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COGNITIVE BIASES IN OPERATIONAL RISK SCENARIO ANALYSIS: A FOCUS GROUP INVESTIGATION AMONG ACADEMIC SUBJECTS

ALEX AALTONEN
UNIVERSIDADE PRESBITERIANA MACKENZIE (MACKENZIE)

FABIO FAIAD BOTTINI
UNIVERSIDADE FEDERAL DE MINAS GERAIS (UFMG)

DAVI FAIAD BOTTINI
UNIVERSIDADE FEDERAL DO ESPÍRITO SANTO (UFES)

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1. INTRODUCTION

Operational risk management has become a top agenda among Brazilian banks and regulators owing to the enormous losses incurred worldwide (Girling, 2013). Operational loss possibilities are pushed by the increasing sophistication and complexity of financial instruments and by high levels of litigation in labor relations, sometimes materialized in class action suits, and taxation issues.

Operational risk scenario analysis has been specifically required for large financial conglomerates in Brazil since 2017. We believe that this process is not mature. The advanced use of this risk management tool could be directed toward improving internal controls to reduce future losses (Committee of Sponsoring Organizations of the Treadway Commission (COSO), 2013). This could better serve the banks' strategic objectives and would favor the mitigation of systemic risk by banking supervisors (Bank of International Settlements (BIS, 2011, 2021).

We envision that many of the challenges listed above materialized in extreme operational risk loss events in Bank Barings, Natwest Markets, Allied Irish Banks, Societe Generale, and Bank UBS (Girling, 2013) and in Wells Fargo Bank (British Broadcast Corporation (BBC), 2016; Gray, 2017; Jopson & Gray, 2016), among others, may display a certain limitation in the excessive emphasis on the quantitative treatment of operational risk scenario analysis. A deeper study of the scientific qualitative approach for preparing these scenarios could complement the quantitative approach to prime the operational risk scenario elaboration.

Nevertheless, applying a qualitative approach presents the challenge of identifying and overcoming cognitive biases when conducting scenario analysis. It is well known in the operational risk management literature that cognitive biases must be avoided when preparing operational risk scenarios (BIS, 2011; Girling, 2013). Such biases may harm the accuracy and efficiency of scenarios, in addition to damaging the decision-making process of enterprises (Lemay & Leblanc, 2018).

2. RESEARCH PLOBLEMS AND OBJECTIVES

During the preparation of operational risk scenarios, one of the objectives of the present research is to identify and prevent biases and heuristics to avoid harm to the initial aims of the activity (Tversky & Kahneman, 1974; Fox & Clemen, 2005; Kahneman, 2011; Baybutt, 2016). Another objective is to avoid biases and overcome difficulties.

Therefore, there are two research questions in this paper:

H1: We will experience 16 cognitive biases in operational risk scenario analysis.

Anyone may commit mistakes due to the interplay of cognitive biases and intuitive heuristics (Kahneman, 2011). The objective of hypothesis H1 is to investigate, while conducting operational risk scenario analysis, if 16 biases emerge during the focus groups conducted with undergraduate students and some of their professors, and how those biases could harm the group dynamics and interfere with its results.

H2: Hazard and Operability (Hazop) and the literature on biases may list and describe ways to overcome the 16 biases that may emerge in the scenario analysis process.

As a supplementary objective, we investigated how additional difficulties might influence the operational risk scenario analysis process: scarcity of data about existing processes, limited previous information about other severe operational risk events, lack of

methodological preparation among some participants, faulty scale dimension of the analysis problems, and unrealistic discussions.

We did not locate academic research on the themes mentioned above treated simultaneously. Therefore, we understand that a paper about cognitive biases emerging from operational risk scenario analysis in financial institutions, using Hazop, as will be explained in the section "Methodology," to overcome biases, might contribute to the management of financial institutions and to finance academic knowledge.

3. THEORETICAL FOUNDATIONS

Operational risk can be defined as "the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events. This definition includes legal risk, but excludes strategic and reputational risk." (BIS, 2017). The mentioned definition is very similar to that adopted in the Brazilian jurisdiction in Article 32 of Resolution CMN Nº 4.557/2017 (Conselho Monetário Nacional, 2017).

Operational risk events, according to Resolution 4.557, are internal fraud; external fraud; employment practices; workplace safety; clients, products, and business practices; damage to physical assets; business disruption; system failures; execution, delivery, and process management.

The scenario analysis technique has reached significant relevance among the tools used to support decision-making in organizations. It allows managers to act with greater confidence to face uncertainties in the enterprise environment and build knowledge. This may add quality, creativity, safety, and agility to decisions (Moritz e Pereira, 2005).

