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Cognitive biases that influence Lean implementation and practices in a multicultural environment.

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Abstract

Purpose:

The objective of this research is to highlight the prominent cognitive biases that influence Lean practices in organisations that have a multicultural work environment which will aid the organisational managers and academics in enhancing the understanding of the human thought process and mitigate them suitably.

Methodology:

A multiple-study was conducted in organisations that were previously committed to Lean practices and had a multicultural work environment. The research was conducted on five companies based on ninety-nine in-depth semi-structured interviews and seven process observations that sought to establish the system-wide cognitive biases present in a multicultural Lean environment.

Findings:

The novel findings indicate that nine new biases influence Lean implementation and practices in a multicultural environment. The study also found strong connectivity between Lean practices and 45 previously identified biases that could affect positively or negatively the lean methodologies and their implementation. Biases were resilient enough that their influence on Lean in multicultural workplaces, even with transient populations, did not demonstrate cultural differentiation.

Practical implications:

The results can provide an enhanced understanding of biases and insights into a new managerial approach to take remedial steps on biases' influence on Lean practices that can result in improved productivity and well-being from a business process perspective. Understanding and mitigating the prominent biases can aid Lean manufacturing processes and support decision-makers and line managers in improving lean methodologies' effectiveness and productivity. The biases can be negated and used to implement decisions with ease. The influence of biases and the model could be used as a basis to counter implementation barriers.

Research limitations/implications:

Like any qualitative research, constructivism and narrative analysis are subjected to understanding based on knowledge gained on the subject, and data may have been interpreted differently. Constructivist co-recreation of process scenarios-based result limitations are therefore acknowledged. However, research design and. The interactive participation in exploring the knowledge sought after and interaction that could have a probable influence on the participant needs to be acknowledged. However, the research design, multiple methods of data collection, generalisation based on data collection, and analysis methods limit the effects of these and findings are reliable to a greater extent.

Originality/value:

This is the first study that connects the cognitive perspectives of Lean business processes in a multicultural environment to identify the cognitive biases that influence Lean practices in organisations that were previously committed to Lean practices. The novel findings indicate that nine new biases and 45 previously identified biases influence Lean implementation and practices in a multicultural environment. The second novelty of the study shows the connection between cognitive biases, Lean implementation, and practices in multicultural business processes.

Keywords: Lean manufacturing, Human barriers, Cognitive bias, Bias, Lean

1 Introduction

Background: Lean offers lucrative business opportunities Baysan et al. (2019), environmental benefits (Dieste et al. 2019) and waste reduction (Purushothaman, Seadon, and Moore 2020) though it faces barriers (Zhou 2016). Barriers to lean implementation and practices are broadly due to human, technical, organisational, and economic factors (Kumar and Kumar 2014). During the mid-20th century, the Japanese developed and adopted Lean, which more efficiently manufactured multiple products or mixed models (Womack, Jones, Roos, & Carpenter, 2007). Lean is a method of processing procedurally, as per customer requirements (Yogesh and Prabagaran 2016). Lean has been researched using diverse theories, though comparatively fewer study has considered the psychological aspects of lean (Hozak and Olsen Eric 2015). Human behaviours are psychologically based on cognitive factors and each of the actions is directly proportional to the cognitive ability and distortions (Sedliačiková et al. 2020). Though human barriers had been studied in the Lean context for more than two decades, problems still exist. Many fields, except Lean, have extensively researched and adopted cognitive factors and included them in their models (Hozak and Olsen Eric 2015). The cognitive influence studies have immensely benefited other fields, especially in terms of identifying the thinking process, influences, and barriers. This paves the way and necessitates the need for research on human cognitive factors, especially cognitive biases influencing Lean (Hozak and Olsen Eric 2015).

Need for the study: Lean offers lucrative benefits, but its barriers tend to slow economic growth and impact productivity. Following the global trend, even though the manufacturing sector is adopting

Lean and digital technology, labour and multi-factor productivity have fallen in developed countries. For example, in New Zealand, labour productivity and multi-factor productivity fell by 0.7 per cent and 0.4 per cent, respectively, from 2011 to 2016, indicating that other factors were present (StatsNZ 2017). One contributor to the decline was human factors, which could lead to waste in terms of delay, over-processing, and errors. Though numerous studies have been done in New Zealand on Lean, Human Factors Engineering and waste, a gap exists in identifying their interaction in this multicultural country. While many developed countries have adopted Lean principles in the manufacturing and supply chain, system-wide influences of cognitive biases on Lean tools are yet to be understood. This study is a step forward to understanding cognitive biases' influence on Lean to improve productivity through the enhanced application of Lean practices while prudently using biases that result in a waste reduction to make an organisation more resilient. Cognitive bias is defined as "the action of supporting or opposing a particular person or thing unfairly because of allowing personal opinions to influence your judgment" (Cambridge.Dictionary 2015). Cognitive bias is the tendency of people to lean on a subject based on perception, prejudice, interpretation, temperament, and outlook and conclude with inclined understanding or without understanding it (Kahneman & Tversky, 1982).

Research Question and objective: Cognitive biases are researched extensively and identified in various fields such as psychology, economics, and politics. However, the identification of biases in a Lean environment is yet to be understood. The research questions for this study were:

- What were the system-wide cognitive biases present in organisations that influence Lean implementation and practices?
- What were the effects of different cultures on cognitive bias in organisations?

The research objectives included identifying prominent cognitive biases that influence Lean implementation and practices, the effects of different cultures on cognitive bias in organisations and proposing a system dynamic mapping of interactions of the cognitive biases.

Research contributions: The cognitive biases would be of particular interest to lean practitioners and academics as it provides insights into the way people would think and act. For the first time, this study identified cognitive biases prevalent in multicultural Lean environments. Bias is a term used in many fields, but this paper refers to cognitive bias. The study of the cognitive influence on Lean processes in a multicultural environment also provides novelty in the paper. While the predominant ethnicity in New Zealand is European (62.3%), there are also indigenous Maori (14.7%), Asian (13.3%), Pacific people (7.2%) and Middle Eastern/Latin American/African (2.4%) (StatsNZ 2021). In keeping with the general population, a multicultural mix is common in the workforce and provides a new study on the biases present in organisations in a multicultural environment.

2 Literature review

Lean is an extensively researched field concerning lean benefits and barriers. Many researchers have analysed and reported that lean isn't free from barriers. Lean barriers are broadly due to human, technical, organisational, and economic factors (Kumar and Kumar 2014). Bhuvanesh Kumar and Parameshwaran (2018) concluded that lack of control and standardisation are key barriers to lean implementation and success in the Indian manufacturing sectors. Prashar (2017) identified that a lack of resources, skills, knowledge, willingness, and expertise are key barriers to lean practices in small and medium enterprises. Saad et al. (2006) stated that financial culture, structure abilities, and proficiency are barriers to lean implementation in small and medium enterprises. Tezel, Koskela, and Aziz (2018) investigation on lean thinking in the highways construction sector identified a Lack of standardisation, insufficient benefit measurement, insufficient know-how, employee resistance, problems in retaining experience and know-how, lack of continuous training, insufficient control of the value stream and, insufficient planning and coordination in the implementation as barriers. Further, they stated that the industry viewed lean branding as a means to impress the client rather than implementing it to achieve productivity and quality standards. A summary of barriers to Lean implementation and practices is shown in Table 1 below.

Table 1: Lean Barriers

Factor	Antony et al. (2012)	Allaoui, Guo, and Sarkis (2019)	Kurilova-Palisaitiene, Sundin, and Poksinska (2018)	(Losonci, Demeter, and Jenei 2011)	Elicianea et al. (2020)	Bieraugel (2015)	Caldera, Desha, and Dawes (2019)	R. Jadhav, S. Mantha, and B. Rane (2014)	Helleno, De Moraes, and Simon (2016)	Abu et al. (2019)	Sim and Rogers (2008)	Womack et al. (2005), (Pearce 2014)	Chiarini and Brunetti (2019)	Leite, Bateman, and Radnor (2020)	DeSanctis et al. (2018)	(Yadav, Seth, and Desai 2018)
Awareness							✓									
Behaviour														✓		
Collaboration		✓						✓								
Commitment								✓				✓			✓	
Credence				✓							✓					
Communication				✓												
Cost control									✓							
Cross-functional team conflicts								✓						✓		
Culture							✓								✓	
Decision making					✓											
Empowerment and engagement								✓				✓				✓
Expertise							✓									
Involvement								✓							✓	
Job change/security						✓										

Factor	Antony et al. (2012)	Allaoui, Guo, and Sarkis (2019)	Kurilova-Palisaitiene, Sundin, and Poksinska (2018)	(Losonci, Demeter, and Jenei 2011)	Elicianea et al. (2020)	Bierаugel (2015)	Caldera, Desha, and Dawes (2019)	R. Jadhav, S. Mantha, and B. Rane (2014)	Helleno, De Moraes, and Simon (2016)	Abu et al. (2019)	Sim and Rogers (2008)	Womack et al. (2005), (Pearce 2014)	Chiarini and Brunetti (2019)	Leite, Bateman, and Radnor (2020)	DeSanctis et al. (2018)	(Yadav, Seth, and Desai 2018)
Knowledge							✓	✓	✓	✓		✓				
Leadership											✓		✓			
Process thinking	✓															
People influence														✓		
Performance measurement system													✓			
Regulations and policies							✓									
Resistance								✓							✓	
Resources							✓			✓		✓		✓		
Responsibility	✓			✓												
Skills and training					✓		✓					✓	✓			
Strategy and planning	✓		✓										✓			✓
Time							✓									

Organisations engage people to perform activities that enhance, create, or add value (Charlwood and Hoque 2017). Similarly, operation management, production, planning and control functions engage people to excel in productivity and quality activities. The activity is a result of physical and mental actions and reactions (Wrzesniewski and Dutton 2001) that enhance value (Cook 2016) and/or induce drawbacks (Charlwood & Hoque, 2017). Mental actions and reactions are subjected to cognitive biases that impact decision-making (Busenitz and Barney 1997, Elicianea et al. 2020). Cognitive biases are anomalies in the thought process that result in doubtful decisions (Dvorsky 2013). Biases influence the decision-making process where negativity is more than positivity (Wells et al. 2016, Weyman and Barnett 2016, Whiting et al. 2016). Wrong decisions due to biases adversely affect a decision-maker and the allied organisation (Hammond, Keeney, and Raiffa 1998). Deficiencies due to decision-making biases influence an organisation, and inherent biases induce stress for the individual(Kahneman and Tversky 1977). Cognitive bias distorts decision-making (Kahneman and Tversky 1982, Baron 2008, Hama 2010) and reduces judgement ability (Moen et al., 2016). However, some biases enable faster decisions (Baron, 2008; Hama, 2010; Kahneman & Tversky, 1982).

In organisations, decision-making is intuitive, where the individual accumulates biased information and delivers a decision that produces negative outcomes (Saaty 2000). People are a critical part of the Lean system and barriers include human attitudinal issues, the involvement of employees, workers' resistance, and cultural factors (Bose and Sinha 2012). Human barriers to Lean include cognitive stress and collaboration (Rane, Sunnapwar, and Rane 2016). Collaboration in this paper's context means discussion, decision-making, and attitude alignment (Kvarnstrom 2008). However, the decision-making process has subjectivity (Caldera, Desha, and Dawes 2019) which is influenced by human factors such as biases and framing effects (Tversky and Kahneman 1983). Cognitive biases often emanate from adjustments due to prior decisions, which could be deficient (Pranoto 2005). A bias, which can affect a process, may have positive or negative effects (Weyman and Barnett 2016). Biases are evident throughout the life cycle of decision-making: receiving data (George et al. 2020); understanding data (Drory and Meisler 2016); analysing data (Britton and Scalia Tomba 2019); planning, resources accumulation (Chen, Moskowitz, and Shue 2016); execution of a decision (Whiting et al. 2016); reiteration, outputs, and knowledge recording (Zipp and Craig 2019). Biases influence the decision-making process where negativity is more than positivity (Wells et al. 2016). However, some biases enable faster decisions (Tversky and Kahneman 2018).

Cognitive psychology identifies a list of biases prevalent in society (Tversky and Kahneman 2018). The literature review identified 239 biases (refer to annexure 1), and the explanation and literature reference for the prominent biases identified by this research are provided in table 5. Economics, finance, and marketing researchers have incorporated bias influence in their models. For example:

- ounded awareness: the tendency of failing to notice the crucial information, options, roles, and parties involved (Elicianea et al. 2020);
- Confirmatory bias: the tendency to search or interpret information in a way that confirms own preconceptions (Li and Cheung 2020);
- Optimism bias: the tendency to believe that one is comparably at reduced risk or overconfident in their ability to avoid or avert a negative situation (Li and Cheung 2020);
- Prejudice /self-affirmation: The tendency to form an opinion ahead of analysing or receiving information about a person or situation (Li & Cheung, 2020);
- Subjective validation/ personal validation effect: The tendency to agree with a fact or data if it matches personal beliefs (Elicianea et al. 2020); and
    - Present Bias: The tendency to maintain the present scenario (Fuerst and Singh 2018) Psychological researchers have recorded the cognitive biases that ascribe success or challenge to the practice of operation management tools. For example:
    - Status quo bias and people's resistance to change (Gong et al. 2020);
    - Status quo bias in information system implementation (Kim and Kankanhalli 2009);
    - Planning fallacy and lead time performance improvement (De Treville, Hoffrage, and Petty 2009);
    - Cognitive biases influence IT system execution (Iris and Cebeci 2014);

- Pre-conception, self-affirmation, optimism and interest-oriented biases influence dispute management (Li and Cheung 2020);
- Cognitive influences on the purchase and use of eco products (MacDonald and She 2015, Zhou et al. 2018); and
- Belle, Cantarelli, and Belardinelli (2017) provided evidence of anchoring and halo Effects in the performance appraisal system of the public sector.

However, psychologists have researched the influences of biases, but few operations research focuses on biases' influence on management tools (McNamara 2014). Over the last two decades, a few researchers have stated bias's influence on Lean tools; however, they are not the studies specific to biases influencing lean implementation and practices. For example:

- Ballé (2005) stated lean practitioners exhibit a hurried bias to encounter problems, try incomplete solutions to obtain expertise, and leadership use the emotional and practical anti-meeting room bias to pull people for a Gemba;
- Eisemann, Ries, and Dillard (2013) explain how to mitigate cognitive biases such as Optimism bias, confirmation bias, the planning fallacy, and the sunk cost fallacy that otherwise can contribute to poor decisions that influence lean start-up methodology;
- Hozak and Olsen Eric (2015), in their study on lean thinking, stated that "people have cognitive limits and, as a consequence, their decisions might be hampered by systematic biases".
- York and Danes (2014) suggested ways to mitigate risks of decision-making biases in the Lean Start-ups;
- Antony et al. (2012) stated that lean initiative should not be viewed as a quick-fix to problems, indirectly referring to the fix-it fallacy; and
- Keyser, Sawhney, and Marella (2016) mentioned extrinsic incentives bias (job security and pay) and intrinsic incentives bias (learning new skills) in the change management context;

The literature review found few studies specific to cognitive biases influencing lean practices, for example:

- Self-serving bias and fundamental attribution error were barriers to the effective implementation of 5S in an Irish case study (McNamara 2014); and
- Biases influence 25 lean tools in the uni-culture environment - a case study of an Indian manufacturer (Purushothaman, Seadon, and Moore 2021).

Biases are the cognitive limitations or influences that affect decisions, actions, and practices (Gino and Pisano 2008). To sustain a Lean system, management needs to find worker perceptions and identify cognitive biases obstructing potential solutions (Morley et al. 2013). Attempts to identify solutions included Nickerson, Silverman, and Zenger (2007), who proposed synthetic process methods to overcome cognitive, motivational and informational biases.

Research Gap: The literature review reveals that lean researchers have limited themselves to behavioural elements within the human factors and have not yet understood the cognitive influences that drive the behaviour to a certain extent. Few researchers have briefly identified the cognitive influence; however, in-depth study have not been undertaken yet. Many operational, analytical models assume that people are tempted to behave rationally without cognitive influence, while economics, finance, and marketing researchers incorporate people's influence into their models, unlike operations (Gino and Pisano 2008). This literature review substantiated De Treville, Hoffrage, and Petty (2009), McNamara (2014), and Gino and Pisano (2008)'s claim of comparatively fewer studies on cognitive biases influence lean practices and implementation and established that a gap exists in understanding the interaction of biases in an operation process, its influence on Lean implementation and practices.

The psychology research identifies numerous biases, and this study identified 239 biases through the systematic literature review (Annexure 1). The key biases are discussed in section 4- Results. The study adopted the following research methodology to identify cognitive biases that are prevalent and interact in a multicultural lean environment.

3 Research Method

To address the first research question for this study, "What were the system-wide cognitive biases present in organisations that influence Lean implementation and practices?":

- The data collection on cognitive biases prevalent in lean practicing industries is through SLR and semi-structured interviews based on snow balling with selection criteria.
- The data analysis on cognitive biases prevalent in lean practicing industries is through narrative analysis.
- Results are presented in ~~ana~~ system dynamic mapping (causal loop diagram)

To address the second question, "What were the effects of different cultures on cognitive bias in organisations? :

- The data collection on effects of different cultures on cognitive bias in organisations is through semi-structured interviews based on snow balling with selection criteria.
- The data analysis on effects of different cultures on cognitive bias in organisations is through narrative analysis.
- Results are presented in as text.

The reasoning, method, and details of the research methodology are discussed below.

