purpose and how the activity relates to goals, you will not be motivated to work on it*". He also provided information about an internal climate satisfaction survey that he performs on a quarterly basis with his team.

The purpose of the survey is to keep people happy and motivated to work on activities they were allocated to. Depending on the survey results, people not pleased with a certain activity can be reallocated, because Participant #4 believes that lack of motivation can negatively impact goals achievement. Participant #5 said that people get motivated when there are individual indicators to be achieved and when they are associated to salary bonus or career opportunities.

In summary, IT service managers consider the opinion of their teams to define strategies in a bottom-up approach. Strategies are implemented by means of projects. IT service managers employ causal analysis techniques to identify aspects that strategies should focus on. Deviations in service level agreements are also a source for action plans. They are also addressed in strategies to remediate situations and reestablish agreed service quality considering targets to evaluate success or failure. External meetings are carried out to get all together and avoid interruptions in the office. Brainstorming techniques are used to get ideas from the team and mind maps are

used to organize gathered data and connect goals, actions and people in charge of execution. The selection of people to be responsible for the strategies considers motivation and skills. Individual indicators and targets are used to measure the contribution of each person to goals achievement and can be associated to salary bonus or career opportunities. Internal climate satisfaction survey can be used to measure people motivation for working on strategies and measurement initiatives. Managers use indicators to verify accomplishment of strategies and dashboards based on measurement results to verify if schedule is on time. However, the measurement plan needs to be clearly defined to avoid data manipulation and masked results to satisfy someone's interests. A qualitative evaluation can be additionally used to provide more details during the strategy results evaluation.

RQ4: What difficulties are faced when defining, measuring and monitoring IT service goals and strategies?

As a wrap-up question, we asked participants what difficulties they face during the process of defining, measuring and monitoring results IT service goals and strategies. From the interviewees quotations, we created open codes to represent pitfalls. For instance, Participant #1 mentioned that strategies could conflict one with another. As an example, he explained a strategy to deliver software that could only run in a new and dedicated server conflicts with a strategy designed to reduce the number of servers.

Participant #4 also highlighted this issue by saying "*I can have two areas that to achieve their goals, have a strategy that disrupts another strategy.*" We coded both into the pitfall "Conflict between strategies related to different goals". Participant #4 said that keeping people motivated is important and that having people engaged to collaborate with others to maximize the results to be achieved is they key point for success. However, he considered motivation hard to measure. In this case, we coded as "Difficulty to measure people motivation".

As a result of the analysis of the interviewees' answers about the difficulties, we identified the following 19 pitfalls:

P1. Conflict between strategies related to different goals.
P2. Difficulty to measure people motivation.
P3. Lack of available time to work on measurement results.
P4. Lack of collaboration between different areas.
P5. Lack of discipline to provide measurement data.
P6. Manipulation of measurement data.
P7. Lack of governance.
P8. Lack of a holistic view of strategies and goals.
P9. Lack of process to deal with people behavioral issues.
P10. Lack of knowledge of business processes.
P11. Lack of standardization of actions that produce good results.
P12. Lack of sense of belonging.
P13. Lack of sense of ownership.
P14. Lack of understanding on what to do with measurement results.
P15. Lack of understanding the reasons why activities are executed.

P16. Lack of a unified terminology, methodology and process for IT service management.

P17. Need to constantly reevaluate measures definition.

P18. Need to create new strategies to replace conflicting strategies.

P19. Frequent changes in strategies priority.

4 HYPOTHESIS ON PITFALLS IN DEFINING, MEASURING AND MONITORING IT SERVICE GOALS AND STRATEGIES

After identifying the 19 pitfalls presented in the previous section, we analyzed the relationships between them and elaborated some hypothesis that need to be further evaluated.

The formulated hypotheses are presented and discussed based on the pitfalls used for its creation (as we mention forward in the text) and, additionally, based on literature findings that corroborate, explain or show a possible solution for it.