The literature on risk management explores the quantitative aspects of operational loss scenarios and statistical models to measure risk (Aue & Kalkbrener, 2006; Chaudhury, 2010; Dutta & Babbel, 2014; Morais, Pinto & Klotzle; 2018). A qualitative approach designed to prepare operational risk scenarios that can complement the quantitative approach has not been well established. In addition to representing a prospective view of the future of the firm, operational loss scenarios search for plausible severe losses beyond the past loss experience of the institution (Girling, 2013). This type of scenario requires a periodic revaluation. Otherwise, one might hold implausible, irrelevant, or obsolete results.

One way to deal with cognitive biases and intuitive heuristics is to map our thinking into so called "System 1" and "System 2" (Kahneman, 2011). System 1 was fast, efficient, and could not be turned off. This is the result of a long evolutionary history (Baybutt, 2016). System 2 was slow, indolent, and required more effort. Nevertheless, it provides a well-thought answer. System 1 has biases such as systematic errors that will occur in certain circumstances. System 2 is better equipped to avoid biases and heuristics; however, it may choose the path with less effort.

From the literature on biases and heuristics, we extracted 16 theories that we are going to test under H1, aiming to contribute both to the research on bias effects and to the research on scenario analysis. This literature explores the effects of cognitive biases on the behavior and dynamics of groups: politicians (Stolwijk & Vis, 2021), graduate students (Fox & Clemen, 2005), chemical engineers (Baybutt, 2016), members of the board of directors (Zhu, 2014), high officials of the federal government (Kelman, Sanders & Pandit, 2017), blue-collar workers in chemical factories (Hambach, Mairiaux, François, Braeckman, Balsat, Van Hal, Vandoorne, Van Royen & Van Sprudel, 2011), product designers (Bleda, Querbes & Healey, 2021), respondents to research questionnaires (Oppenheimer, Meyvis & Davidenko, 2009), researchers (Hillson & Hullet, 2004), technology and cyber security experts (Lemay & Leblanc, 2018), entrepreneurs (Manso, 2016) and retail consumers (Kim, 2017). These 16 biases and heuristics were chosen because they seemed to be more relevant to the scenario preparation

setting. Some other biases seem more relevant to investment decisions, for example, and are not listed in our research hypothesis H1.

3.1 Anchoring: The tendency to stick to the first available information to reach conclusions (Montibeller & Winterfeldt, 2015). In the operational loss scenario, participants may conclude differently if they start from a $20 million figure than if they start from a $200 million figure. The group estimates are anchored in the initial figure.

3.2 Availability heuristic: Someone may count on the first information that comes to mind in order to judge something (Fox & Clemen, 2005; Stolvijk & Vis, 2021). Less experienced participants may not recall or have insufficient knowledge about the situation in which the group is dealing. This may lead them to follow the opinions of more experienced participants.

3.3 Confirmation bias: it is the idea that initial impressions do not modify with new data, even when they logically deny the basis of the initial impressions (Kelman, Sanders & Pandit, 2017). If participants are optimistic or pessimistic, they may conduct the group to underestimate or overestimate the possible losses.

3.4 Peer pressure: How the fact of being observed may influence the behavior of an employee being evaluated (Bonein, 2018). A few individuals may be motivated to express opinions against the majority of the group, even feeling isolated. However, this is not common because of peer pressure.

3.5 Framing: This occurs when different but equivalent forms of describing a situation might lead to different decisions and outcomes (Tversky & Kahneman, 1974; Kahneman, 2011). In a variation called "framing of attributes," a proposal to reduce risks that is 99% trustworthy may be better accepted than an equivalent proposal that is 1% untrustworthy. In another variation called "framing of choice of the risky alternative," someone could, for example, choose not to undergo surgery if he or she is informed that the failure rate is 10%. However, the same person might agree to the surgery if he or she learns that the success rate is 90%.

3.6 Group polarization is the systematic propensity for a group's post-discussion decision to intensify members' average pre-discussion disposition. (Zhu, 2014).

3.7 Groupthink: Kelman, Sanders, and Pandit (2017) define groupthink as "a phenomenon where members conform and leaders stifle dissent, producing inadequate, biased information search and consideration of alternatives".

3.8 Representativeness heuristic: Evaluate a situation similar to another situation that is familiar to the person (Hambach et al., 2011). An example is to evaluate a production process that is more automatized than it is actually without verifying the involvement of workers. A variation in this bias was related to insensitivity to sample size. The proportion of accidents in comparison to the total number of accidents may mistakenly be the same if the information is presented using samples of different sizes.

3.9 Satisficing: An early solution might be considered good enough and sufficient to mitigate the risk when a better solution can be found (Oppenheimer, Meyvis & Davidenko, 2009). When preparing a scenario, a team may search for a supposedly good reason to adopt a solution and, when the first reason is found, finish the debate.