The cognitive factors that require participant engagement influence the observer and the participant (Burrell and Morgan 1979). Therefore, idealism was chosen as the ontological position of the researcher and the research. The research seeks knowledge on the cognitive bias influence on Lean processes. Understanding cognitive factor influences need an interactive approach where the participants, being the subject matter experts, share their experiences. The fact that knowledge was dynamically 'constructed' by participants instead of passively received from them, and the researcher

acquired it through a systematic approach (Rachel et al. 2013) made it suited for cognitive responses' understanding. Hence, this research was positioned in the constructive epistemology dimension, which provides interactive knowledge acquired through flexible design and qualitative analysis. Following Meredith (1998), the constructivist epistemological position of this research is linked to the interpretivism theoretical framework. The phenomenon that underlines the value of interpretation and observation in seeking knowledge is known as 'interpretivism' (Rachel et al. 2013). At the same time, the related 'constructionism' emphasises that knowledge is dynamically 'constructed' by participants, instead of passively received from them (Rachel et al. 2013). The researcher is focused on acquiring knowledge from the participants' experience through their points of view (Rachel et al. 2013). Following Clandinin (2016), the study adopted a qualitative narrative inquiry methodology, a ubiquitous practice in which humans narrate their experiences, which was interweaved to construct a phenomenon. The research onion is shown in figure 1.

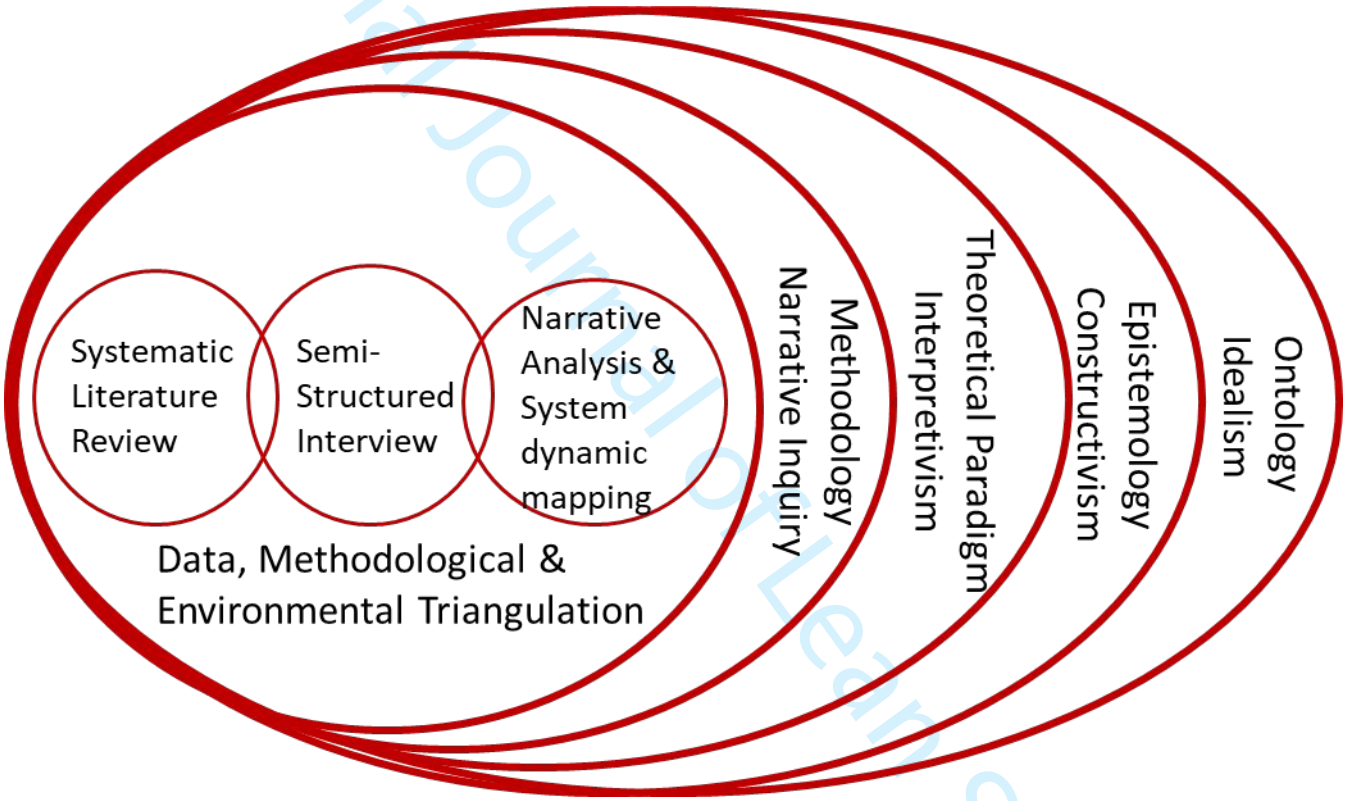

Figure 1 Research Onion

This qualitative study was conducted over nine months. The study used in-depth semi-structured interviews (SSI) with ninety-nine employees (for between half and one hour for the interview), process study (seven) and narrative analysis in five organisations in New Zealand to understand the biases prevalent in lean industries in a multicultural environment. The seventeen SSI questions were derived from a systematic literature review (SLR). Since cognitive biases were not studied widely in lean research, the SLR was conducted across various fields. The SLR was identified and evaluated by a combination of all the empirical evidence that met pre-specified eligibility criteria as specified by Creswell and Creswell (2017). The process used was similar to Pedrini and Laura (2019). Five databases were selected to search for articles published from 1958 to 2020. The keywords used

were biases, cognitive influence, and Lean. Starting from 534911 articles identified using the keywords search,1290 key journal articles were systematically reviewed using both bibliometric and qualitative methods for analysis. The articles were sourced globally from different journals and books. The steps followed are given below in Table 2.

Table 2: Systematic literature review

Process		Individual steps	Analysis resulting	No. of articles
Search process and data collection	1	Identification of keywords: (Cognitive influence, cognitive bias, Lean)	Previous research and reviews	
	2	Development of exclusion and inclusion criteria, methodology	Quality of the article and limitations	30
	3	Specification of relevant search engines and execution of the search (5 engines: GOOGLE SCHOLAR, A WEB OF SCIENCE, EMERALD, SCIENCE DIRECT, SCOPUS)	Title and abstracts (automated based on keywords)	534,911
	4	Development of A-, B-, and C-list:		
		C-list	Key words w.r.t Cognitive bias, lean and cognitive influence	117,431
		B-list	Title and abstracts that referred to Cognitive bias, lean	11354
		A-list	Full text (strong focus cognitive bias)	1090
		Narrative inclusions in this article	Full text	126
Descriptive and thematic analysis	5	Descriptive categories (e.g., journals covered, methodologies applied)	Cognitive bias influences in Lean environment	1090
	6	Deductive and inductive categories to identify central themes and interpret results	Definition of bias, Cognitive bias influence in Lean environment	1090

An initial primary code and connected words were developed from the SLR that considered the system-wide biases. The primary codes were derived from respective literature that provided the biases description. The primary codes were the key issues, concepts, and themes identified during the analysis phase of this research that was linked back to the biases. The primary code denoted the prime tendency, keywords and connected words are the different possible terms that a person uses to indicate the bias. The SLR identified 239 biases. The details of the biases, primary code, connected words, important words, actions and behaviour is given in Annexure 1. The knowledge sought was decoded and constructed from inductive and/or deductive reasoning processes of forms of qualitative information gathered in the non-numeric form (Morse 1994). A system-wide study of the prevalent biases in lean organisations was conducted through multiple case studies that involved people at various levels and experiences. The information about participant experiences and perspectives was stimulated by SSI (Russell et al. 2005). Inductive reasoning was used to interpret the data to construct a working model, and deductive reasoning was used to interpret data to confirm or contradict the model (Holloway 1997). The participants represented different levels in their organisations and were from varied cultural backgrounds, mostly representative of the overall population in New Zealand.

The key steps in research design are given in Figure 2.

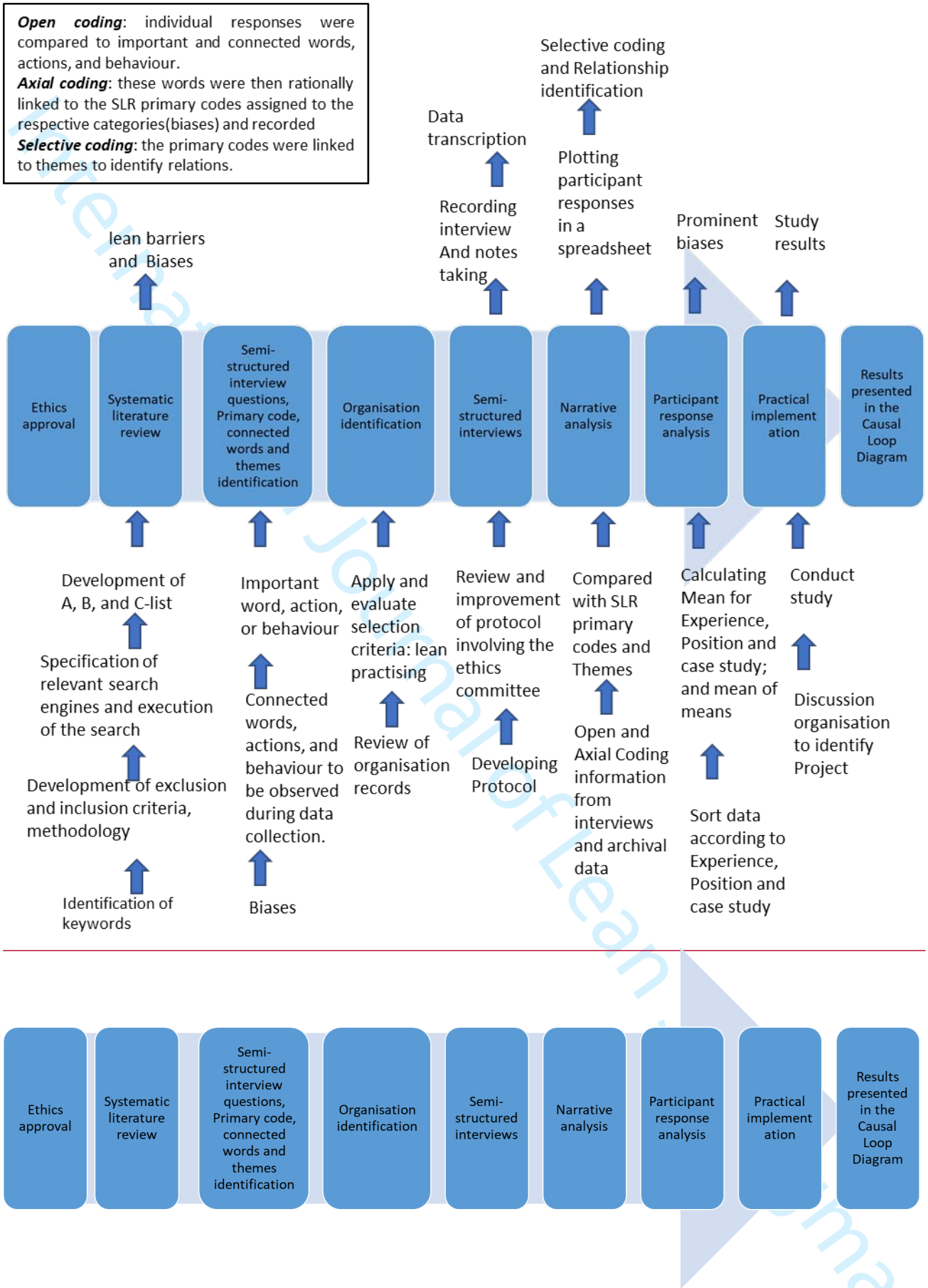

Figure 2 Research design

The research used three types of triangulations:

1. Data Triangulation: Data was collected from multiple system-wide case studies; each case study had different locations, participants, and nature of work.
2. Methodological triangulation: Employed in-depth interviews, the response was recorded and noted, and the questions covered the topics of their work and process experience. The process also involved SLR. The other method adopted was process observation and records review; and
3. Environmental Triangulation: System-wide case studies involved multiple locations and seasons. One case study covered three sites that included their customers, one case study involved two sites, and one case study was administered over two seasons, four months apart.

From the participant observations and discussions, interview recordings and notes were used to identify system-wide bias through framework analysis. The key elements of interviews, based on Nicky (2006), focused on location, obtaining voluntary consent, adoption of neutral body language (open and emotional), and keeping distractions for recordings to a minimum. The SSI had the same open-ended questions for each voluntary participant that was designed to be generic to extract the cognitive thought process of participants. This aided in integrating multiple case study responses. These prime open-ended questions were followed up with specific questions based on a reply from the participant to understand the knowledge explicitly sought.

- May I know your level in the organisation and your overall experience?
- Can you please explain what you do with making the product/ service?
- How did you improve the process in the past, and what were the issues while improving the process?
- What are the current issues in the process?
- What is the waste, in terms of human effort, material and time in the process?
- What improvements are needed to increase your productivity and ease your workload?
- What sort of interruptions do you have while working? What are your ideas for overcoming difficulties?
- Do the new technologies bring improvement to the process, and do they help you?
- Have you been given suggestions for improvement by your peers, supervisors, and managers?
- Can you give some examples of improvements you implemented and those you rejected?
- Why did you accept or reject the suggestions?
- What are the assumptions you made in accepting or rejecting the suggestions?
- Do you have anything else that you want to add?

Out of 239 biases identified during SLR conducted in various fields, this research identified 45 prevalent in the industry through data collection and analysis. The framework analysis was used to analyse the interview recordings, interview notes, and process observation notes to identify system-wide biases. The system-wide bias data analysis followed an approach similar to (Pope, Ziebland, and Mays 2006); the steps involved were:

- Familiarised data: The data familiarisation was done by listening to interview recordings and reading the process observation, participant observation, and interview notes.
- Identified a thematic framework (Primary codes and themes): In the next step, the interview recordings and notes were used to identify the themes (people, performance, and technology) that participants narrated. The themes linked to primary codes were used to categorise the data. The 14 primary codes were:
    - Automation;
    - Cost, time, and/ or energy.
    - Decision;
    - Examples;
    - External;
    - Group;
    - Management;
    - Negativity;
    - Performance;
    - People;
    - Relate;
    - Standardisation;
    - Trust; and
    - Zero (risk or defect).
- Search for themes: Next, the identified primary codes were linked to the 239 biases identified in the literature review.
- Review themes: In the next phase, the notes and recordings were read and listened to twice to identify potential primary code, important and connected words, actions, and behaviour and correlated to respective biases. The responses were noted as yes (y) and no (N) for the influence and tabulated participant-wise in a matrix in the excel file; and
- Summary of data: The summarised matrix data were matched to the participant, their position and their experience. The matrix structure was visually upfront and aided the recognition of patterns in the data, with empty cells drawing attention to differing data.

An example of bias interpretation is shown in Figure 3 below (primary code- People):

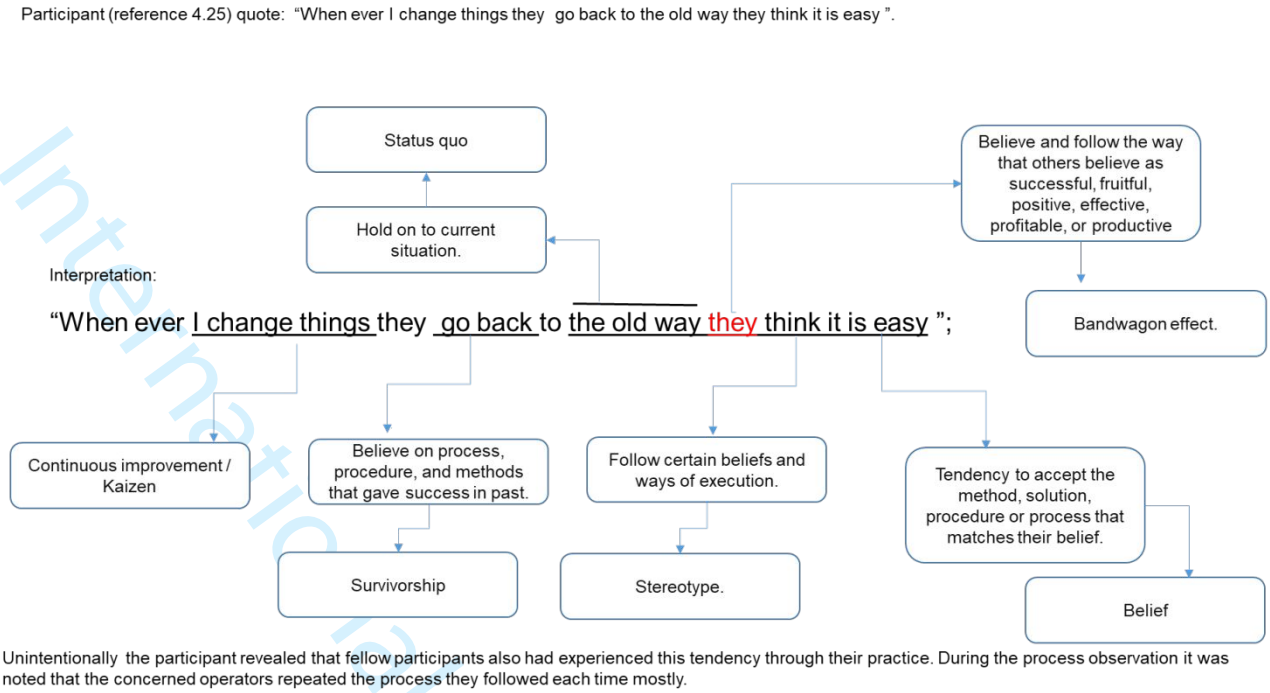

Figure 3: Bias interpretation

The case study involved four large-scale and one small-scale organisation practising lean, totalling 99 people. The case studies were chosen to represent major types of business operations in New Zealand – the service sector and food processing. Criteria for study participants included knowledge of English and working in organisations practising lean. A summary of the case studies is shown in Table 3 below.