> **Hypothesis 1**: Lack of awareness and transparency on the relationship between strategies and goals may harm the achievement of IT service goals and associated strategies

Explanation: People do not know why they are executing a certain activity (*P15. Lack of understanding the reasons why activities are executed*) and at the same time are concerned with executing only activities to which they were allocated, not realizing that those activities are part of strategies defined to achieve goals (*P12. Lack of sense of belonging*) and that goals achievement can depend also on other activities being performed by other people. This happens when there is no transparency about strategies and goals to be achieved (*P8. Lack of a holistic view of strategies and goals*), and how each activity contributes (or is associated) to strategies and goals. Consequently, people do not collaborate (*P4. Lack of collaboration between different areas*) with other people and lose opportunity to produce better results. When strategies are not formally allocated to people, with the respective goals, indicators and targets to achieve, people perceive strategies too abstract and do not commit themselves as responsible for executing any actions to contribute to strategies success (*P13. Lack of sense of ownership*). Hypothesis 1 was based on pitfalls gathered during interview with Participant 4.

Discussion: To increase motivation, activities should have clear goals [33], be interesting to the individual, be clearly defined and be linked to strategies [25]. When goals are considered intrinsic or inherent (as mentioned in Section 3 - RQ1 discussion) they can be not formally documented and cause misunderstanding. GQM+Strategies grid could help address *P15. Lack of understanding the reasons why activities are executed,* as the grid is considered a communication tool [4] [21] and the relationship between goals and strategies is explicitly presented in the grid. GQM+Strategies drives definition of strategies, which can be decomposed into more granular levels until individual activities. That way, GQM+Strategies would help address *P13. Lack of sense of ownership* by making clear who owns each activity, what is his

role and responsibility, and how the strategy result and respective responsible person will be evaluated. Ownership can also be related to individual effort, which is affected by motivation and commitment. An adequate visual interface tool to represent and keep track of changes is important to get people involved and help address *P12. Lack of sense of belonging* and *P8. Lack of a holistic view of strategies and goals* [20] [21]. When establishing cross-goals that permeate different areas, and rewards that can only be given to all involved if the cross-goal is achieved, people can be motivated to work together and help address the *P4. Lack of collaboration between different areas* in order to succeed goals achievement and receive the reward.

> **Hypothesis 2**: Lack of proper support to execute the measurement initiative inhibits reevaluation and adjustment of strategies and indicators related to IT service goals accomplishment**.**

Explanation: Organizations that measure goals and strategies results, but do not have available resources (*P3. Lack of available time to work on measurement results*), knowledge, process or mechanisms to evaluate and manage measurement data (*P14. Lack of understanding on what to do with measurement results*), are not able to evaluate if, when or how measures definition need to be adjusted (*P17. Need to constantly reevaluate measures definition.*) and neither are able to evaluate if strategies should also be adjusted or reprioritized (*P19. Frequent changes in strategies priority*). Hypothesis 2 was based on pitfalls gathered during interviews with Participants 3 and 4.

Discussion: GQM+Strategies presents a measurement-based mechanism to monitor alignment between goals and strategies across different units, make informed decisions based on measurement, transparently communicate goals and strategies within the organization and objectively monitor goal attainment and the success/failure of defined strategies. Interpretation models of GQM+Strategies support the quantitative evaluation of strategy success and goal attainment according to context factors and assumptions. Changes in GQM+Strategies grid elements can be done in both Implement and Learn phase, depending if they are minor or major, respectively [4].

> **Hypothesis 3**: Lack of motivation can jeopardize decision-making by IT service managers.

Explanation: IT service managers need a human resource process (*P9. Lack of process to deal with people behavioral issues*) to constantly follow-up motivational clime and personal behavior of their teams' members (*P2. Difficulty to measure people motivation*). This process is important to keep people interested in executing activities to which they were allocated and collaborating in other activities to help achieve strategies and goals targets.

Lack of motivation can drive people to not input data where is needed *(P5. Lack of discipline to provide measurement data)*. Moreover, being afraid of consequences can drive people to

manipulate measurement data for their own interests (*P6. Manipulation of measurement data*), impacting measurement results and, consequently, decision making based on the results. Hypothesis 3 was based on pitfalls gathered during interviews with Participants 1, 2, 4 and 5.