3.10 Motivational bias: The direction of the discussion may lead to the choice of a lower probability of occurrence, which is unrealistic. The objective is to diminish stakeholders' risk perception (Hillson & Hullet, 2004; Bleda, Querbes & Healey, 2021). A firm's professionals may underestimate risk.

3.11 Hindsight: Lemay and Leblanc (2018) define it as relying on past decisions the benefit of the retrospective, leading to the judgement of past behavior using the information

available today. They verified the influence of hindsight bias on decisions regarding cybersecurity incidents.

3.12 Survivorship bias: An analysis may be incorrectly influenced by the fact that the investigated objects survived. One might not consider objects that did not survive but could offer fundamental information (Manso, 2016). An example is to just analyze the operational loss scenario analysis considering what occurred to surviving banks, instead of observing what occurred to banks going bankrupt due to severe operational losses.

3.13 Halo effect: among consumers a usually positive attitude towards a firm may provide immunity to a crisis (Kim, 2017). Propensity to like or dislike everything about someone, including characteristics that someone does not access, is identified as a halo effect.

3.14 Overconfidence bias*:* It is common to not admit that certain hidden key evidence may be critical to our judgement (Haselton, Nettle & Murray, 2016). In a scenario, this could lead to an extremely rapid loss estimate.

3.15 Base-rate neglect: This happens if someone is taken by first impressions or prejudices, disregarding statistics. (Kahneman, 2011). This may include insensitivity to the sample size.

3.16 Self-serving bias: This makes the decision maker interpret ambiguous information to favor himself or herself (Lemay & Leblanc, 2018).

4. METHODOLOGY

Instead of a quantitative approach, the choice of investigation was a qualitative approach. It may provide rich and thorough descriptions in addition to explanations of processes in identified local contexts (Vieira, 2006).

How do people consider experiences, ideas, or events? To answer this question, the researcher is required to apply a method that is close to the reality of each individual, which might be favored when groups are organized, to create an adequate environment for spontaneous manifestations of each participant and the interaction of all (Fukumura, Gray, Lucas, Becerik-Gerber, Roll, 2021). This situation may point to the focus group being applied (Freitas & Oliveira, 2006). The focus group is characterized once there is an introduction by the moderator of discussion topics related to the studied object. These topics allow the emergence of a wide range of information from individual opinions about the subject, and may eventually induce polarization when exposed to the group (Madriz, 2000; Godoi, 2015).

A focus group was adopted because it generates complex information at a relatively low cost, considering a limited period of time. Participants are encouraged to express creative solutions and talk to each other instead of simply answering the moderator's questions (Liamputtong, 2011; Fukumura, Gray, Lucas, Becerik-Gerber, Roll, 2021).

In particular, for conducting operational loss scenario analysis, as a secondary inspiration, we considered the application of a technique developed by chemical engineering called Hazop. Therefore, this study aimed to validate the use of Hazop to conduct operational risk scenarios. No previous research applying Hazop to the operational risk management of financial institutions could be located in the literature. Hazop was used to improve the information-capture process.

Hazop refers to the prospect of possible deviations in industrial processes in relation to the intended design of the factory and its established parameters (Danjó, Fthenakis, Vilches & Arnaldos, 2010). Some of the themes of the deviations were volume too high, volume too low, or no volume, too much pressure or insufficient pressure, high temperature or low temperature, deficient maintenance, and deficient training.

Hazop's team of participants usually contains engineers, chemistry experts, plant operators, safety department members, programmers of automatized processes, and engineers

from equipment manufacturers. In other words, the team was composed of professionals from various backgrounds and hierarchical levels. Ideally, they should be immersed in the study process for at least one year (Kletz, 1999).

Examining the daily routine of a chemical factory, the Hazop technique may clarify the operation interruption possibilities to avoid financial losses and reduce labor accidents. Among the severe event possibilities prospected with the help of this tool are explosions, fire, natural contamination, leakage of toxic gases, and death. This technique has been improved over several decades by chemical plant professionals (Kletz, 1999).

Hazop is frequently used in the design of new factories, in the expansion of existing ones, and in old production plants. In these three cases, one looks for the original intent of the factory to treat eventual deviations from this intent. Chemical engineers aim to learn from damage events and past injuries (Kasniak, 2010; Baybutt, 2016) and try to promote improvements once these events are integrated into Hazop.

Whenever conducting scenarios, chemical engineers often count on so-called guiding expressions to help them list production process deviations, their causes and consequences, as well as the required attitudes to prevent those deviations. Some of those guiding expressions are: none, more of, less of, contrary, such as, part of, more than, beyond that, too early, later, passing by, and near to (Kletz, 1999). These guiding expressions have also been adapted to incorporate human factors that may cause errors in the production process (Aspinall, 2006). During the design of a new plant, these expressions are applied until the end of the process. This facilitates the writing of the operating procedures.