Table 3: Case studies

Company	Case Study	Industry	Number of People involved in the study	Turnover in NZD (million)
1	Alpha	Printing	1 management 1 staff 4 operators	5
2	Beta & Gamma	Electrical distribution	4 management 4 staff, 12 operators	350
3	Delta & Epsilon	Fast-moving consumer goods	6 management 10 staff 28 operators	22474
4	Zeta		1 management 7 staff 1 operator	
5	Eta	Fruit cool store and packing	5 management 14 staff 1 operator	160

In Table 3, staff refers to supervisors, clerical staff, and assistant managers and operators are the value adders physically executing the job. Figure 4 shows the position distribution of participants, and Figure 5 shows the experience of the participants.

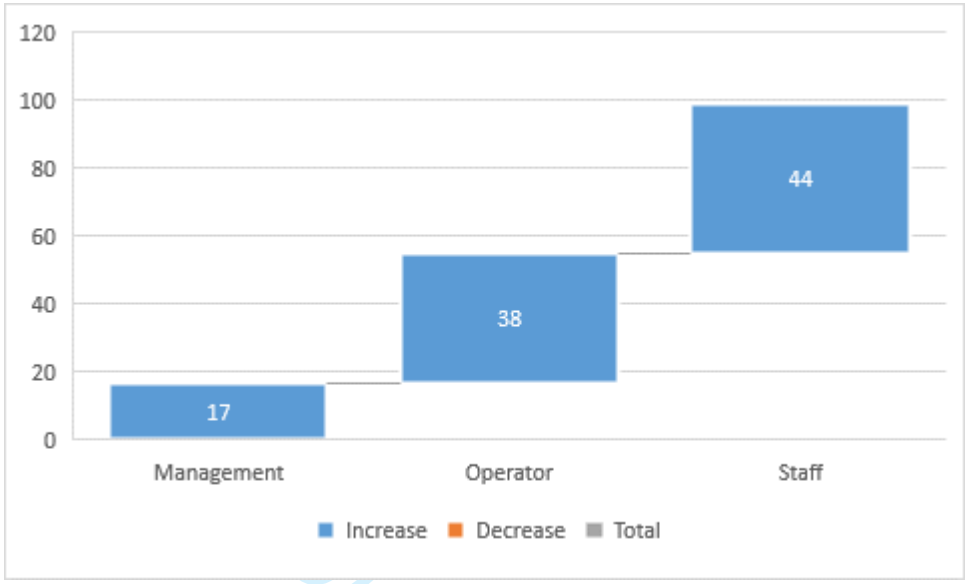

Figure 4: Roles of participants.

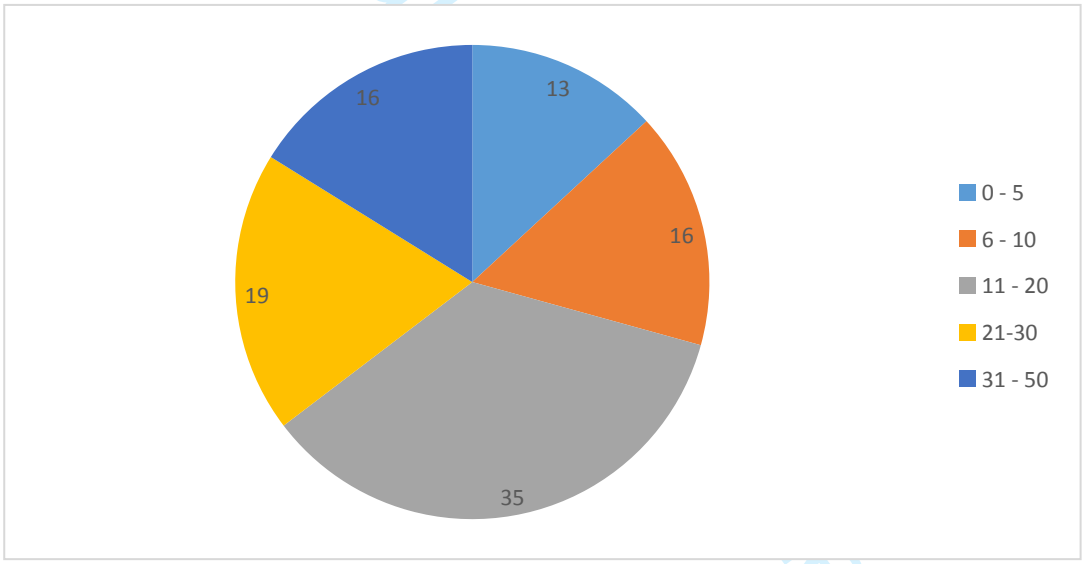

Figure 5: Experience of participants

The multicultural dimension was studied by analysing the participants' responses to see if different cultural groups provided disparate responses. The cultural distribution of participants is shown in Table 4:

Table 4: Participants' Cultural background

Culture	Percentage	Management	operator	Staff	Grand Total
European	45%	13	17	15	45
Asian	18%	2	1	15	18
Pacific	36%	2	20	14	36
Grand Total		17	38	44	99

3.1 Quality control criteria for research design

The reliability and validity of the qualitative research were intellectualised as trustworthiness and rigour in data collection and analysis. Walliman (2017) affirmed various factors that enhance reliability in qualitative research, which this research followed, such as ethics, large sample size (99), multiple sites (7), triangulation (3), data from a large organisation, careful sampling, and rigorous coding. The validity of the research depends on the robust ethical design that used the same protocol and was carried out in normal life settings that provided data representativeness of influence on sought variables (Denzin 1978). Yin (1994) stated that multiple case study evidence establishes the construct validity and reliability, while Carter et al. (2014) argued triangulation is a strategy to achieve validity. Golafshani (2003) emphasised that reliability, validity, and triangulation reflect the multiple ways of establishing the truth. The effectiveness of qualitative research is generally associated with reliability and validity, and this research relied on ensuring reliability and validation (Golafshani, 2003).

Reliability: Reliability was ensured by adopting an ethical approach (confidentiality and volunteers), achieving substantial participation, using multiple sites, and utilising triangulation.

Validity: The validity of the current research was ensured by adopting ethical practices and was conducted at multiple sites, with the same protocol and triangulation aided to obtain data that genuinely reflect the influences of the variables (Cognitive bias and Lean tools). The case studies were conducted in normal work-life settings with high ethical practices that obtained high-quality data and feedback on the study's usefulness in mostly large reputable organisations, ensuring the reliability and validity of the current research.

Confirmability: The research generalised theory through the analysis of multiple case study data and reported the process improvement to the organisation, and obtained feedback on the usefulness of the study;

Credibility: Following Patton (1999), credibility was ensured by gathering and analysing high-quality data from mostly large reputable organisations that had implemented Lean, multiple case studies, triangulation; and

Transferability: The research was conducted in normal work-life settings with high ethical practices to ensure transferability.

4 Results

The key takeaway from the case studies was that other biases affected the process and performance compared to the literature survey. The adopted research methodology helped to identify these novel biases. For example, discussion, interview, and observation revealed that people interpret organisational policies and health and safety policies at their convenience. Further, the Bill of Materials and Standard operating procedures were not updated periodically, and non-adherence

was observed. Furthermore, people had not considered the reactions of the entire chain (system-wide) that was involved in the process and did not consider critical responses from the chain on current issues and changes in the process.

The system-wide bias data analysis followed an approach similar to (Pope, Ziebland, and Mays 2006) as explained in section 3. Analysis revealed that people accepted or declined actions based on group reactions and stress. Based on the analysis, Nine novel biases were observed in case studies that are listed below:

- Chain reaction bias: The tendency of being unaware or unresponsive to people's reactions in the process chain;
- Convenience bias: The tendency to miss or decline actions based on convenience of interpretation of instructions, policies, or procedures;
- Critical Response bias: The tendency to miss or avoid critical responses with stakeholders;
- Group reaction bias: The tendency to decline support based on predicted reactions of their group;
- Health and safety bias: The tendency to accept or decline based on predicted consequences of health and/ or safety;
- Organisational Policy bias: The tendency to accept or decline based on the understanding of policies or legal requirements;
- Standard Operating Procedure (SOP) bias: The tendency to miss, deviate or decline actions stated in standard operating procedure;
- Stress bias: The tendency to decline actions based on predicted stress on oneself or the process; and
- System-wide approach bias: The tendency to discount or not consider stakeholders in the system for a situation, issue, or action.

Initial data capturing from the semi-structured interview recordings, notes, and transcripts identified connecting words that could be linked to primary codes and in turn 136 ~~The~~biases. The responses on biases that were noted as yes (y) and no (N) for the influence and tabulated participant-wise in a matrix in the excel file was analysed. First the response was sorted based on case study, followed by experience and then by position. Response to ~~B~~biases were then analysed based on the case study, experience ~~level~~, and position~~experience~~. Furthermore, the percentage mean for each type of analysis based on the number of responses (R) and the number of participants (P) and its median were calculated and plotted.

The formula of % mean calculation

$$\%\ \text{Mean}_{\text{Case study}} = \text{Average}\left(\left(R_{\text{Alpha}} / P_{\text{Alpha}} \times 100\right) + \left(R_{\text{Beta}} / P_{\text{Beta}} \times 100\right) + \left(R_{\text{Gamma}} / P_{\text{Gamma}} \times 100\right) + \left(R_{\text{Delta}} / P_{\text{Delta x}} 100\right) + \left(R_{\text{Epsilon}} / P_{\text{Epsilon}} \times 100\right) + \left(R_{\text{Zeta}} / P_{\text{Zeta}} \times 100\right) + \left(R_{\text{Eta}} / P_{\text{Eta}} \times 100\right)\right)$$

$$\%\ \text{Mean}_{\text{Experience}} = \text{Average}\left(\left(R_{\text{trainee}} / P_{\text{trainee}} \times 100\right) + \left(R_{\text{Adequate}} / P_{\text{Adequate}} \times 100\right) + \left(R_{\text{Reasonable}} / P_{\text{Reasonable}} \times 100\right) + \left(R_{\text{Good}} / P_{\text{Good}} \times 100\right) + \left(R_{\text{Superior +}} / P_{\text{Superior +}} \times 100\right)\right)$$

% Mean $_{Position}$ = Average (($R_{Management} / P_{Management}$ x 100) + ($R_{operator} / P_{operator}$ x 100) + (R_{Staff} / P_{Staff} x 100))

Those biases that appeared in all three types and which were above the calculated means (case study (81.75), experience (89.02) and position (90.43)) were treated as prominent biases. This ensured that only those biases that were identified across all case studies, experience bands, and positions above % mean responses appeared as prominent. The results are shown in Table 5 below.

Table 5: Biases that influence lean organisations

Bias	Description	% Mean			% Response		
		Experience	Position	Case study	Positive	Negative	Nil
Absent-mindedness	A tendency to forget events, situations, or facts (Tornas et al. 2016)	100.0	100.0	100.0	4.0	96.0	0.0
Anchoring and adjustment	The tendency to relate facts to a prominent person's view, prominent situation, or first information and later adjust to it while talking decisions (Y. Zhou, Chen, Xu, & Wu, 2018).	93.2	94.1	91.2	92.9	0.0	7.1
Automation	The tendency to rely on automation and ignore differing facts presented without automation (Dutilh and Rieskamp 2016).	93.6	95.9	92.2	86.9	8.1	5.1
Automation omission	The tendency to miss information, events, data, and facts when not prompted by automation (Lyell and Coiera 2017).	95.1	96.7	93.7	86.9	9.1	4.0
Bandwagon effect	The tendency to believe in data, facts, or situations to align themselves to the majority of people's beliefs in a particular way and follow them, irrespective of their own beliefs or the tendency to follow methods of previous success irrespective of their own beliefs (VandenBos, 2007).	92.8	94.9	86.5	92.9	1.0	6.1
Belief	A tendency to accept the method, solution, procedure, or process that matches their belief (Jonathan & Feeney, 2004)	93.3	94.9	86.5	93.9	0.0	6.1
Bounded awareness	The tendency to fail to notice the crucial information, options, roles, and parties involved (Elicianea et al. 2020)	100.0	100.0	100.0	100.0	0.0	0.0
Chain reaction	The tendency to be unaware or unresponsive to people's reactions happening in the process chain	100.0	100.0	100.0	100.0	0.0	0.0
Congruence	The tendency to rely on direct data and facts rather than derived data or the	95.1	96.7	93.7	94.9	1.0	4.0

Bias	Description	% Mean			% Response		
		Experience	Position	Case study	Positive	Negative	Nil
	tendency to adopt direct hypotheses tests instead of possible alternative hypotheses tests (Baron 2008)						
Context-dependent cues	The tendency to recollect any situation after being nurtured with past examples or situations((Simon-Kutscher et al. 2019)Godden & Baddeley, 1975)	92.2	94.1	85.7	87.9	5.1	7.1
Convenience	The tendency to miss or decline actions based on convenience of interpretation of instructions, policies, or procedures	95.4	97.0	95.7	93.9	1.0	5.1
Critical response	The tendency to miss or avoid critical responses with all stakeholders	100.0	100.0	100.0	100.0	0.0	0.0
Cue-dependent forgetting	The tendency to recollect after serving with past examples or situations (Pastorino and Doyle-Portillo 2012).	96.8	96.4	94.4	90.9	6.1	3.0
Digital amnesia	The tendency to not remember information that is readily available in digital mode (Sparrow, Liu, & Wegner, 2011).	95.1	96.7	93.7	86.9	9.1	4.0
Escalation of commitment	The tendency to be more committed when the outcome is negative (Staw 2002).	93.8	94.9	87.6	93.9	0.0	6.1
Fear of job loss	The tendency to fear job loss (Vujičić et al. 2015).	95.8	95.6	94.3	89.9	6.1	4.0
Fix it Fallacy	A tendency to hurriedly solve the problem with naive solutions (Hirshleifer and Hirshleifer 2017).	95.9	97.4	94.4	96.0	1.0	3.0
Fundamental attribution	The tendency to value internal factors or characteristics more than external factors(Tukachinsky 2020).	92.0	94.0	84.9	92.9	0.0	7.1
Guidance	The tendency to seek guidance from management, people, or consultants in ambiguous situations (Kotlyar and Karakowsky 2007).	95.8	96.5	96.2	96.0	0.0	4.0
Immune neglect	The tendency to be unaware of one ability to adapt to negativity ((Martin et al. 2020)Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998).	99.4	99.1	99.5	1.0	98.0	1.0
In attentional blindness	The tendency to miss obvious or visual information when focusing on a particular task (Simons 2000).	97.9	98.4	97.1	98.0	0.0	2.0

Bias	Description	% Mean			% Response		
		Experience	Position	Case study	Positive	Negative	Nil
Long work	The tendency to work long hours for productivity, quality, earnings, promotions, and job security (Kodz et al. 2003).	95.9	97.4	94.4	97.0	0.0	3.0
Memory inhibition	The tendency not to remember irrelevant facts or situations (Wade, Tavris, & Garry, 2012)	92.7	94.1	84.9	92.9	0.0	7.1
Mere-exposure effect	The tendency to judge positively based on familiarity (Zajonc, 2001).	100.0	100.0	100.0	98.0	2.0	0.0
Modality effect	The tendency to understand based on the presentation method (Leahy and Sweller 2011).	93.3	94.9	86.5	93.9	0.0	6.1
Organisational policy	The tendency to accept or decline based on the understanding of policies or legal requirements	95.4	97.0	95.7	93.9	1.0	5.1
Patenting	The tendency to believe that patents are unnecessary to gain returns (Sampat and Shadlen 2017).	96.6	97.5	94.8	97.0	0.0	3.0
Picture superiority effect	The tendency to remember pictures or images better than words (Curran & Doyle, 2011)	93.8	93.8	87.1	93.9	0.0	6.1
Priority	The tendency to work based on priority, favour one of the response options or perceived urgent options (Dutilh and Rieskamp 2016).	98.5	99.1	97.6	99.0	0.0	1.0
Recollection	The tendency to recollect information from the past for any situation(Botvinick et al. 2009).	98.9	99.1	98.4	96.0	3.0	1.0
Reverse psychology	The tendency to project negative factors into a situation to obtain desired results (Sinha & Foscht, 2006).	92.4	94.1	90.3	91.9	1.0	7.1
Self-Integrity or preserving moral integrity	The tendency to preserve moral integrity in all situations (Kroon 2008)	100.0	100.0	100.0	100.0	0.0	0.0
SOP	The tendency to miss, deviate or decline action stated in standard operating procedure	92.8	95.0	89.5	93.9	0.0	6.1
Standardisation	The tendency to adopt the same way of operations every time (Ungan 2006).	92.8	95.0	89.5	1.0	92.9	6.1

Bias	Description	% Mean			% Response		
		Experience	Position	Case study	Positive	Negative	Nil
Status quo	The tendency to hold on to the current situation or method (Martin 2017).	94.3	95.7	88.1	93.9	1.0	5.1
Stereotype	The tendency to follow certain beliefs and ways of execution (Cox, Abramson, Devine, & Hollon, 2012)	91.7	94.0	84.9	91.9	1.0	7.1
Stress	The tendency to decline actions based on predicted stress on oneself or the process	96.9	98.5	98.6	98.0	0.0	2.0
Subjective validation	The tendency to agree with a fact or data if it matches personal beliefs (Elicianea et al. 2020).	92.2	94.0	84.9	92.9	0.0	7.1
Survivorship or Survival	The tendency to believe in mechanisms that gave success in the past and neglect other options (Shermer, 2014).	92.8	94.9	86.5	92.9	1.0	6.1
System-human	The tendency not to acknowledge system and /or human influences (Kolus, Wells, and Neumann 2018)	96.6	97.5	94.8	86.9	10.1	3.0
System-wide approach	The tendency to discount or not consider stakeholders in the system for a situation, issue, or action	100.0	100.0	100.0	100.0	0.0	0.0
Tip of the tongue	The tendency to fail to recollect familiar events or situations (Schwartz and Metcalfe 2011).	98.9	99.1	98.4	3.0	96.0	1.0
Underreporting	The tendency to underreport situations or facts (Drakos and Gofas 2006).	92.2	94.1	84.9	75.8	17.2	7.1
Zero defect	The tendency to assume or insist on zero defects in a process (Ghosh, Mukhopadhyay, and Lu 2006).	94.6	96.6	96.2	2.0	93.9	4.0
Zero-risk	The tendency to avoid complete risk or the preference for reducing a small risk to zero over a greater reduction in a larger risk (Raue and Schneider 2019)	95.7	97.5	96.7	97.0	0.0	3.0

The analysis also revealed 100% response from different cultures for Absent-mindedness, Bounded awareness, Chain reaction, Critical response, Mere-exposure effect, Self-Integrity or preserving moral integrity and System-wide approach biases. In addition, greater than 95% of all cultures responded to Automation omission, Congruence, Convenience, Cue-dependent forgetting, Digital amnesia, Fear of job loss, Fix it Fallacy, Guidance, Immune neglect, In attentional blindness, Long work, Patenting, Priority, Recollection, Stress, System-human, Tip of the tongue, and Zero-risk biases. Also, Greater than 85% of all cultures responded to Anchoring and adjustment, Automation,

Bandwagon effect, Belief, Context-dependent cues, Escalation of commitment, Fundamental attribution, Memory inhibition, Modality effect, Organisational policy, Picture superiority effect, Reverse psychology, SOP, Standardisation, Status quo, Stereotype, Subjective validation, Survivorship or Survival, Underreporting, and Zero-defect biases.