Discussion: Motivation antecedes performance [23] and is associated with initiation, direction, intensity and persistence of behavior. People motivation at work depends on organizational incentives and rewards according to achievements of individual goals [25]. People can be oriented to engage in work primarily for its own sake, because the work itself is interesting, engaging, or in some way satisfying. If so, it is usually called intrinsic motivation [29]. People can be also oriented to engage in work in response to something apart from the work itself, such as reward or recognition or to the dictates of other people. This is usually called extrinsic motivation [24]. In [22], authors present an instrument to assess IT staff motivation through rewards. They argue that organizations with motivated IT employees should have more success on IT strategies aligned to business goals. In [25], authors verified the most motivating factor for software engineers is identifying themselves with the task, followed by collaboration with other work, having a good management and career path, variety of work, sense of belonging and rewards. In [33], authors present a structure to organize the set of motivators according to their relationship to the task, to the team and teamwork, or to the organization, and grouped outcomes according to their emotional, behavioral, or job related nature. The proposed structure was based on case studies with software engineers, but could be used by IT service organizations to help build more effective teams and process to measure people motivation.

> **Hypothesis 4**: Conflicts between strategies may harm IT service goals achievement

Explanation: Conflicts between different strategies can happen when distinct activities have requirements or generate results that contradict the alignment to goals (*P1. Conflict between strategies related to different goals*) and can demand to create new strategies to replace the conflicting ones *(P18. Need to create new strategies to replace conflicting strategies)*. Hypothesis 4 was based on pitfalls gathered during interviews with Participants 1 and 4.

Discussion: GQM+Strategies approach is concerned about goals conflicts and considers that a conflict happens when a certain strategy supports attainment of one goal while having a negative impact on another goal. It suggests that conflicting goals should be identified, and improvements actions should be taken [4]. Organizational ambidexterity is the ability to simultaneously pursue goals that conflict with one another [35]. In [34], authors present a process to achieve ambidexterity like a pendulum swing, going back and forth changes in IT outsourcing governance that shifted between contractual and relational focus. Although ambidexterity pendulum [34] was suggested to balance contractual and relational governance for outsourcing in the IT service area, it could be applied to balance conflicting strategies, considering classic resolution styles from Thomas-Kilmann Conflict Mode Instrument [36]: Competing, Collaborating, Compromising, Avoiding and Accommodating.

> **Hypothesis 5**: Lack of proper support to execute IT service management initiatives may harm IT service goals achievement.

Explanation: According to Participant #4, actions that bring good results in single areas can be structured and generalized in processes to be followed by other areas (*P11. Lack of standardization of actions that produce good results*). When there is no unique direction and process to guide organization on managing IT services (*P16. Lack of a unified terminology, methodology and process for IT service management; P7. Lack of governance* and *P10. Lack of knowledge of business processes*), people do not know the relevance of executing measurement activities and fail on providing measurement data (*P5. Lack of discipline to provide measurement data*). Hypothesis 5 was based on pitfalls gathered during interviews with Participants 1, 2, 4 and 5.

Discussion: IT service providers need to follow IT Service Management (ITSM) processes as IT customers are increasingly expecting evidence of a systematic service management approach from suppliers. [28]. ITIL is the most widely used ITSM framework and covers the entire service lifecycle with five core ITSM books: Service Strategy, Design, Transition and Operation, and Continual Service Improvement [2]. In addition to ITIL, there are several other frameworks that can be used to improve IT service operation such as COBIT framework, which approaches ITSM from an IT governance perspective and suggests control objectives, roles and responsibilities, and metrics for ITSM processes, cascaded from business goals [9]. Clear definition of roles and appropriate communication and training need to be done to engage people in measurement activities [26] SINIS [13] is a method created to identify goals, strategies and indicators for IT services. It was developed to assist IT service measurement initiatives by supporting the definition of strategies to achieve IT service goals, and indicators to evaluate the strategies and goals achievement. SINIS is based on process improvement approaches (mainly GQM+Strategies) and approaches related to IT service management (mainly COBIT Goals Cascade) [13].

5 LIMITATIONS AND THREATS TO VALIDITY

Every study presents threats to the validity of its results [14]. We used terms in questions that interviewees were familiars with meaning to increase validity. For instance, Participant #1 considers goals as challenges and strategies as milestones (to achieve those challenges). We followed the same terms while talking to him to avoid misinterpretation because of different terms in use by industry and academy. All collected data were analyzed along with other researchers (second and fourth authors), who reviewed and

analyzed quotes, codes, and categories. Moreover, participants validated transcriptions and codes. We interviewed participants from IT service departments of only four different organizations. However, we included companies of different sizes and that are internal and external service providers, also to increase validity. We presented only types of goals and indicators that were cited by participants during interviews of this study. They are not exhaustive. There is a need for more theory-based conceptual models of service operation [28]. However, the hypotheses presented in this paper are still exploratory, were not validated and do not constitute a theory. During the discussion, we mention alternatives to possibly deal with pitfalls around hypotheses, but they were not validated yet and will be furthered investigated. We interviewed IT service managers from large companies, who provided their understanding and knowledge about organization goals. We did not validate if their information about organization goals was complete. However, we scoped the study to the reality of those IT service managers, and even if they don´t have complete information about all the organization goals, they provided us with information about organization goals they know and need to achieve.