4.1 Data collection

In the focus groups, data were collected in three ways. With the permission of the volunteers, we recorded audio sessions. Volunteer profiles were registered in a document and recorded. The third way to register data was the consensus spreadsheet, to be detailed below.

Three sources were considered to extract the scenario storyline. The first is the list of possible contingent liabilities listed in the notes on the financial statements of Brazilian banks. The second source was composed of the risk factors mentioned in the 20F reports, which are part of the financial statements of Brazilian banks that have presence or subscribed shares or bonds in the US capital markets. The third source was the financial press, mainly the newspapers Valor Econômico, Estado de São Paulo, Financial Times, and the BBC. This third source, corporate scandals, might have influenced the press to raise more details (Medeiros e Silveira, 2017; Oliveira, 2015).

The most promising source for an adequate storyline to develop scenarios was the press because of its rich details. The case study was adapted from three news pieces from British publications (BBC, 2016; Gray, 2017; Jopson e Gray, 2016). The values were hidden to avoid anchoring bias. All information made available to the focus group participants was released until May 5, 2017.

The five in-person focus groups were organized in September and October 2017. To conduct these, one of the authors was the moderator in all five groups. For each group, a volunteer was invited to be a scribe. The scribe was allowed to contribute to the scenarios with ideas. In the two groups, scribes chose to do so; in the other three groups, the scribes were neutral. All scribes were oriented to take notes on consensus in a spreadsheet. The room layout was suggested by Baybutt (2013) for the Hazop, with participants placed in an oval shape, including the scribe, who fed the consensus spreadsheet and made sure it was projected on a large screen. The facilitator stood at the sharp edge of the oval beside the projection. Two audio recorders were placed between all the participants.

The size of the groups ranged from four to ten participants (Table 1), as recommended by the literature on focus groups (Madriz, 2000; Hambach et al., 2011; Liamputtong, 2011;

Cheah, Foster, Heaney, Higgins, Oliver, O'Neill & Russell, 2015) and Hazop (Kletz, 1999; Baybutt; 2013). Volunteers were invited from two universities, along with undergraduate course coordinators. An executive summary with research intentions was sent to all the potentially interested students and professors.

Table 1 - Profile of the subjects.

Total of participants:	32
Undergraduate students:	26
Professors:	6
Age of participants:	18 to 46 years old
Undergraduate courses:	Business administration; Technology applied to financial management; Technology applied to civil service management.
Number of universities:	2
Number of focus groups:	5
Minimum number of participants:	4
Maximum number of participants:	10
Number of scribes:	6 (2 professors e 4 students; one group had 2 scribes)
Moderator:	One of the authors in the five focus groups.
Observer:	One of the authors in one of the focus groups.
Motivation:	Gift card from a local book shop.

4.2 Data analysis

For the data analysis, the researchers aimed to interpret the individual psychological nature and group dynamics. Some participation rules were proposed (Table 2).

Table 2 - Participation rules agreed at the beginning of the focus groups.

Rules	**Text**
1.	We may (and should) propose improvements to the described processes in the case;
2.	Our objective is to search consensus among participants;
3.	We should promote the participation of everybody and should avoid unnecessary criticism;
4.	We should be open minded and allow the free flow of creativity from everybody;
5.	We should dynamically participate in all proposed activities;
6.	We should remember that, despite the audio recording, participant privacy is 100% guaranteed;
7.	Even Nobel Prize winners incur in cognitive biases (Kahneman, 2011).

Each group activity began with a warm-up case that was concluded by informing about the existence of survivorship bias in the described situation. Three groups independently identified bias. Two groups did not.

Once the preparation of scenarios was initiated, each group of participants identified the necessity of raising additional information (Table 3) to streamline the operational loss estimates in subsequent scenarios. For each item, the related sources of litigation or loss were identified.

Table 3 - Relevant information to be searched after the five focus groups.