5 Practical Implementation: A Case study

Each of the case studies was substantiated with a sample implementation study. One of the case studies is outlined in this section. A Gemba study was conducted in company number 5 to demonstrate improvement in a process by understanding biases. The organisation had implemented lean practices in the primary fruit processing line and lacked lean thinking in the repack process. The study was undertaken in the repacking process, where the fruits were reinspected and repacked. The process was mapped and plotted; refer to Figure 6.

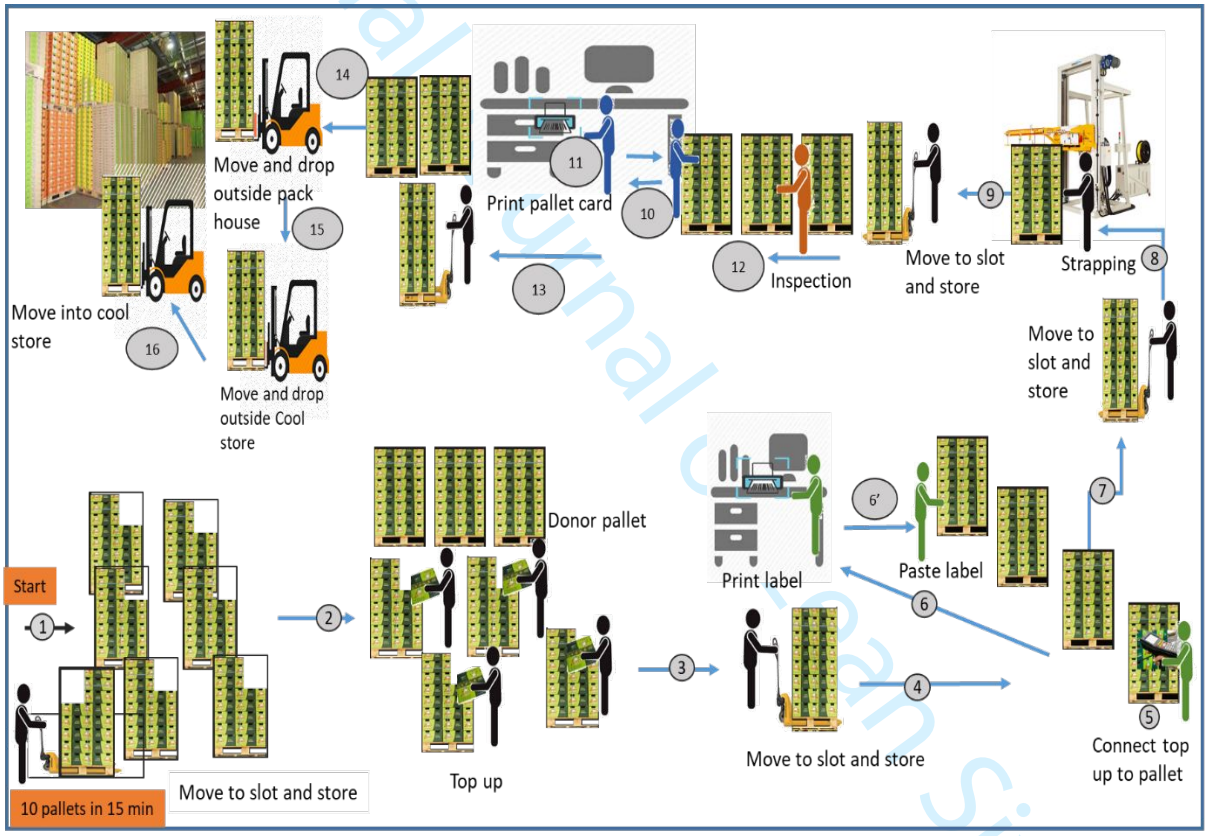

Figure 6: Repack pre-intervention process

The process started when the pallets from the inspection table flowed at a rate of 10 pallets per 15 minutes. An operator moved the pallet, aligned it, and stored it in the designated slot (1). The pallets were short of fruit boxes due to rejection at the inspection stage. Then, another set of operators topped up the pallet with fruit boxes from donor pallets, which were of the same quality and quantity requirement (2). The pallet was then moved, aligned, and placed in the labelling area slot (3). The labels for each topped-up box were scanned by an operator, who then moved to the station to print customer-specific labels and paste them on the boxes (4-6). Then the pallet was moved, aligned, and stored in the strapping area (7). After strapping, the boxes were moved, aligned, and stored in the pallet card area (8-9). An operator removed the old pallet card and scanned it. Subsequently,

the system generated and printed a new pallet card that was pasted on the pallet by the operator (10-11). This was followed by an inspection, and the pallet was passed (12). The inspected pallets were then moved and stored at a designated area for movement to a cool store (13). The pallets were then moved, aligned and stored by the forklift operator in a designated area outside the packhouse (14), which was moved later by another forklift to a designated area outside the cool store, properly aligned, and stored (15). Then the pallet was moved into a cool store, aligned, and stored at a designated slot by another forklift operator (16). Further, the process was impacted by stressors (factors that stressed the process) and associated biases, as shown in Table 6.

Table 6: Company 5 Gemba study stressors and associated biases

Process stressors	**Primary stressors**	**Remarks**	**Associated biases**
Direction for next work	waiting	The process was directed by staff, and people waited for instruction. Process errors were evident.	Absent-mindedness, bandwagon effect, automation omission, system-wide approach, and anchoring and adjustment.
Delay	Time	Delay and fear of missing processes were evident.	Bounded awareness, guidance, zero risk, and priority.
Time	Priorities	The team was under constant time pressure.	Bounded awareness, chain reaction, and priority.
Priority	Priorities	The team acted on priorities.	Priority, SOP and critical response

In the next phase, three discussions were held on the same day with the team specifically highlighting the biases involved to arrive at the improved process. The team was briefed on the human tendency of forgetfulness (Absent-mindedness), failing to notice the crucial information, options, and roles (Bounded awareness), and their thought alignment to the Lead staff (Anchoring and adjustment). The lead staff was asked to take data during Gemba (automation omission), consider what the team thinks (critical response), consider every stakeholder opinion (system-wide approach) and consider the effects of all departments (chain reaction). The team was encouraged to give suggestions without any guidance from superiors (guidance) and take calculated risks (zero-risk). The process was brainstormed, a continuous flow was adopted to avoid priority interference (priority), and a workable SOP was written based on trials (SOP). The change process took two and a half shifts from the start of the study till successful trial and implementation. The finalised process is shown in Figure 7.

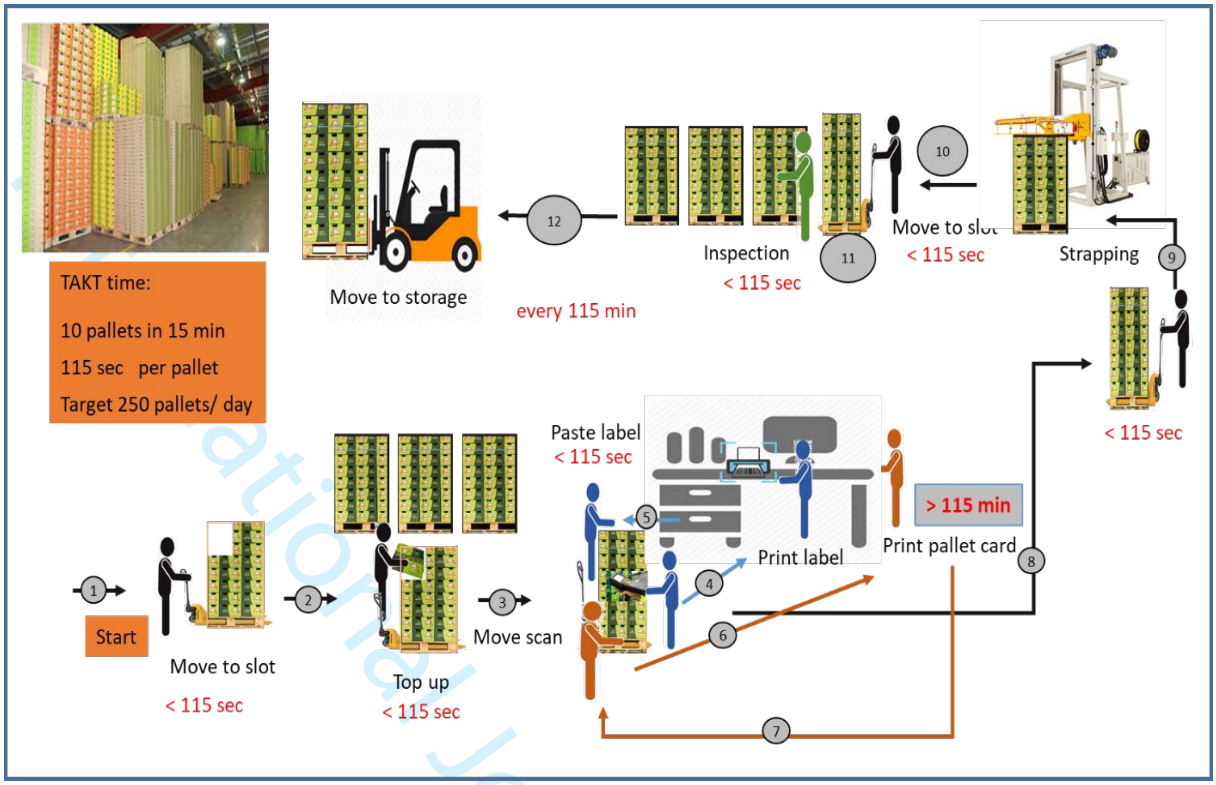

Figure 7: Improved repack process

The improved process started with the pallets from the inspection table flowing at a rate of 10 pallets per 15 minutes. An operator moved the pallet, aligned and stored it in the designated slot (1). Then, another set of operators topped up the pallet with fruit boxes from donor pallets, which were of the same quality and quantity requirement (2). The pallet was then moved, aligned, and placed in the labelling area slot (3). The labels for each top-up were then scanned by an operator, who then moved to the station to print customer-specific labels and paste them on the boxes (4-5). Simultaneously, another operator removed and scanned the pallet card, and once label printing was completed, the pallet card was printed and pasted to the pallet (6-7). In the next step, the pallet was moved to strapping, and once strapping was completed, it was moved to the inspection slot (8-10). This was followed by inspection, and the pallet was passed (11). The inspected pallets were then moved to the cool store, aligned and stored at a designated slot by another forklift (12). This stage required two forklifts to be operated simultaneously. When the report was presented to the management, they identified that a trolley could be fabricated and used to transport the fruit pallets to the cool store by using a forklift, which would carry more pallets and reduce the number of trips.

The results of the trial were that four operation steps were reduced, and staff were freed to organise the donor pallets and their next jobs. The congestion and space requirements for the operation were reduced while the process adhered to the Takt Time requirements. The status of stressors and associated biases are shown in Table 7.

Table 7: Eta Gemba study improved process stressors and biases status

Process stressors	Primary stressors	Improvement in Improvised process	Associated biases
Direction for next work	Waiting	The flow was continuous, and everyone was working on a set task that eliminated the direction, absent-mindedness, provided an alternative solution, prompted information other than system-generated and was a new experience for the participants.	Absent-mindedness, bandwagon effect, automation omission, system-wide approach, and anchoring and adjustment.
Delay	Time	Continuous flow within Takt time reduced delays and fear of missing a process step.	Bounded awareness, guidance, zero risk, and priority.
Time	Priorities	Visual information and data during the Gemba study aided the continuous flow and reduced the time required to perform the overall process.	Bounded awareness, chain reaction, and priority.
Priority	Priorities	Continuous flow within Takt time avoided priorities at this stage.	Priority, SOP and critical response

A note of caution is that the implementation study results should be interpreted as cognitive biases that were barriers to lean practices/ implementation (Kaizen, Gemba and continuous flow). The biases' elimination without the use of lean tools may not yield desired results.

6 Discussion

The literature review revealed numerous lean barriers were identified (refer to Table 1). The lean barriers identified included human factors such as behaviour, conflict, skills and training, culture etc. The literature review also revealed that researchers have not yet understood the cognitive influences that drive behaviour to a certain extent. Few researchers have briefly identified the cognitive influence; however, in-depth studies have not been undertaken yet. Through its qualitative approach (as elaborated in section 3), this research aimed to stretch the existing human factors understanding and knowledge by linking cognitive biases to lean practices.

System-wide biases present in organisations: Barriers to lean implementation and continued practices are attributable to human, technical, organisational, and economic factors (Kumar and Kumar 2014). Through a system-wide investigation of seven organisations practising lean, this empirical research identified 45 prominent biases out of 239 previously identified in other fields and Lean. Further, this study identified nine novel biases (Chain reaction bias, Convenience bias, Critical Response bias, Group reaction bias, Health and safety bias, Organisational Policy bias, Standard Operating Procedure (SOP) bias; Stress bias and System-wide approach bias) that were not identified previously in the literature. Out of the nine novel biases, seven appeared in the prominent biases list. This research identified that people tended to decline support based on the predicted reactions of their group. This is an addition to previous findings that identified individual views related to the group (Kazenin and Kozlov 2020), support for the group (Jones and Roelofsma 2000), group formation (Larson and Lewis 2018), incline to the majority view in a group (Kotlyar and Karakowsky 2007)and garner group support (Tversky and Kahneman 2018)

The current study on biases found similarities with previous studies in other fields where people followed the chain of command (Daylamani-Zad, Graham, and Paraskevopoulos 2019), had a lack of control (Safra, Baumard, and Chevallier 2018), identified loopholes to blame (Sterman 2006) and

sought guidance (Kotlyar & Karakowsky, 2007). This study additionally revealed that people were unaware or unresponsive to the people's reactions happening in the process chain (chain reaction bias), tended to miss or avoid critical responses with all stakeholders (critical response bias) and discount or not consider stakeholders in the system for a situation, issue, or action (system-wide approach). The study results showed that 93.9% of people would decline actions based on the convenience of interpreting instructions, policies, or procedures (convenience bias). Mostly, people accept or decline actions based on the understanding of policies or legal requirements (organisational policy bias), out of which 56% of people specifically predicted the consequences of health and/or safety (health and safety bias);

Furthermore, the findings presented here showed that 92% of people reported documents that were not in a standard format, and different reports were available for the same situation as people tend to work with their format, which differs from Ungan (2006), who revealed that people tended to document in a standard format. In addition, 93.9% of people reported a tendency to miss, deviate or decline action stated in an SOP bias. The most interesting finding was that 98% of people stated that for every change, they would determine benefits, such as reduced work /effort, or else decline actions based on predicted stress on oneself or the process (stress bias). The probable reason could be that people tend to take advantage of every change and are unwilling to be disadvantaged. This research identified fear of failure, change of job, lack of control, and self-perceived job insecurity as system-wide biases, and fix-it fallacy, standardisation, and status quo as prominent biases. Previously, researchers have also identified self-perceived job insecurity (Keyser, Sawhney, and Marella 2016), fear of failure (Salonitis and Tsinopoulos 2016), change of job (Bieraugel 2015), fix it fallacy (Antony et al. 2012), lack of control, standardisation (Bhuvanesh Kumar and Parameshwaran 2018)and status quo bias (Kim and Kankanhalli 2009).

Interestingly, in this deductive approach that used existing literature to identify various biases, 96% of the participants responded relevantly to questions sharing their past and future experiences, demonstrating a negative response to absent-mindedness and tip-of-tongue biases and a positive response to recollection. This could demonstrate the ability to recollect processes, past practices and mistakes made when needed. Similarly, participant observation and interviews showed that 98% of participants were able to adapt to negativity and had a negative response to immune neglect bias. This could demonstrate responsiveness. It is somewhat surprising that guidance bias was noticed in an unionised environment similar to a non-unionised environment, with 96% of participants wanting suggestions to be implemented after management approval. This could demonstrate the willingness to work with management and avoid possible conflict with them.