6   FINAL CONSIDERATIONS

This paper presented a qualitative study performed to investigate how IT service goals and strategies are defined, measured and monitored and what difficulties are faced in this context. We conducted interviews with five IT service managers from four different global organizations and applied coding procedures based on Grounded Theory to analyze the collected data.

We found that IT service goals and targets are derived from business goals defined at higher levels and the responsibility of IT service managers is to elicit strategies and define associated activities for teams to work on. In some cases, IT service managers can suggest adjustments to goals and targets, but they need to provide a concrete justification for that. IT service goals and indicators can be categorized according to their scope in categories such as Quality, Productivity, Human Resource, Financial and Contractual. Goals achievement is monitored mainly in periodic meetings with analysis of measurement results or data provided to real-time access through electronic applications.

Managers reported informal processes to evaluate strategies results. Although there is a concern with the capacity of the strategies to achieve goals, there is no formal mechanism to evaluate and adjust strategies to improve goals achievement. Human factors need to be considered because they can influence people motivation for working on strategies and measurement initiatives which can impact goals achievement.

From difficulties related by the participants we identified 19 pitfalls and discussed five hypotheses around them: (H1) Lack of awareness and transparency on the relationship between strategies and goals may harm the achievement of IT service goals and related strategies; (H2) Lack of proper support to execute the measurement initiative inhibits reevaluation and adjustment of strategies and indicators related to IT service goals

accomplishment; (H3) Lack of motivation can jeopardize decision-making by IT service managers; (H4) Conflicts between strategies may harm IT service goals achievement; and (H5) Lack of proper support to execute IT service management initiatives may harm IT service goals achievement.

Concerning H1 and H2, strategies and activities with clear relation to goals are motivating factors for teams [25] [33] and GQM+Strategies [4] can help by providing a well-stablished grid that shows the relationships between goals and strategies at several organizational levels. Moreover, GQM+Strategies consistently define measurement aligned with business goals and help to interpret and compile measurement data at each level.

As for H3, having a human resource process to constantly measure team motivation can help to avoid negative behaviors that jeopardize measurement data and decision-making.

With respect to H4, GQM+Strategies [4] could be extended with ambidexterity concepts [34] to balance strategy conflicts by simultaneously pursuing goals that conflict with one another.

Finally, with respect to H5, IT Service Management processes need to be followed by IT service providers to measure their performance operation and enable organizations to achieve continuous improvement goals. ITIL [2] and COBIT [13] are the most known libraries in this context.

Summarizing, the study results provide information about: *(i)* how IT service managers define IT service goals, indicators and strategies, *(ii)* types of goals and indicators in use, *(iii)* how and when indicators results are evaluated, *(iv)* how strategies to achieve goals are elicited and cascaded in projects or operational activities for teams to work on, *(v)* factors that can influence people motivation for working on strategies and measurement initiative; *(vi)* how strategies results have been evaluated, and *(vii)* difficulties faced when defining, measuring and monitoring IT service goals and strategies.

Industry practitioners can use the study results to have insights into their own initiatives to define, measure and monitor IT service goals and strategies and also to avoid pitfalls that can negatively impact goals achievement. Moreover, researchers can use the study results to identify issues to be addressed in future researches.

As future work, we plan to perform new studies with other IT service managers and also investigate perceptions of other stakeholders, like team members who actually work on projects and strategies to achieve goals. We aim to validate the hypotheses and alternatives discussed to deal with pitfalls, starting by getting information about how conflicting strategies have been balanced in the IT Service Industry. We also plan to investigate the impact of human factors on conflicting strategies. Based on knowledge obtained from these studies, we intend to define a systematic approach to help IT service organizations/departments to identify, avoid and manage conflicts in strategies to achieve IT service goals, and design the proposed approach as an extension of GQM+Strategies.

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