Item	Information	Source of litigation or loss
I)	Total number of employees of Wells Fargo Bank.	Former employees (FE)
II)	Turnover.	FE
III)	Legal fees in each type of litigation.	The four sources (4S)
IV)	Litigation from former employees.	FE
V)	Historical annual remuneration of former employees.	FE
VI)	Current number of shareholders.	Investors
VII)	Share of professional shareholders in the equity of the banks: pension funds, investment funds, insurance companies.	Investors
VIII)	Possible allegations to claim reparations or to justify penalties.	4S
IX)	Average reparations obtained in the justice or in extra court negotiations in similar cases.	4S
X)	Incidence of class action suits in each kind of litigation.	4S
XI)	In similar cases, the guilty party for the internal fraud was the employee or the bank?	FE
XII)	Total number of bank agencies of Wells Fargo Bank.	FE
XIII)	Five largest operational losses ever registered in the financial sector and outside the financial sector.	4S
XIV)	Frequency of credit rating of banks among credit rating agencies.	4S
XV)	Date of occurrence of the fraud.	4S
XVI)	Proportions of employees in sales and other commercial activities.	FE
XVII)	Modus operandi to falsify accounts.	4S
XVIII)	Average remuneration of the commercial sector employees of the retail bank.	FE
XIX)	Proportion of current accounts and credit card accounts in the 2.1 million falsified accounts.	Clients

Note: The four sources of litigation or losses mentioned in the third column are former employees, investors, clients, and regulators.

To build the operational loss scenario, a storyline, adapted from financial news articles (Gray, 2017; BBC, 2016), was distributed. The moderator invited the participants to estimate how much litigation the Wells Fargo Bank could lose, after possibly forcing some of its employees to mislead clients, investors, and regulators. All of the presented information was available to the public and most were related to falsified account openings. The participants were instructed to break the proposed question into smaller parts to ease the operational loss estimation. The moderator also motivated participants to list assumptions to logically structure the estimates.

During the scenario production, the scribe was reminded to register the progress of the tool shop in a consensus spreadsheet projected to everyone in the room. The spreadsheet has three columns: “Assumptions”, “Results, and “Subsequent Attitudes”. In addition to being recommended by Hazop (Baybutt, 2013, 2016), spreadsheet registration was considered a key research piece of data. As the same storyline was proposed for the five groups, based on the

same information, it was possible to compare the effects of the adopted assumptions, the logical entanglements to calculate the losses, and the designed action plans to avoid similar losses in the future.

The guiding expressions, usually used in the Hazop technique (Kletz, 1999; Aspinall, 2006) were useful in challenging seemingly too low loss estimates and overly high loss estimates. These expressions were also used to stimulate the debate whenever there were doubts about the inner workings of the business environment surrounding Wells Fargo Bank. This institution's presence was very limited in the Brazilian market at the time of this study. The six-column framework of Hazop's guiding expressions was adapted: step, guiding expression, deviation, possible causes, consequences, and required action. This resulted in a three-column consensus spreadsheet, which was planned to retain the same information. Sessions were audio-recorded following the participant's permission. Recorded subsequent attitudes, even when not registered in the consensus spreadsheet, can be recovered as the object of sequential scenarios.

The analysis of the audio recordings of the five groups allowed the researchers to split the content into themes to infer the manifestation of cognitive biases and intuitive heuristics. The analysis was also used to streamline the scenario technique to obtain more efficacy in the preparation and avoidance of bias. After listening three times and identifying the speakers from the list of participants, the following aspects were identified and described: positioning of participants in each room, development of each debate, emerging biases and heuristics, peculiar occurrences, applied Hazop techniques in operational risk scenario analysis, and applied actions to avoid or overcome biases.

5. ANALYSIS OF RESULTS

The research confirmed that both debating participants as well as one of the scribe participants manifested biases and heuristics, even with all the efforts of the moderator to avoid these phenomena. The five focus groups were numbered from 1 to 5, and in all of them, one, two or three of the 16 biases emerged (Table 4).

Table 4 – Biases identified in the groups and solutions to avoid biases.

Bias	**Bias avoidance strategy according to the literature about Hazop and about cognitive biases**	**Group**
Anchoring.	To provide objective data. To conduct sequential scenarios.	1
Availability heuristic.	To conduct sequential scenarios, providing more data.	3
Confirmation bias.	To challenge the conclusions of the group.	1, 2, 4
Peer pressure.	To previously negotiate the rules of the exercise.	
Framing.	To be alert and reset the exercise, if necessary.	2,4
Group polarization.	To challenge the conclusions of the group.	1
Groupthink.	To compose a group with diversified background.	2
Representativeness heuristic.	To conduct sequential scenarios, providing more data.	
Satisficing.	To be alert and reset the exercise, if necessary.	
Motivational bias.	To invite an external specialist. Moderator should act convincingly.	
Hindsight.	To challenge the conclusions of the group.	
Survivorship bias.	Moderator should be alert to pinpoint this bias.	
Halo effect.	To provide more data to avoid quick conclusions.	

Overconfidence bias.	To conduct sequential scenarios.	5
Base-rate neglect.	To clarify the meaning of presented statistics.	
Self-serving.	To challenge the conclusions of the group.	