Further, the observation and interview supported the negative response to standardisation. Participants expressed that deviations from SOPs in a practical work situation are practised as the SOP is documented by people who were not doing the actual work. The possible reasons could be the correctness of SOPs and not updating them for every change, and lack of involvement in involving operators in creating them. However, participants accepted or declined situations based

on the SOPs. The literature review did not reveal any identical articles that discussed the above biases concerning the process or Lean practices. This result is somewhat counterintuitive concerning zero defect, where 93.9% of respondents stated they did not expect to have zero defects. This differed from Lee, Siu, and Zhang (2017) article, which stressed zero defect. This could demonstrate that people do understand that errors can happen in-process, and over a while, this may lead to an organisation taking errors lightly. However, 97% of participants were in favour of zero risk, which confirmed the findings of Friedman (2017) and Gudivada, Ramaswamy, and Srinivasan (2018). A possible explanation for this might be that participants avoid risk to the best of their knowledge and possibly accept defects if they happen despite extensive scrutiny of processes and practices.

The study found similarities in people's responses to the bandwagon effect, stereotype, survivorship, and status quo biases. These relations may be partly explained by the fact that people tend to follow successful practices (bandwagon effect), repeatedly (stereotype), maintain the current level of performance (status quo), and focus on their survival (survivorship), thus offering fewer suggestions to improve the process productivity. Other important findings were that people relied on IT system information (automation), missed information other than those provided by IT systems (automation omission), did not remember vital data (digital amnesia), often relied on direct data (congruence), and ignored obvious or visual facts (in attentional blindness). This could allow defects to reach the field that is not captured by automation, and missing vital data could increase cost, reduce profitability, and mislead strategy development. Surprisingly, 86.9% of participants failed to realise the system-human influence, and 75.8% were under-reporting a situation. In this study, 89.95% of participants reported fear of job loss. This data must be interpreted with caution because it is difficult to explain this result, but it might be related to various factors such as stress, biases, age, organisation management, performance, and automation.

Seven of the novel Biases (chain reaction, convenience, critical response, organisational policy, SOP, stress, and System-wide approach biases) identified during the research appeared in the prominent biases list that influences lean organisations. The possible reason for inclusion could be that these could be prominent in Lean, multicultural, or New Zealand environments. The exclusions were group reaction and health and safety bias. The possible reason for exclusion could be that people would not openly acknowledge groups in the industry and think themselves healthy and working safely. Overall, 45 biases (refer to Table 5) are identified that influence Lean organisations in a multi-cultural environment. The narrative analysis revealed the interlink between various biases. Figure 8 below shows the links between various biases and the polarity of impact. The positive and negative impacts are represented by + and – signs and colour-coded blue and red, respectively.

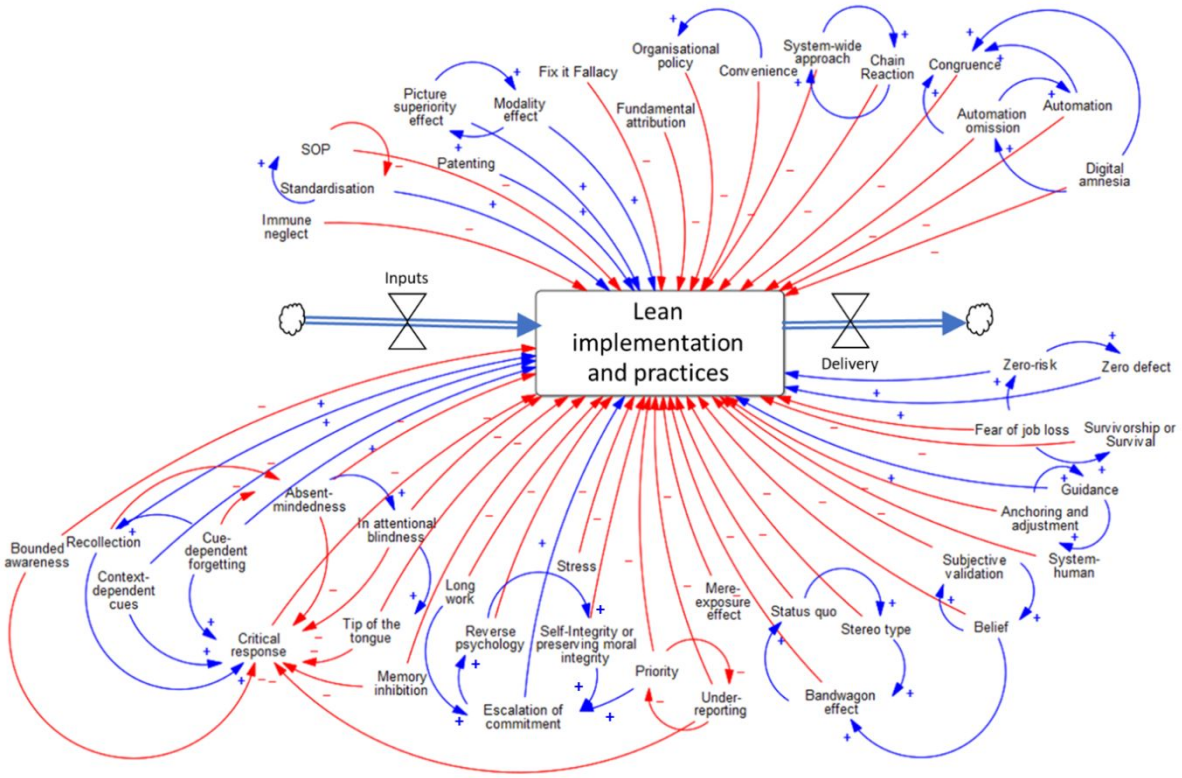

Figure 8: Cognitive Biases interaction and influence on lean implementation and practices in a multicultural environment

The key takeaway from Cognitive Biases interaction and influence on lean implementation and practices in a multicultural environment (refer to Figure 8) is that the critical response bias is influenced by 8 other biases, essentially reiterating that the human response is highly influenced by biases that act in tandem or against each other. The critical response is probably the influencer of conflicts and behaviour barriers identified in the literature review. The study also revealed that escalation of commitment is influenced positively by priority, long work, reverse psychology and self-integrity biases. The escalation of commitment in a work environment is itself a positive approach that can benefit lean practice. However, long work may affect health in the long run. Priority and underreporting biases negatively influence each other, probably because one leads to the other. Status quo, stereotype, and belief, along with subjective validation biases, positively influence the Bandwagon effect, probably because all of these biases lead to following existing practices, avoiding improvements and a key barrier for Kaizen. Guidance and anchoring, and adjustment positively influence each other. Guidance is probably linked to training and skill development; these biases also positively influence lean implementation.

The case study (refer to section 5) provides insight into more barriers to Kiazen and lean implementation linking to biases. Fear of job loss influences survival ship bias, both can adversely affect lean implementation and practice and they tend to avoid kaizen implementation and follow old practices. However, the fear of job loss can influence zero risk and zero defect, which advocates enhanced quality, health, and safety. Automation omission and digital amnesia can lead to complete automation. However, complete reliance on automation (or autonomation) without human intelligence can prove detrimental. Heavy dependence on automation resulted in Toyota's 8.5 million

vehicles being recalled in 2010 due to quality concerns about the braking system (Dibia & Onuh, 2010). Standardisation positively influences SOP bias, probably because SOP encourages standardisation. However, SOP negatively influences standardisation because of the frequent updations required when implementing kaizens. SOP bias is specific to lean practices and adds to the existing knowledge of lean barriers and the list of biases. The convenience bias is influenced by organisational policy, probably because people tend to interpret the policies to suit their needs and belief. However, both these biases add to the existing knowledge and adversely affect lean implementation. System-wide approach and chain reaction add to existing knowledge of lean and biases that work in tandem and negatively affect lean implementation. This is probably due to either people not considering all stakeholders or reacting based on things happening. Biases such as the fix-it fallacy that advocates quick solutions and fundamental attribution that focus on the blame game negatively influence lean implementation and practices are an addition to the knowledge of lean barriers. These were probably generally listed by researchers as cultural and human barriers.

Effects of different cultures on bias in organisations: The study had voluntary participation from European (45%), Asian (18%), and Pacific (35%) cultures. The study revealed 100% response from all cultures for absent-mindedness, bounded awareness, chain reaction, critical response, mere-exposure effect, self-Integrity or preserving moral integrity and system-wide approach biases. In addition, greater than 95% of all cultures responded to automation omission, congruence, convenience, cue-dependent forgetting, digital amnesia, fear of job loss, fix-it fallacy, guidance, immune neglect, attentional blindness, long work, patenting, priority, recollection, stress, system-human, the tip of the tongue, and zero-risk biases. In addition, greater than 85% of all cultures responded to anchoring and adjustment, automation, bandwagon effect, belief, context-dependent cues, escalation of commitment, fundamental attribution, memory inhibition, modality effect, organisational policy, picture superiority effect, reverse psychology, SOP, standardisation, status quo, stereotype, subjective validation, survivorship or survival, underreporting, and zero-defect biases. In addition, from the percentage mean of Table 5, it can be inferred that the percentages of responses were between 85.6% to 100%. This shows that the cultural influence on these biases was minimal. This also meant that the cultural influences on these 45 prominent biases could be ignored for all practical purposes. The probable reason could be that organizational culture is the driver behind system-wide biases on lean and is a field that could be studied in future. The study found similarities with (Purushothaman, Seadon, and Moore 2021) and identified biases such as bandwagon effect, congruence, fix-it fallacy, guidance, planning fallacy, priority, loss aversion, long work, Self-integrity, standardisation, survivorship, system-human, zero-defect, and zero risk influence on lean in a multicultural environment. However, the study analysis did not support the influence of biases such as fear of failure, self-perceived job insecurity, person-environment fit, confirmation, technology aversion, herd instinct and hyperbolic discounting affect, pseudo-certainty effect, self-serving, unacceptability, loophole, gender, project short implementation, change dilution, chain of command, change of job, over entry, authorisation conjunction fallacy, lead, omission, the illusion of control, information and illusion of transparency choice supportive, irrational escalation,

agreement, patenting, talent misjudgement, group formation, clustering illusion, stakeholder trust, trust, easy study, no time and energy. This may be probably due to the multicultural factor. However, the case study demonstrates the practicality of cognitive biases in understanding and implementation to attain the maximum value of Lean.

7 Conclusion, limitations, implications and outlook

Implementation of Lean tools in an organisation aids the achievement of a common business goal and environmental measures (Womack and Jones 2010). Lean implementation and sustenance depend on human factors, especially cognitive biases. This research used a multiple case study approach to identify the biases present in a multicultural Lean environment. The study's objective was to consider system-wide relationships that identify biases in a Lean environment. The research collected data through a systematic literature review and semi-structured interviews, as detailed in section 3. The research used narrative analysis (detailed in section 3) to get the results that were substantiated with a sample implementation study. The results of this empirical research showed that 45 biases are commonly present in a lean environment that could influence positively or negatively (refer to Table 5 and Figure 8). These findings are additions to the existing knowledge on lean barriers. Notably, seven out of nine novel biases (chain reaction, convenience, critical response, organisational policy, SOP, stress, and system-wide approach biases) that were identified during the research played an important part in a Lean environment. These were additions to the existing knowledge of biases as well as lean barriers. Patenting, standardisation, picture superiority effect, modality effect, recollection, context-dependent cues, escalation of commitment, guidance, zero defect, and zero risk positively impacted lean practices. However, there was no indication that cultural background made a difference in cognitive biases' influence on Lean. The study agrees with previous literature that there are barriers to lean implementation. However, this research, through the findings from the data yielded by the study, supports the notion that establishes biases influence Lean and biases are barriers to lean implementation.

A theoretical implication of the research is that managers can cultivate cognitive biases to the advantage of Lean and its implementation. This research adds to the prominent biases and their effects on existing theories that evaluate and mitigate barriers to Lean. This research highlights the qualitative perspective of cognitive biases through narrative analysis and its practical implementation via a case study. The practical implications would include cognitive knowledge that will aid managers in implementing lean methodologies with less resistance. This cognitive knowledge of prominent biases will aid managers in understanding human behaviour and mood swings which can be negated to the advantage of lean implementation and continual practice. The case study in section 5 demonstrates the practicality of the study.

This study can be utilised to identify specific biases that could influence Lean positively or negatively and take suitable remedial actions. The limitation of the study in New Zealand and its sample size needs to be acknowledged. Further empirical research is needed to understand the root cause and quantify cognitive biases' positive or negative influence on lean in a business environment. Another

limitation was that biases in the literature were identified from English language publications, and biases identified by authors in other languages had not been a part of this study. The research recognised this limitation.

The study recruited participants with different positions and varied experiences, covering a range of industries practising lean; the following limitations existed:

- Core manufacturing sectors, like original equipment, construction and automobile, and non-core manufacturing sectors, like health, education, and government functions, were not covered, and they may yield differences in findings; and
- The study covered a limited five sectors; other sectors may use different or additional Lean tools, which may yield additional knowledge to the field.

Like any qualitative research, constructivism and narrative analysis are subjected to understanding based on knowledge gained on the subject, and data may have been interpreted differently. Constructivist co-recreation of process scenarios-based result limitations are therefore acknowledged. However, research design and generalisation based on data collection and analysis methods limit these effects, and findings are reliable to a greater extent. The interactive participation in exploring the knowledge sought after and interaction that could probably influence the participant needs to be acknowledged. However, the research design and multiple data collection methods limit the influence's effect.

These limitations are a future outlook for the research community. Future research could yield a new set of biases from fields not covered in this research. Future research on other industries could highlight more influences of bias in a Lean environment. Further, research on core manufacturing industries would throw new insights into biases influence that would be of productive interest to industry and academics. Furthermore, research on bias influence on different lean tools could be taken up in the future.

This is the first qualitative study focused on biases influence on lean practices in multicultural business processes that highlights the positive and negative impacts of 45 prominent cognitive biases on Lean practices. For the first time, nine novel biases specific to the lean environment is highlighted are and discussed in a multicultural environment, and the influences and interlinkages of prominent biases are plotted over the Lean process that shed light on the human cognitive barriers. As demonstrated in section 5, the practical implications include understanding human cognitive barriers that can provide a new approach to taking remedial steps on biases influence processes, thereby improving the values such as productivity, quality, cost, delivery, and sustainability provided by Lean practices.

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Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Absent-mindedness	A tendency to forget events, situations, or facts	People	Recollect	Forgot, fail to recall, be unable to remember, erase from the mind, overlooked, not remember, and not recalled
Actor and the observer	The tendency to credit those behaviours and temperaments to others, which one would not attribute to himself.	People	Correlation	Bad about others behaviour and temperament
Affective forecasting/ Variation of durability/ Hedonic forecasting	The tendency to over estimate time and value of the future events.	Cost, time and/ or energy	Valuate	Over estimating/ appraising time
Age	The tendency to consciously or unconsciously avoid equal opportunity based on the age of a person	People	Preference	Preference based on age
Agreement / Collective consciousness	The tendency to possess collective consciences for achieving a common goal.	Group	Preference	Agreeing, supportive, approving, like-minded, harmonising, in agreement, in favour, reach an agreement, come to an understanding, supplementing, concurring, consenting, or go along with team.
Alternatives	The tendency to choose a particular practiced or known option more often when there are additional alternatives.	Decision	Inclination	Known alternative/substitute process
Ambiguity effect	The tendency to decide with uncertainty or insufficient information.	Decision	Ability	Decide with limited, incomplete, imperfect, partial, inadequate, restricted, or insufficient information.
An appeal to probability or possibility	The tendency to take things for granted and assume that it would be a particular situation or case.	Decision	Belief	Assuming its only for a particular case
Anchoring and adjustment	The tendency to relate facts to a prominent person's view, prominent situation, or first information and later adjust to it while talking decisions.	People	Influence	Relevantly relate to superior, well-known, important, high-up, or top person views.
Anchoring or focalise	The tendency to incline on the first information while taking decisions.	People	Correlation	Believe first information
Anecdotal	The tendency to judge based on own experience or rare happenings instead of facts, data, or evidence.	People	Inclination	Trusting experience/ rare happening
Anthropomorphism	The tendency to relate human feelings to non-human beings or objects	Relate	Correlation	Machine issues related to human feeling.
Anti-trust	A tendency to suspect everything.	People	Belief	Suspect, doubtful suspicious, distrust, mistrust, disbelieve, and be wary of trust

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Appeal to novelty	The tendency to claim or believe a new modern approach is superior.	Relate	Belief	New approach, way, process, or methodology, are superior, exceptional, outstanding, notable, best quality, better, greater, advanced, improved or enhanced.
Argument from fallacy	The tendency to believe that since the view or fact has a mistaken belief its result or conclusion is wrong.	Decision	Belief	Results are wrong because of misconception, a mistaken belief or erroneous belief.
Asymmetric dominance effect / The decoy effect	The tendency to prefer an advantageous situation, thing, or person between the two choices after presented with lesser advantage third choice.	Decision	Correlation	A decision on advantageous initial choices.
Attentional	The tendency to judge based on selective attention to negative, positive aspects, data or facts, specifically to pay greater attention to sources of threat.	Cost, time and/ or energy	Correlation	Judgement based on positivity, negativity, threat, danger, risk, hazard, or warning
Authorisation	A tendency to overestimate the risk of unauthorized actions.	People	Valuate	Unauthorised action risk, danger, hazard or threat
Autocratic	The tendency to assume having complete knowledge on the subject and irrespective of the requirement dominating the judgment, process, and directing others.	People	Belief	Control, direct, manage supervise, or regulate every process step.
Automation	The tendency to rely on automation and ignore differing facts presented without automation.	Automation	Valuate	Automation, computerisation, robotics or mechanisation focus to get data and facts.
Automation adherence	The tendency to adhere to automation though better alternatives are available.	Automation	Preference	Automation, computerisation, robotics or mechanisation focus for process step though other options are available
Automation omission	The tendency to miss information, events, data, facts when not prompted by automation.	Automation	Omit	Miss, neglect, forget, overlook, ignore, skip, exclude, or leave out data and facts when not prompted/ notified by automation, computerisation, robotics or mechanisation.
Availability heuristic	The tendency to make decisions based on recalled experience or examples.	Decision	Decision	Based on experience, knowledge skill, practise, or familiarity examples
Bandwagon effect	The tendency to believe in data, facts, or situations to align themselves to majority people belief in a particular way and follow them, irrespective of their own beliefs or the tendency to follow methods of previous success irrespective of their own beliefs.	People	Believe	Believe and follow the way that others believe as successful, fruitful, positive, effective, profitable, or productive
Barnum / Forer effect	The tendency to accept vague universal data or facts as	Relate	Relate	Trust vague, unclear, imprecise, or ambiguous universal data

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
	correct and/ or relate universal vague descriptions to oneself.			
Base rate fallacy	A tendency to consider specific information and ignore base or general information in decision-making.	Decision	Decision	Considering specific info
Belief /prior hypothesis	A tendency to accept the method, solution, procedure or process that match their belief.	People	Belief	Accept the method, solution, procedure or process when belief/ faith match.
Bizarreness effect	The tendency to remember odd situations more than normal situations, while making decisions.	Decision	Decision	Remembering/recalling odd, abnormal, unusual, peculiar, weird, or uncommon situation/ examples while making decisions.
Blind spot	The tendency to understand other people bias and fail to recognise own biases.	People	Belief	Identify other's bias and miss their own
Bounded awareness	The tendency of failing to notice the crucial information, options, roles, and parties involved.	People	Omit	Missing crucial information, options, roles, and parties involved.
Chain of command	The tendency to follow the rules, policy, procedure, methods or technology after direction or approval from the management.	Management	Preference	Follow the rules, policy, procedure, methods or technology after direction or approval from the management.
Change blindness	The tendency to overlook or not noticing changes.	People	Omit	Not noticing changes, modifications, transformations, or amendments.
Change dilution	The tendency to continue the existing process, procedure, or method and simultaneously implementing the required changes for correcting the issues or the tendency to believe in not diluting the current status when change is happening.	Management	Preference	Prefer to undertake changes, modifications, transformations, or amendments while the process is live.
Change of job	The tendency to have anxiety on the known or unknown job change.	People	Believe	Concerned on job change, alteration, modification, amendment, exchange, or swap
Cheerleader effect	The tendency to believe that people as a group are more attractive or effective.	Group	Believe	State attractive as a group
Choice-supportive	The tendency to attribute success to the decision made by oneself.	People	Believe	Self-praising/ attribute success to the decision made by oneself
Clustering illusion	The tendency to see imaginary patterns or erroneously interpret patterns from random samples as non-random.	People	Imagine	Imagine or incorrect interpretation of patterns.
Confabulation	The tendency to fabricate or modify own memory unintentionally.	People	Recollect	Memory modification
Confidence	The tendency to overestimate own skill, ability to control oneself or environment.	People	Overestimate	Overestimate one's skill and ability.

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Confirmation	The tendency to interpret facts or data's as per self-beliefs.	People	Belief	Interpret data/ fact based on self-belief/faith
Confirmation evidence trap	The tendency to explore information, data, events, or facts that confirm the initial choice.	People	Explore	Find information, data, events, or facts that confirm the initial choice
Confirmatory	The tendency to search or interpret information in a way that confirms own preconceptions.	People	Search	Search information, data, events, or facts that confirm the preconceptions/ predeterminations.
Congruence	The tendency to rely on direct data and fact rather than derived data or the tendency to adopt direct hypotheses test instead of possible alternative hypotheses tests.	Automation	Belief	Relying on direct data, information, facts, records or statistics.
Conjunction fallacy	The tendency to assume that specific conditions are more probable than general ones.	People	Belief	Specific conditions are more likely, possible, apparent, evident or noticeable
Conservatism	The tendency of not grasping negative facts to one's beliefs.	People	Omit	Dose not obtain, collect, accept, or gather negative facts.
Context-dependent cues	The tendency to recollect in any situation after nurtured with past examples or situation.	Examples	Recollect	Recollect after giving examples
Cross-race effect/Own-race	The tendency to recognise persons of the same origin.	Group	Preference	Recognising person of the same origin
Cryptomnesia	The tendency to believe recalled memory as new and original.	People	Recollect	Past incidence as new.
Cue-dependent forgetting	The tendency to recollect after served with past examples or situation.	Examples	Recollect	Remembering after providing an example of the situation.
Curse of knowledge	The tendency to predict with the knowledge one possesses instead of predicting from others view or fact presented.	People	Predict	Relying on self to judge based on knowledge/ experience without considering others views fact or data
Declinism	The tendency to value the past positively and future negatively	Relate	Valuate	Past work/ job environment/opportunity good and future is bad.
Default	The tendency to choose pre-determined options negating superior options	Decision	Decision	Pre-determined choice.
Defensive attribution	The tendency to defend one's self-esteem in any situation.	Performance	Defend	Defend self-decision, performance, routine, or functioning.
Denomination effect	The tendency to prefer spending large sum rather than its equivalent small sums.	Relate	Preference	Spending a large amount verses small equivalent.
Denying value trade-offs.	The tendency to over-value favoured alternative by denying value trade-offs.	Decision	Valuate	Over value their option
Devaluation	The tendency to de-value alternatives.	Relate	Valuate	Devalue alternatives.

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Diffusion of innovation theory / Pro-innovation	The tendency to ignore limitations or weakness of own innovation.	Decision	Omit	Ignoring one's own innovation weakness or limitations
Digital amnesia	The tendency to not remember information that is readily available in digital mode.	Automation	Recollect	Not remember information, data, statistics, facts, figures, or report when available digitally.
Disagreement	The tendency of not stating disagreements in a forum.	People	Disagreement	Not disagreeing in form/group.
Disaster neglect	The tendency of constructing negative scenarios that do not reflect the correct magnitude of the disaster.	Relate	Construct	Constructing fallacious, misleading, erroneous, deceptive, false, wrong, or untrue negative scenarios.
Disposition effect	The tendency to dispose of the value appreciated things and retaining the depreciated things.	Decision	Dispose	Positive value things passed and negative held
Distinction	The tendency to distinct two opinions while considering at the same time or relating closely when viewed at different time.	Relate	Time	Distinct two different options of the same time or relating two different options of different time.
Dunning–kruger effect	The tendency to overestimate one's ability based on illusion.	People	Ability	Imaginary overestimation of one's ability
Durability	The tendency to overestimate the duration of the emotional impact.	People	Valuate	Overestimating emotion
Duration neglect	The tendency to judge on positivity or negativity ignoring their duration.	People	Time	Judgement on situation, problem, process, procedure, method, practice, or activity ignoring time.
Easy study	The tendency to take the easy and unproblematic area/time for a study to prove the subject worthiness.	Management	Consider	Easy, stress-free, comfortable, simple, unproblematic, or painless area/ time for a study
Effort justification	The tendency to overvalue the results while involving self-effort or contribution.	Relate	Valuate	Overvaluing self-results.
Egocentric	The tendency to overemphasises, unduly trust, or overestimate one's belief as reality.	People	Belief	Overemphasise ones idea/ belief as reality
Empathy gap	The tendency to underestimate own or others emotions while taking decisions.	Decision	Underestimate	Emotions during the decision process.
Endogeneity.	The tendency to omit erred variables.	Decision	Omit	Omitting erred variables, information, statistics, facts, figures, numbers, records, documents, or files.
Endowment effect / Divestiture aversion / Mere ownership effect	The tendency to over valuate own creations or things	Relate	Valuate	Over valuate, appreciate, respect, cherish, or assess ones idea/creation.
Escalation of commitment	The tendency to be more committed when the outcome is negative.	Negativity	Committed	Working intensely, vigorously, rigorously, relentlessly or fast when results are negative.

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Ethnic	The tendency to have a positive or negative outlook because of the ethnicity.	Group	Outlook	Based on ethnicity.
Expectancy	The tendency to distort to achieve one's expectations.	Decision	Distort	Distorting facts for ones benefit, prospects, opportunities, anticipations, or expectancies.
Experimenter	The tendency to consciously or unconsciously influence participants to achieve the believed data's or results.	Decision	Influence	Researcher influencing others for achieving ones believed data's, results, benefit, prospects, opportunities, anticipations, or expectancies.
External influence	The tendency of being influenced by external agencies.	External	Influence	Influenced by auditors, consultants, government and legal authority, or other external agencies.
Extrinsic incentives	The tendency to believe that others motive is more coinage than to gain skill or knowledge.	Relate	Belief	The motivation of others is money, income, funds, assets, cash, or currency.
Fading affect	The tendency to forget negative events faster than positive events.	People	Negativity	Forgetting negatives
False-consensus	The tendency to believe that their belief is normal and similar to others.	People	Belief	All think alike/ agrees with their belief and it is normal.
Fear of failure	The tendency to minimise the risk of failure at the cost of success.	Negativity	Avoid	Minimise risk always.
Fear of job loss	The tendency to fear job loss.	Negativity	Fear	Fear to loose job
Fix it fallacy	A tendency to hurriedly solve the problem with naive solutions.	People	Resolve	Quickly solve problem/ issues
Focusing illusion	The tendency to attach importance to a single factor, information, or event while neglecting unavailable information or other important events.	Relate	Importance	Attach importance to single factor, information or event while neglecting unavailable information or other important events.
Framing effect	The tendency to frame an opinion based on the presentation method.	Relate	Presentation	Importance to presentation method.
Frequency illusion	The tendency to notice things or their similarities, which come into own thoughts.	People	Notice	Similarity observing, or people repeat the same answer for different questions.
Functional fixedness	The tendency to believe that the data, fact, or view is to be used only in a traditional way, as previously used, or as per the original intended purpose.	Decision	Belief	Using data only to the purpose intended / not using data for other solutions/ideas.
Fundamental attribution	The tendency to value internal factors or characteristics more than external factors.	People	Valuate	Estimating internal factors more than external.
Gambler's fallacy/ Monte carlo fallacy/ The fallacy of the maturity of chances	The tendency to believe frequent occurrences indicate that it would occur less in the future and vice versa.	Decision	Belief	Predicting future occurrences based on the frequency

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Gender	A tendency to impart unequal treatment based on gender of an employee or group of employees	People	Preference	Discriminating, distinguishing, differentiating, favouring, or victimising based on gender
Generation effect	The tendency to remember own generated ideas more than acquired.	People	Recollect	Remembering own idea more than acquired.
Group attribution error	The tendency to believe or relate an individual's view or behaviour to the group.	Group	Relate	Relate, connect, or associate individual views or behaviour to his group.
Group escalation of commitment	The tendency to continue support to the group during a negative outcome.	Group	Support	Support group during a negative outcome.
Group formation	The tendency to form small groups within a team and discuss an issue on side-line.	Group	Form	Forming small groups
Group polarization Majority	The tendency to incline to the majority view, irrespective of fact and data.	Group	Incline	Incline to the majority view.
Group think	The tendency of inclining to garner the support of a group.	Group	Incline	Incline and get group support.
Guidance	The tendency to seek guidance from management, people, or consultants in ambiguous situations.	Management	Guidance	Seeking guidance or approval from superiors or management
Halo effect	The tendency to have an opinion on view, situation, or people as an observer and later use appropriately. The decision maker sees a story as more emotionally consistent than it really is.	Decision	Opinion	Stay as an observer of a problem and use it at an appropriate time/ else ware.
Herd instinct	The tendency to adopt the opinions and follow the behaviours of the majority to avoid conflict or be secure.	Group	Opinion	Inclining to a majority to be safe or avoid conflict/ disagreement.
Hindsight	The tendency to relate one's non-factual prediction to its prior predictability or believe the result all along the process.	Relate	Believe	The result is based on non-factual prediction.
Hot-hand fallacy or phenomenon	The tendency to believe that random success has subsequent success with more attempts.	Relate	Believe	Random success has subsequent success with more attempts.
Hyperbolic discounting	The tendency to inconsistently discount, the fact, or evidence based on the duration of time. The tendency to have a stronger preference for immediate payoffs rather than later payoffs.	Cost, time, and/ or energy	Time	Inconsistently discount, the fact, or evidence based on the duration of time, emphasising its applicable only to past or future
Identifiable victim effect	The tendency to compensate individual higher than the group in a similar situation.	People	Inclination	Individual compensation higher than group

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Illusion of asymmetric insight	The tendency to influence people or situation with knowledge, to gain an advantage.	People	Influence	Influencing others with knowledge, skill, expertise, or familiarity on the subject.
Illusion of control	The tendency to overestimate one's ability to control or influence outcomes that they clearly cannot	People	Ability	Overestimating one's ability to control or influence outcomes.
Illusion of external agency	The tendency of being influenced by an external or unfamiliar participant or situation.	External	Influence	External influence.
Illusion of transparency	The tendency to overestimate others' ability to know them and their ability to know others.	People	Ability	Ability to judge others
Illusion of validity	The tendency to overestimate own ability to judge outcomes based on a steady pattern.	People	Ability	Ability judge outcome based on a steady pattern.
Illusory correlation	The tendency to believe in the fallacious correlation among facts, people, or situations.	People	Believe	Believing a false correlation of facts, people, or situations.
Illusory superiority/Leniency error/Sense of relative superiority/The primus inter pares effect	The tendency to overestimate one's ability based on illusion, relatively to others.	People	Overestimate	Ability to understand the illusion.
Illusory truth effect	The tendency to trust data after considerable experience or continuous disclosure.	People	Trust	Trusting data after experiencing or continuous display.
Immune neglect	The tendency of being unaware of one ability to adapt to negativity.	Negativity	Ability	Ability to adopt negativity or negative situation
Impact	The tendency to predict others future emotional state or behaviour and overestimate the emotional impact	People	Predict	Predict/overestimate another person's emotional impact.
Implicit stereotype	The tendency to point certain characteristics or situation to a person of a specific unit.	Relate	Relate	Relate characteristics or situation to a particular person
Impossibility	The tendency to spend the effort to identify negative fact to convince oneself that it is impossible to achieve desired outcome.	Negativity	Effort	Finding/ providing negative facts, evidence, particulars, specifics, statistics, data, or circumstances to convince it is impossible.
In attentional blindness	The tendency to miss obvious or visual information when focusing on a particular task.	People	Omit	Missing visual information.
Information	The tendency to seek more information though it is irrelevant.	Relate	Correlation	Seeking irrelevant information, data, evidence, report, statistics, or facts.
In-group favouritism/In-group–out-group	The tendency to favour members of the liked group.	Group	Correlation	Group favour.

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Insensitivity to sample size	The tendency to judge without considering sample size.	Decision	Decision	Decision without sample size consideration
Intensity	The tendency to overestimate the initial intensity of the emotional impact.	Relate	Overestimate	Overestimate emotional impact.
Irrational escalation	The tendency to decide irrationally, based upon previous rational decisions or to justify actions already taken.	People	Decision	Justifying actions already taken.
Just-world hypothesis	The tendency to believe in fate for positives and negatives.	Relate	Belief	Believe in fate.
Lack of control	The tendency of not focussing effort to control events, person, or situation.	Management	Focus	Not controlling events, events, person, or situation.
Lack of systemicity	The tendency to overestimate own ability to retain all the pieces of information collected.	People	Overestimate	Overestimating one's ability to store all info with him
Lack of trust	The tendency of not trusting the stakeholders.	Trust	Trust	Lack of trust.
Lake wobegon effect	The tendency to believe that all subjects and situations are above average.	Group	Believe	All people/situations are above performing above average.
Lead	The tendency to not take the lead to expose a complicated issue for discussion.	People	Challenges	Who will tell the management, superior or the group?
Less-is-better	The tendency to prefer smaller alternative when evaluated separately instead of collective evaluation that yields a larger alternative.	People	Preference	Smaller alternatives preferred instead of major changes.
Levelling and sharpening	The tendency to recollect the smallest details and omit certain details to convenience.	People	Omit	Leave out details for convenience.
Levels-of-processing effect	The tendency to recollect or store in memory more details post in-depth analysis.	People	Recollect	The memory of in-depth analysis details.
Long work	The tendency to work long hours for productivity, quality, earnings, promotions, and job security.	People	Belief	Working long hours.
Loop hole	The tendency to identify loopholes and pass the blame.	People	Correlation	Blame others/ weak link
Loss aversion	The tendency to avoid the loss or the disutility of giving up an object is greater than the utility associated with acquiring it.	Cost, time, and/ or energy	Inclination	Avoiding loss while making decisions or operating.
Magical number seven, plus or minus two	The tendency to believe that the average number of items that comes to the memory of average human is 7 ± 2	People	Ability	Quoting about 7 instances
Masked-man fallacy Intentional fallacy Epistemic fallacy	The tendency of unlawfully arguing or judging a phenomenon or people with different qualities and properties as equal.	Performance	Unlawful	People are equal