In Group 1, it was realized that the registered anchoring bias could alternatively distort the scenario preparation exercise or support it with useful information. In other words, there are data that harm the exercise and data that are necessary to it. The first anchor emerged in the proposed storyline: it mentions 11 class action suits from investors at the time of the adapted newspaper article (Gray, 2017). Participants believed that only 11 groups of investors would seek reparations from the bank. A second anchor emerged, related to legal fees. As it was the first scenario about the theme and no other references were initially available, the moderator made the following statement: A bank charged a USD8 million structuring fee to advise a merger. It had to pay USD 2.5 million to the law firm that analyzed the transaction and wrote the contracts. The influence on the estimates was temporary. Nevertheless, it reinforced the necessity of organizing sequential scenarios to improve estimates. These missing data are included in Table 3, alongside others detected while conducting the other four groups. The proportion of provisory legal fees allowed the group to build a loss calculation logic. A third anchor emerged evoked by the moderator when he was motivating the search for a reasonable final operational loss number. After the first loss estimate was produced using no limits, a group polarization bias was detected, and the moderator informed the group about the most probable operational losses ever registered: British Petroleum, large oil spill in the Gulf of Mexico (USD 60 billion), the Bank of America/Merrill Lynch, regulatory fines and reparations for providing poor information to real state bond investors, and lack of due care in product suitability (USD 20 billion). Based on this data, the participants lowered their estimates.

Participants and the moderator noticed that sequential scenarios could make use of additional, more adequate, and more precise data to feed the calculations in order to build a baseline (Kahneman, 2011). For example, following the storyline, what is the percentage of legal fees for each litigation type? Is there a success fee for lawyers? Would it be interesting to invite a specialist in contingent liabilities accounting to participate in scenarios such as the one we were dealing with?

Group 2 showed a group think bias, but this was overcome. The participants were professors and students at the same proportion (Table 5). Some students were initially intimidated and willing to follow the opinions and possibilities presented by the more senior participants and their professors. However, some students started to rely on their knowledge and personality to express themselves with little help from the moderator. Finally, they contributed valuable insights. It was possible to notice that groups with greater heterogeneity (Group 2) may enrich decisions (Kelman, Sanders & Pandit, 2017) but the moderator must be alert to let it happen.

Table 5 - Comparison of the groups and respective loss estimates.

Number of the focus group	**1**	**2**	**3**	**4**	**5**	**Total**
Seniority homogeneity	Yes	No	Yes	Yes	No	
Number of participants	4	10	6	7	5	32
Number of students	4	5	6	6	5	26

Number of professors	0	5	0	1	0	6
Perception of survivorship bias	Yes	Yes	Yes	No	No	
Point of view of the participants (External litigant or bank)	EL	EL	EL e B	EL	EL	
Losses to former employees (USD 000)	6,875,000		10,800		4,665,600	
Losses to investors (USD 000)	25,782,348	4,950,000			5,540,000	
Losses to clients (USD 000)		400,000	1,500,000	33,000,000		
Losses to regulators (USD 000)		23,100,000				
Total estimated operational risk loss (USD 000)	32,657,348	28,450,000	1,510,800	33,000,000	10,205,600	

It was possible to notice another framing bias in Group 2. Just because the numbers were presented by a professor acting as a scribe, it does not mean that these calculations should not be revised. The original calculation for labor relationship-related losses was USD 400 million. At the moment of the preparation of the scenario, the group considered the number relatively low, but proceeded with the exercise. After the focus group, when the authors re-examined the respective consensus spreadsheet, three zeros were missing in one of the steps of the calculation. The actual estimated figure was USD 400 billion, an unrealistic number that would demand greater scrutiny because it would probably surpass the largest operational loss ever experienced by a bank at that moment, as mentioned above. The scribe would promptly correct it if the group asked her. Group 2 provided useful information to detail corrective actions during sequential scenarios: biometric technologies to avoid internal fraud and possibilities of remuneration to motivate better internal controls to mitigate operational risk (COSO, 2013).

Group 3 deciphered the survivorship bias observed during the initial warming phase. The feats of Groups 1 and 2 were repeated. The authors included a bias example at the beginning of the focus groups to draw attention and interest to the research. It worked. Participation was continuous and intense up to the end of two hours. In Group 3, one participant seemed to adopt the bank's point of view. In doing so, she contributed to avoiding the eventual dominance of motivational bias or overconfidence bias. This suggests that a group composition with contrary viewpoints can, with a moderator, provide more realistic estimates of operational risk losses. Audio recording was useful for registering a relevant consequent attitude, modifying the incentives of sales professionals, despite the absence of the item in the consensus spreadsheet. This may have occurred because of lack of time or because the scribe forgot to take note of it. This reinforced the importance of audio recordings to allow the review of the scenarios by moderators, so they can capture valuable missing details in the consensus spreadsheet.

The availability heuristic emerged at least twice in Group 3. First, a participant recalled a labor relations suit in which a former employee asked for R$80,000 and obtained R$22,000. This significantly influenced the subsequent debate in the absence of more elaborate statistics.

It is useful for composing the calculation logic. Taking note of the data that should be provided in sequential scenarios may be useful for avoiding the availability heuristic.

Group 4 was marked by the disagreement between one of the participants and the rest of the group regarding the assumptions of the calculations. This volunteer asked for more data, and for a subsequent scenario, a more complete baseline was requested. He argued that this would allow consensus and improve the calculations. This disagreement halted the calculation of losses from investor suits. There was agreement about losses from client litigation. In a new framing bias, because the group was not unanimous about the losses from investor litigation, it interrupted the listing of attitudes to improve relations with these investors, even after agreeing that investors would be motivated to sue the bank. This deserves the attention of moderators. It can listen to audio recordings and, in sequential scenarios, bring back the subject to make extensive use of the ideas of the group.

Group 5 presented with overconfidence bias when there was no evidence that could be critical for its judgement, perhaps underestimating investor activism in North America's capital markets. When they examined the possibilities of litigation from shareholders, who could allege negligence and tolerance to fraud from the senior management of Well Fargo Bank and deficient information to the market, the group estimated in zero the loss probability, even subsequently recognizing that scarce information to capital markets could be reason to penalties from regulators such as the Securities and Exchange Commission (SEC).

Considering all analyzed groups, seven biases and intuitive heuristics were identified as influencers of group production, in line with the literature: anchoring (Montibeller & Winterfeldt, 2015), availability heuristic (Fox & Clemen, 2005), confirmation bias (Kelman, Sanders & Pandit, 2017), framing (Tversky & Kahneman, 1974), group polarization (Zhu, 2014), groupthink (Kelman, Sanders & Pandit, 2017) and overconfidence bias (Haselton, Nettle & Murray, 2016). However, nine other biases and heuristics were not identified in the five focus groups: peer pressure (Bonein, 2018), representativeness heuristic (Hambach et al., 2011), satisficing (Oppenheimer, Meyvis & Davidenko, 2009), motivational bias (Hillson & Hullet, 2004), hindsight (Lemay & Leblanc, 2018), survivorship bias (Manso, 2016), halo effect (Kim, 2017), base-rate neglect (Kahneman, 2011) and self-serving (Lemay & Leblanc, 2018). Bias avoidance strategies, as listed in Table 4, can be applied to other focus groups presenting these biases.

The propositions identified as resulting in attitudes in the consensus spreadsheets were compiled by themes and translated into verbal commands. They were then classified as inductors to improve employees' ethical practices (Morin, 2006). Resulting attitudes from using the operational risk scenario analysis were dominated by business improvements, in line with Nagashi and Caldeira (2021), and by advances in the control environment and in the control activities, components of internal control framework proposed by the (COSO, 2013). Resulting attitudes and new controls are shown in Table 6.

Table 6 - Resulting attitudes drawn from the focus groups.

Resulting attitudes and new controls	**Focus Groups**	***It may motivate improved ethical behavior among employees.**
To change the internal policy about commercial achievements, making them less aggressive and more realistic.	1, 3, 4 and 5	*
To hire an ombudsman.	1	*

To analyze in depth all fraudulent ways of opening current accounts and credit card accounts.	1 and 2	*
To create a new account management sector.	1 and 2	
To launch a mobile phone app to verify the identity of the clients.	1	*
To pressure the board of directors to seek the interest of all stakeholders.	2	
To control current accounts with no withdrawals and no deposits for a certain period of time.	2 and 5	*
To hire an external audit to investigate the fraud.	2 and 4	*
To create mechanisms to periodically check the management actions of the administrators of the bank.	3	*
To realize the fraud losses and reimburse the clients as quickly as possible.	3	*
To increase the headcount of the internal audit department.	3	*
To prepare sequential scenarios.	4	
To contact clients by phone asking them to come to their agency, to physically check their documents. To motivate the client to sign a signature card, and to register biometric data and digital signature.	2, 4 and 5	*
To improve monthly reports to pinpoint exaggerate growth in new contracts during a short period.	4	*
To assume mistakes to improve decision making in the future.	4	*
To talk to employees about the fraud. To repeat that to senior management.	4	*
To analyze the credit score of the client before conceding and validating a new credit card.	5	
To ask the client permission to send a new credit card.	5	*
To diminish the number of managers and to maintain the number of agencies, in order to reduce costs.	5	

6. CONCLUSION

Research hypothesis H1 was partially confirmed. During the focus groups, out of 16 cognitive biases, seven were noticed: anchoring, availability heuristic, confirmation bias, group polarization, groupthink, framing, and overconfidence bias. Cognitive biases and heuristics disturbed the objectives of the operation loss scenario analysis: interfered with the loss values encountered by Group 2 and interrupted the listing of resulting attitudes and new internal controls by Group 4. The fact that nine biases did not transpire in the five groups does not mean that they will not occur in the other groups while preparing operational loss scenarios. This finding may motivate further research.