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Memory inhibition	The tendency of not remembering irrelevant facts or situation	People	Recollect	Not remembering irrelevant facts.
Mental accounting	The tendency to mentally bifurcate and categorise economic factors.	Cost, time, and/ or energy	Calculation	Mentally bifurcate economic factors.
Mere-exposure effect	The tendency to positively judge based on familiarity.	People	Relate	Familiar things positive
Misattribution of memory	The tendency to attribute facts or situations to the wrong source.	Relate	Relate	Facts to the wrong source.
Misinformation effect	The tendency to recollect less accurate information on a situation based on post event facts or information.	Example	Recollect	Memory recall of less accurate information of a situation based on post event facts or information
Modality effect	The tendency to understand clearly based on the presentation method.	People	Presentation	Understand based on presentation method.
Money illusion	The tendency to provide or evaluate nominal financial value instead of real value in the decision process.	Relate	Valuate	The nominal value provided instead of a real one.
Moral credential effect	The tendency to establish oneself as a person to decide based on consensus but later prove otherwise.	Management	Belief	Not being a decision maker based on consensus against the associated people belief.
Moral luck	The tendency to relate moral connection to an outcome.	Relate	Relate	Moral connection to outcomes
Motivated blindness	The tendency to ignore readily available information that contradicts their preferences, when motivated.	Decision	Omit	Ignore available information if contradicts preference
Murphy's law	The tendency to believe that things, which can go wrong, wil eventually go wrong.	People	Belief	If it is, things will go wrong.
Myside Diagnostic	The tendency to selectively gather and interpret evidence that confirms own diagnosis and ignoring evidence that might disconfirm it.	People	Belief	Selectively gathering and interpreting data, information, statistics, facts, records, or documents based on self-belief.
Naive cynicism	The tendency to predict others to be more selfish than actual.	Relate	Predict	Others are selfish.
Naive realism	The tendency to believe demonstrable things around us, and judge those with disagreement as mind-set person or ignorant.	Relate	Judging	Judging that others who disagree have mind set, ignorant, uninformed, unfamiliar, inexperienced, or illiterate.
Negativity	The tendency to incline towards negativity when both positive and negative have the same weightage.	Negativity	Incline	Incline to negativity.
Neglect of probability	The tendency to judge without considering probability.	Decision	Omit	Not considering probability

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Next-in-line effect	"When subjects are next in line they may ignore cues not related to performing"	People	Ability	Ignoring unwanted cues.
No response	The tendency of waiting, watching and being unresponsive.	People	Response	Not responding to change or improvement.
No time and energy	The tendency to overestimate or believe non-availability of time and/or energy for performing a process or activity.	Cost, time, and/ or energy	Time	No time and energy
Non-rational escalation of commitment	The tendency to escalate the non-rational support or commitment to the decision.	People	Support	Support for a decision.
Normalcy/ Normality	The mental state of people in a disaster situation or tendency to fail to prepare for disaster.	People	Negativity	Not preparing, planning, training, or coaching for a negative situation.
Not invented here	The tendency to ignore views and/or facts that come from an external origin.	External	Omit	External views omitted.
Occam's /Ockham's razor	The tendency to select a solution with fewer assumptions.	Decision	Preference	Selecting option with fewer assumption.
Occupational	The tendency to incline or distance based on people occupation.	People	Inclination	Considering the profession of suggestion maker.
Omission/ Opportunity	A tendency to unconsciously avoid equal opportunity	Group	Preference	Not providing equal opportunity.
Optimism	The tendency to believe that one is at comparably at reduced risk or overconfident in own ability to avoid or avert a negative situation.	Negativity	Negativity	Thinking, judgement, belief, reasoning, or deliberating that risk in a negative situation is low.
Ostrich effect	The tendency to avoid presenting negative financial information.	Negativity	Omit	Not giving negative financial information
Out group	The tendency to avoid or misalign with non-familiar or non-genetically related individuals.	Relate	Avoid	Avoiding no familiar person
Outcome	The tendency to err in evaluating the known outcome or blame others for unfavourable outcomes and ethical violations and gain credit for the positive outcome or be influenced by an expected outcome while evaluating probabilities.	Cost, time, and/ or energy	Decision/ blame	Err outcomes, blame others for an outcome, taking more credit from positive outcome, being influenced by expected outcome.
Out-group homogeneity effect	The tendency to believe that members of the disliked group are similar and liked group members are diverse.	Group	Believe	Believe disliked group are alike and disliked group members are diverse.
Overdo	The tendency to overdo process, procedure, method, system, or technique.	People	Valuate	Over doing process, procedure, method, system, or technique

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Overconfidence effect	The tendency to overestimate, over emphasise, or over precise on subjective factors like the probability of correctness of actions, beliefs, and experience than objective factors while giving a decision.	Management	Valuate	Overestimate, over emphasising, or over precise on subjective factors or the probability of correctness of actions, beliefs, and experience.
Pareidolia	The tendency to believe non-existing familiar pattern when prompted by a situation, image or sound.	People	Recollect	Believe non-existing familiar pattern by situation, image, or examples.
Parkinson's law	The tendency to believe that effort is adjusted to the difficulty of the task.	People	Belief	The effort needed depends on the task
Parkinson's law of triviality	The tendency of the organisation to give over value to trivial issues.	Cost, time, and/ or energy	Concentrate	Organisation to devote time and effort to trivial issues greater than needed.
Part-set cuing effect	The tendency to remember the highlighted facts or events while making a decision.	Decision	Decision	Remember the highlighted, emphasised, or stressed facts or events while making a decision.
Patenting	The tendency to believe that patents are unnecessary to gain returns.	Automation	Patent	Focus on exclusive technology that needs to be patented for future business.
Peak–end rule	The tendency to form an opinion based on experience with extreme results.	Decision	Opinion	Opinion based on experience with extreme results
Person -environment fit	The tendency to believe people-environment fit has consequences and change the person if a process in not working.	Management	People change	Change the person if a process in not working.
Person identification	The tendency to identify a person to appreciate or blame	People	Identify	Blame or appreciate others
Picture superiority effect	The tendency to remember pictures or images better than words.	People	Recollect	Remember pictures/images better than words
Placebo	The tendency to believe successful methods as incompetent.	People	Belief	Believe successful methods/ technology as incompetent
Planning fallacy Hofstadter's law	The tendency to underestimate task-completion times. The tendency to predict the optimistic time required for task completion.	Cost, time, and/ or energy	Time	Underestimate / optimistic task-completion times
Positivity effect	The tendency to value positively negative situations, failures or errors created by oneself, own group or the people of own choice.	Relate	Valuate	Project/ argue positively the negative situations of own or own group.
Prejudice	The tendency to form an opinion ahead of analysing or receiving information about a person or situation.	Decision	Opinion	Form an opinion ahead of analysing.

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Primacy effect	The tendency to remember the beginning of a situation better than the middle events.	People	Recollect	Remembering the situation beginning better than in middle events.
Priority	The tendency to work based on priority, favour one of the response options or perceived urgent options.	People	Preference	Working based on priority, not on first in first out or a set pattern.
Problem set	The tendency to repeat one tactic and restrict developing alternative tactics.	Management	Preference	Using the same tactics, strategies, policies, procedures, schemes, methods, approaches, or ways repeatedly
Project success project short comings	The tendency to accept the success of a project when it achieves base requirements rather than the predicted level.	People	Accept	Accepting base results than the predicted level
Pseudo certainty effect	The tendency to make risk-averse choices if the expected outcome is positive, but make risk-seeking choices to avoid negative outcomes. The tendency to keep outlook positive under uncertainty.	Decision	Negativity	Outlook positive under uncertainty
Reactance	The tendency to enthusiastically react in self's unfavourable situation.	Negativity	Negativity	Enthusiastically, actively, willingly, devotedly, strongly, readily, or whole-heartedly react in self's unfavourable situation.
Reactive devaluation	The tendency to devalue facts and views of contender or competitor.	Relate	Valuate	Devaluate, undervalue, degrade, or fail to recognize not considering competitors/ contender views.
Reasoning by analogy	The tendency to apply simple analogies and images to guide problem definition.	Relate	Problem definition	Using an analogy, comparisons, resemblances, and visual aids
Recency illusion	The tendency to believe a long-standing concept, fact, or data as a recent one.	Relate	Beleive	State old concept as a new one.
Recollection	The tendency to recollect information from the past for any situation.	People	Recollect	Recollect information from the past for any situation
Regret	The tendency to be suspicious of omitting certain diagnosis and thereby overestimating the negative probability of analysis to avoid regret.	Negativity	Avoid	Avoid regret overestimating the negative probability
Representativeness	The tendency to overgeneralise certain characteristics or observation or overemphasise evidence that resembles and represents a particular range of events.	Relate	Emphasise	Overemphasise evidence
Restraint	The tendency to overestimate one's self-control to irresponsible actions	People	Overestimate	Overestimate one's self-control to irresponsible actions
Reverse psychology	The tendency to project negative factors to a situation to obtain desired results.	Performance	Projecting	Projecting or focused stating of negative factors

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Risk compensation	The tendency to adjust their belief or situation based on the level of risk.	Relate	Belief	Adjust based on the level of risk
Rosy retrospection	The tendency to enhance the value of past events.	Relate	Valuate	Enhancing value to the past situation
Saliency	The tendency to find confirming data and elaborate a single alternate.	Relate	Belief	Finding confirming data for particular alternate.
Selection	The tendency to incline to particular participants in a selection process.	Group	Inclination	Inclining towards a choice of people.
Selective perception	The tendency to ignore or not notice views, data, or facts contradicting one's belief.	People	Omit	Ignoring contradicting data, information, statistics, facts, figures, records, or documents contradicting one's belief.
Self-consistency	The tendency to overestimate consistency in outlook and belief, and rejecting ideas inconsistent with their experience, belief or outlook.	People	Overestimate	Overestimating consistency in outlook, viewpoint, stance, and belief
Self-integrity preserving moral integrity	The tendency to preserve moral integrity in all situations	People	Integrity	Preserve moral integrity in any situation or the fear that one's integrity is under questioning when he performs his duties or process.
Self-perceived job insecurity	The tendency to fear job loss due to innovation, improvement, or an alternate process.	People	Fear	Fear of technology, innovation, improvement, or alternate process related job loss.
Self-reference effect	The tendency to understand the information in relation to self.	People	Understand	Understand information, data, information, statistics, facts, figures, records, or documents in relation to self.
Self-serving/ Self – interest	The tendency to favour oneself or enhance self-esteem or engage in self-enhancing attributions in successful situations, and engage in self-protective attributions in negative situations.	People	Belief	State self interest
Semmelweis reflex or effect	The tendency to reject new evidence that contradicts one's belief.	People	Belief	Reject new evidence, information, data, information, statistics, facts, figures, records, or documents that contradict one's belief.
Serial position effect	The tendency to recollect start and end in a situation better than the middle sequence.	People	Recollect	Recollecting start and end of the situation better than the middle sequence.
Social comparison	The tendency to believe disliked and dejected after facing a stronger situation or contender.	Relate	Challenges	Lowness during negativity
Social desirability	The tendency to answer in a manner that is advantageously viewed by others rather than reflecting their real opinion.	People	Answer	Answer advantageously or favourably viewed by others

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Spacing effect	The tendency to understand a situation clearer when it is accessed over a period.	Relate	Time	Understanding a situation, issue, problem or difficulty after considerable experience or over a period.
Spotlight effect	The tendency to overestimate the level of attention one gets.	People	Valuate	Overestimate the level of one's attention
Standardisation	The tendency adopts to same way of operations.	Standardisation	Actions	Work in the same way as followed by others.
Status quo / Situation	The tendency to hold on to the current situation or method.	People	Embrace	Hold on to a current situation
Stereotype	The tendency to follow certain beliefs and ways of execution.	People	Embrace	Follow certain beliefs and ways of execution.
Subadditivity effect	The tendency to believe the collective probability of occurrence is less than the sum of individual probabilities.	Relate	Belief	Believe the collective probability of occurrence is less than the sum of individual probabilities
Subjective validation/ Personal validation effect	The tendency to agree with a fact or data if it match personal belief.	People	Belief	Agree with a fact, data, information, statistics, if it match personal belief.
Suffix effect	The tendency to get distracted when irrelevant information is presented.	People	Distracted	Distracted by irrelevant information
Suggestibility	The tendency to accept untruthful believable facts or data from others while recollecting a situation or incident.	External	Accept	Accept untruthful believable facts
Sunk cost	The tendency to consider invested cost while making decisions or invested cost irrationally influence on future decisions.	Cost, time, and/ or energy	Decision	Consider invested cost
Survivorship/survival	The tendency to believe in mechanisms that gave success in past and neglecting other options.	Management	Belief	Believe on the process, procedure, and methods that gave success in past.
System- human	The tendency not acknowledging system and /or human influences	Automation	Influence	Not acknowledging system and /or human influences
System justification theory	The tendency to have favourable value to oneself, own group and own social system.	Relate	Valuate	Have favourable value to oneself one's team.
Talent misjudgement	The tendency to misjudge talent and expect extraordinary results in their function.	Management	Talent	Expect extraordinary results from all people.
Technology aversion	The tendency of aversion to using technology without understanding what the technology offers.	Automation	Aversion	Aversion to using technology
Telescoping effect	The tendency to believe the recent event occurred in distant past and vice versa.	Relate	Believe	State recent event occurred in distant past and vice versa.

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Testing effect	The tendency to devote time to recollect events or situation to enhance knowledge.	People	Recollect	Devote time to recollect events or situation to enhance knowledge
The IKEA	The tendency to overvalue one's partially created things.	Relate	Valuate	Overvalue one's partially created things
Third-person effect	The tendency to believe that publicised messages impact or effect more on others.	External	Believe	Believe that publicised messages impact or effect more on others
Thyme-as-reason effect/ Eaton-rosen phenomenon	The tendency to believe things more accurate when it is rhymed.	People	Presentation	Things more accurate when it is rhymed
Tip of the tongue	The tendency to fail to recollect familiar events or situation.	People	Recollect	Fail to recollect events or situation in work place.
Trait ascription	The tendency to estimate one as predictable more than others in different situations.	Relate	Valuate	Estimate one as predictable more than others in different situations
Ultimate attribution error	The tendency to believe that group positivity is due to people character and negativity is due to the situation.	Relate	Belief	Group positivity is due to people character and negativity is due to the situation.
Unacceptability	The tendency to refuse or evade questions that may embarrass or invade privacy.	People	Refuse	Refuse or evade questions that may embarrass or invade privacy
Underreporting	The tendency to underreport situations or facts.	People	Report	Underreport situations or facts
Weber–fechner law	The tendency to recall odd situations more than normal situations while making decisions.	Decision	Recollect	Recall odd situations more while taking a decision
Well-travelled road effect	The tendency to estimate time, based on one's familiarity.	Cost, time, and/ or energy	Time	Estimate time, based on one's familiarity
Wishful thinking	The tendency to underestimate the impact or consequences based on the analysis.	Decision	Underestimate	Underestimate risk, impact, or consequences
Wrong information	The tendency to provide wrong information or wrong classification.	People	Information	Provide wrong information, data, evidence, facts, or report
Zero defect	The tendency to assume or insist on zero defects in a process.	Zero (risk or defect)	Insist	Insist on zero defects in a process.
Zero-risk	The tendency to avoid complete risk or the preference for reducing a small risk to zero over a greater reduction in a larger risk.	Zero (risk or defect)	Avoid	Avoid complete risk
Zero-sum	The tendency to believe the effect of positivity and negativity equals zero.	Zero (risk or defect)	Believe	Believe the effect of positivity and negativity equals zero

Theme: Technology
Primary code: Automation
Theme: People
Primary codes: Trust, Decision, Examples, External, Group, Management, Negativity, People, Relate
Theme: Performance
Primary codes: Cost, time, and/ or energy, Standardisation, Performance, Zero (risk or defect)

Cognitive biases that influence Lean implementation and practices in a multicultural environment