Thus, research hypothesis H2 was confirmed. When knowledge from the Hazop technique (Baybutt, 2016) is combined with advances in the literature on cognitive biases (Montibeller & Winterfeldt, 2015), more tools are available to deal with either the seven encountered biases or the nine other studied ones. Sequential scenarios organized after prospecting additional relevant information (Table 3), as listed in the first exercise, may surpass anchoring and overconfidence biases. Balancing group composition in terms of knowledge fields and seniority may beat groupthink and group polarization biases. Framing bias can be

pinpointed and avoided by an experienced moderator whenever he or she is versed in cognitive biases and intuitive heuristics. To solve the other biases, please see Table 4.

Confirmation bias works through System 1 (Kahneman, 2011) and may cause acceptance of extreme but less probable events. This happened more than once (Table 4), as some participants came up with scenarios with losses well above the largest operational loss ever experienced by a bank, of USD 20 billion, and also superior to the loss already estimated by the bank that far, USD 2 billion (Table 5). It is part of the moderator's role in searching for additional relevant data to take advantage of the creativity and arguments expressed in the first exercise of each group. It is advised to organize subsequent scenarios to obtain more precise figures.

In the context of operational risk management, the additional data in Table 3 may involve litigation. In a well-structured bank, details about administrative and legal suits might be readily available in a database of the legal department, which could be customized and could offer, for example, some of the items listed in Table 3. When a lawyer of a bank takes part in a scenario analysis, it is expected that he or she will add to the balance of the group by formulating more pertinent questions and demanding additional data for sequential scenarios. Even with the contribution of such professionals, one should not expect to obtain all final answers in a single scenario analysis session.

The benefit of conducting various focus groups on the same subject within a relatively short timeframe is to extract a comprehensive list of useful information for sequential scenarios (Table 3). It also allows the compilation of a wide-ranging list of resulting attitudes and new controls to avoid severe losses in the future (Table 6) and to improve business practices and ethics.

The focus group method allows researchers to examine the manifestation of biases and heuristics. For example, only during the second focus group was a scribe-participant holding a superior management position at the university provoked by chance a framing bias when the group took for granted her calculation without checking. This mistake was prevented in the other groups by systematically reviewing the figures, regardless of who took care of the numbers. It was not until the fourth group that major disagreement halted the estimates. It amplified attention to prevent confirmation bias and organize sequential scenarios.

This study had some limitations. It is not advisable to generalize the findings to other organizers of the scenario analysis focus groups. The absence of direct working experience inside Wells Fargo Bank prevented the groups from knowing the internal procedures of the studied financial institution and elaborate on more internal control improvements to mitigate the legal risk and streamline the ethical behavior of employees.

On the other hand, the fact that none of the 32 participants were linked to Wells Fargo Bank may have allowed more freedom of thinking and more independence to list the resulting attitudes and new controls (Table 6). They may have been less censored to estimate future severe operational losses (see Table 5).

Among other possibilities for future research, one is to invite participants with estimates of operational losses before the beginning of the focus group (Kahneman, 2011; Cheah et al., 2015). Researchers can check whether it makes better use of diversity in terms of knowledge, experiences, and opinions.

7. CONTRIBUTION/IMPACT

Besides testing the manifestation of biases and heuristics in focus groups about operational risk scenario analysis, as an additional contribution, the methodological construct of the text, validating Hazop as useful to operational loss scenario analysis conducted by focus

groups, may be useful outside the academic environment: a practical tool for operational risk scenario analysis in banks, as a form of filling the eventual gap in the operational risk management of financial institutions. It is possible that the literature on focus groups, taken in isolation, would not be completely effective in guiding all the details necessary for the conduction of scenarios (and ever higher efficacy was reached when completed by the literature on Hazop).

Therefore, the above methodological construct (for which the name "Financial Hazop' is proposed) can be viewed as a practical operational risk management tool for financial institutions. The size of the groups, rules of participation, group composition, ways to register data, layout of the room, desired profile of the participants and scribe, and required moderator stance are themes developed by one field of knowledge, chemical engineering, which could complement another field of knowledge, scenario analysis of operational risk in financial institutions, using the focus group research method.

The triple combination proposed may assist the conduction of operational risk scenario analysis either by academic researchers (as the essence of the focus group method was entirely respected) or by professionals of financial institutions. Regulators may also benefit by understanding and analyzing the application of risk management tools while identifying and avoiding biases.

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