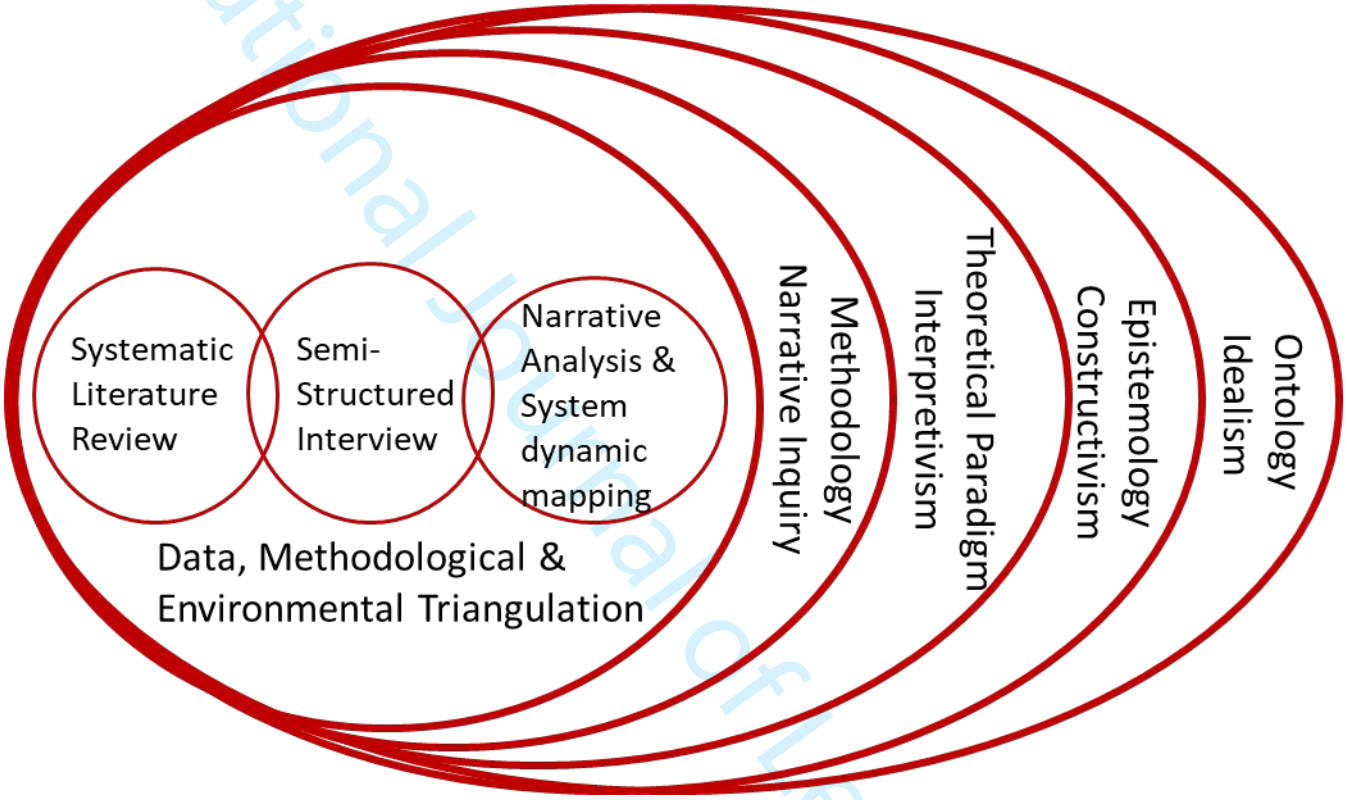

Figure 1 Research Onion

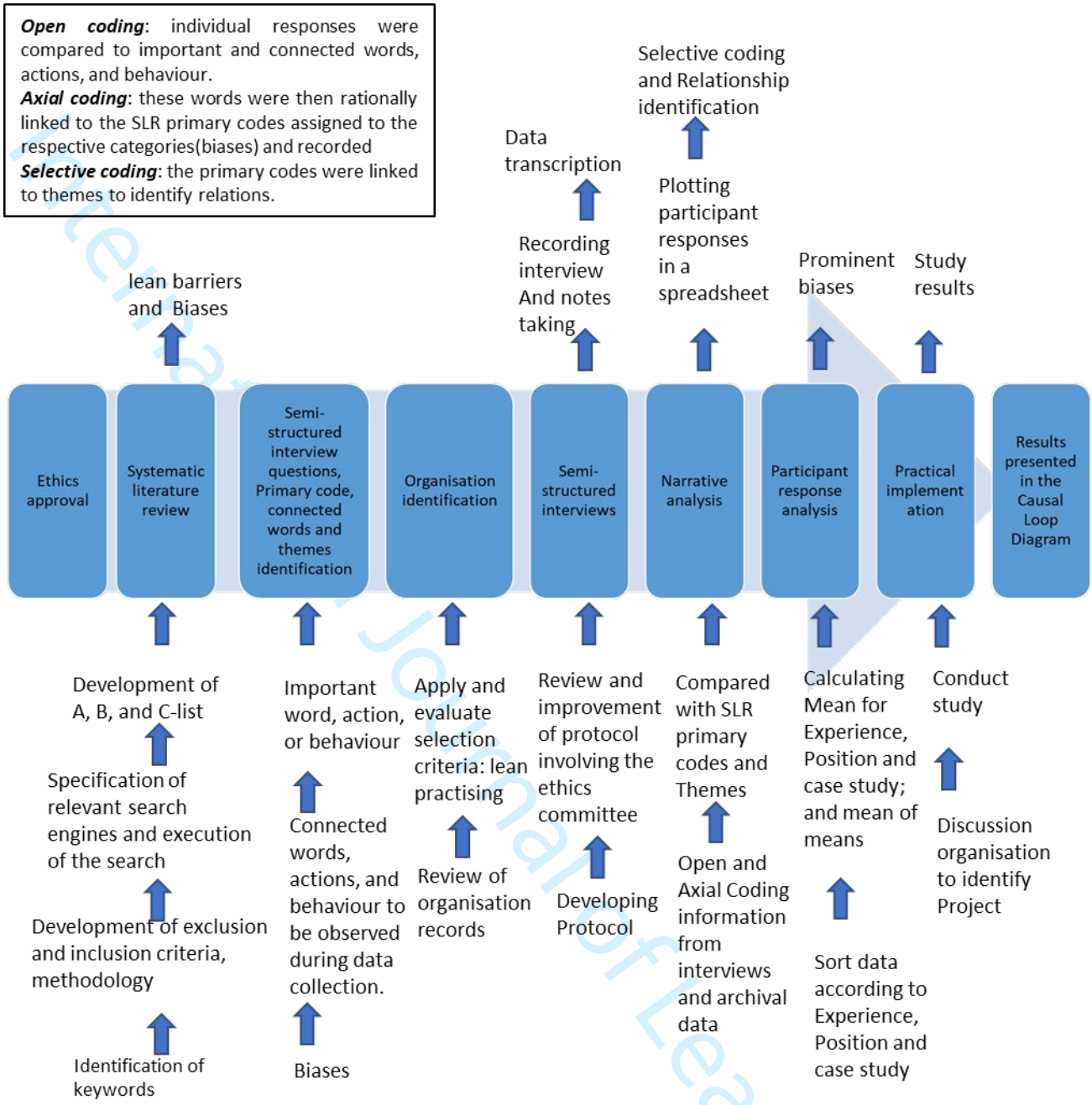

Figure 2 Research design

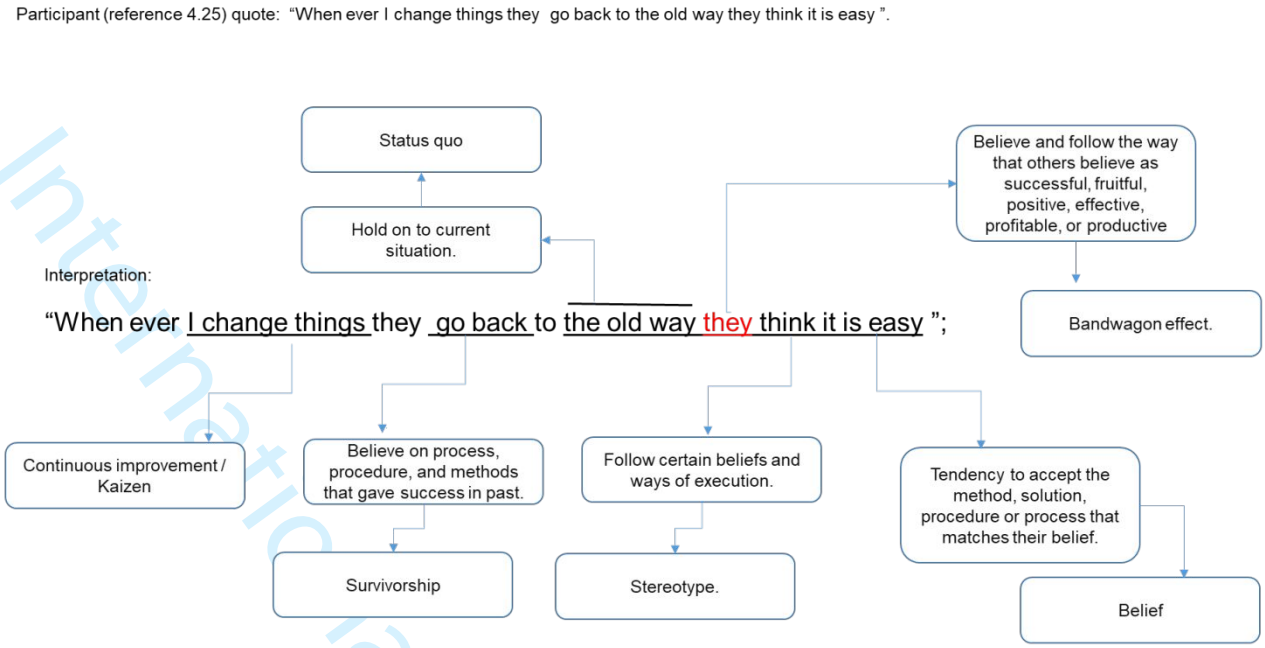

Figure 3: Bias interpretation

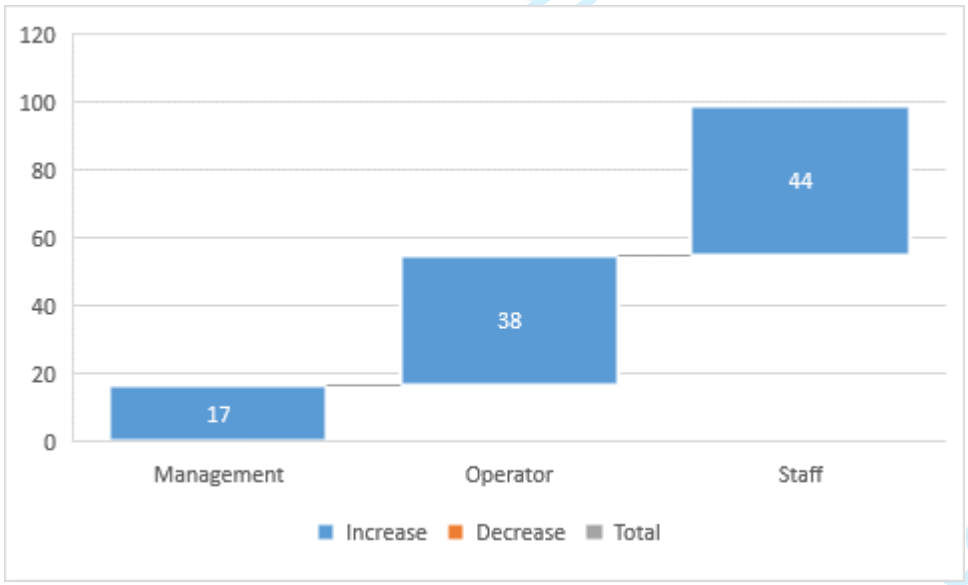

Figure 4: Roles of participants.

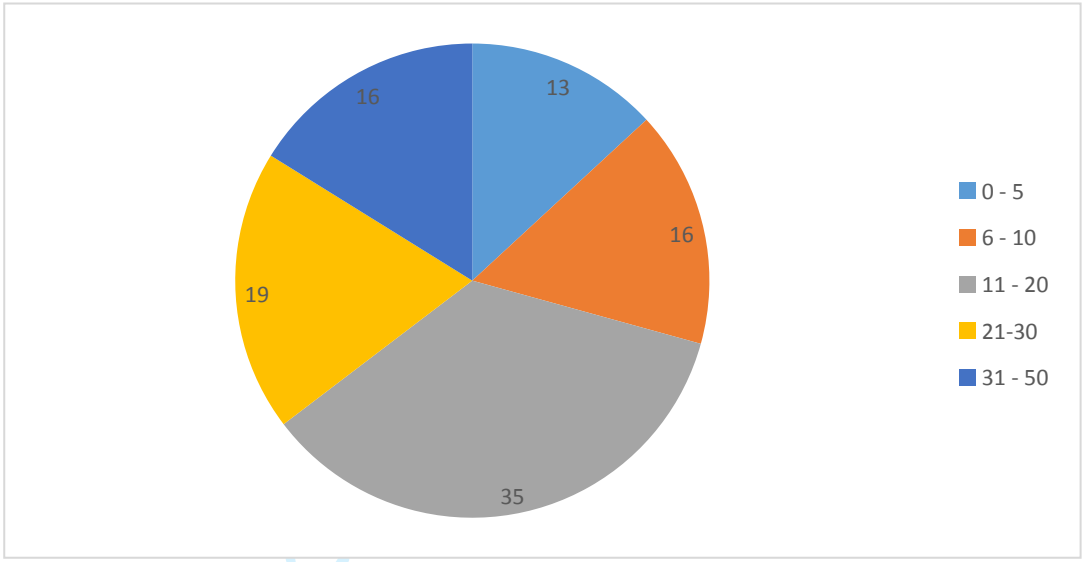

Figure 5: Experience of participants

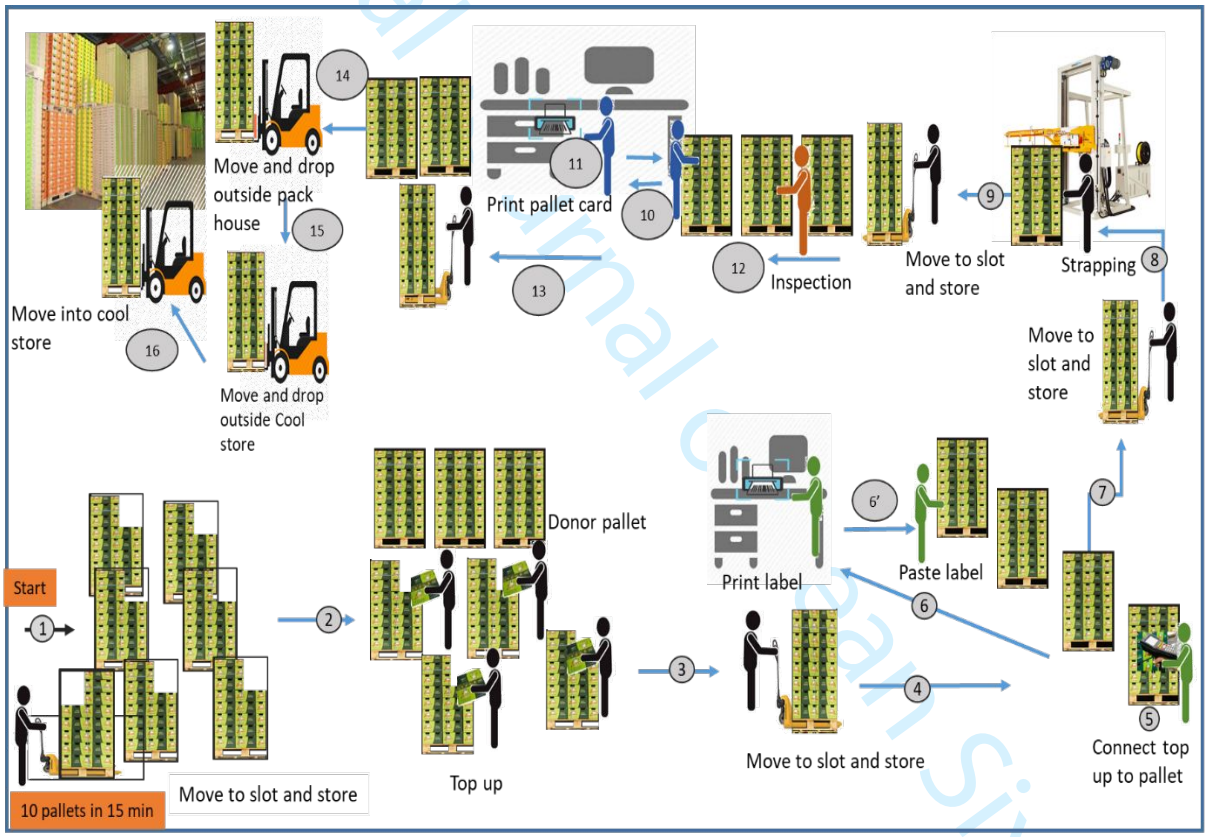

Figure 6: Repack pre-intervention process

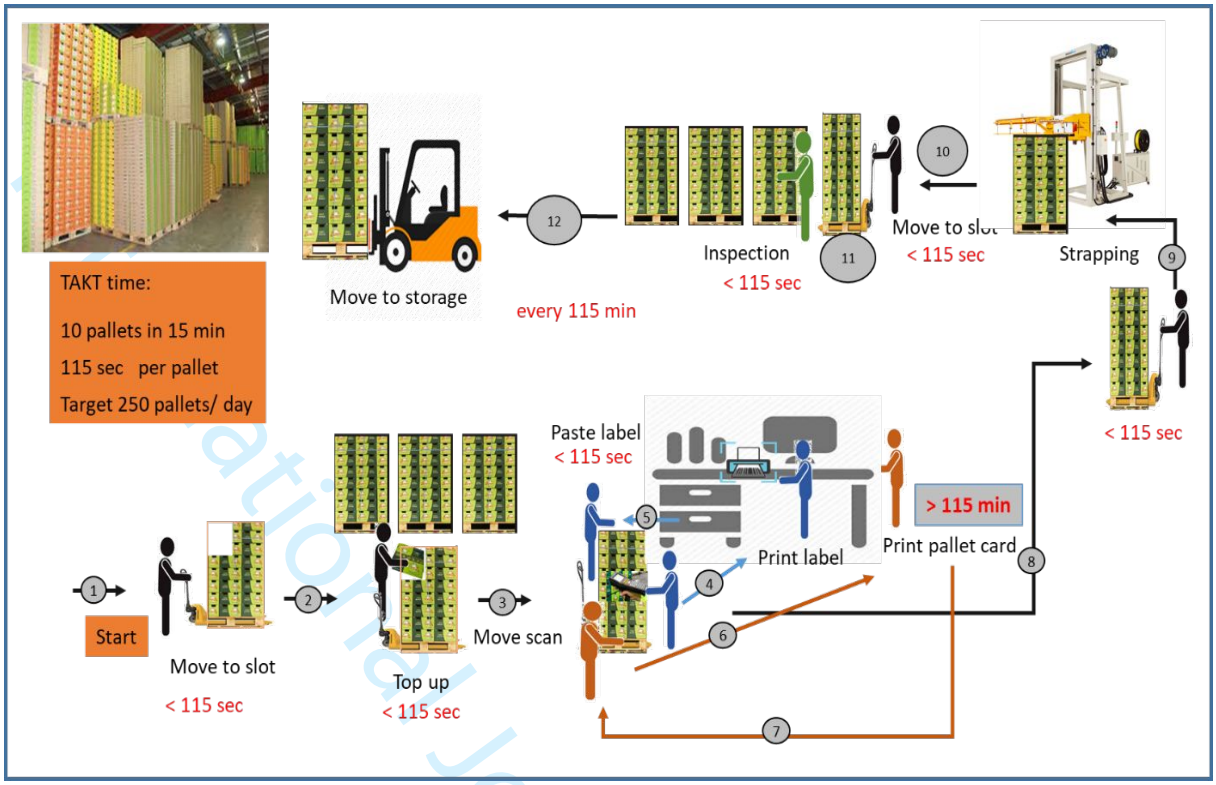

Figure 7: Improved repack process

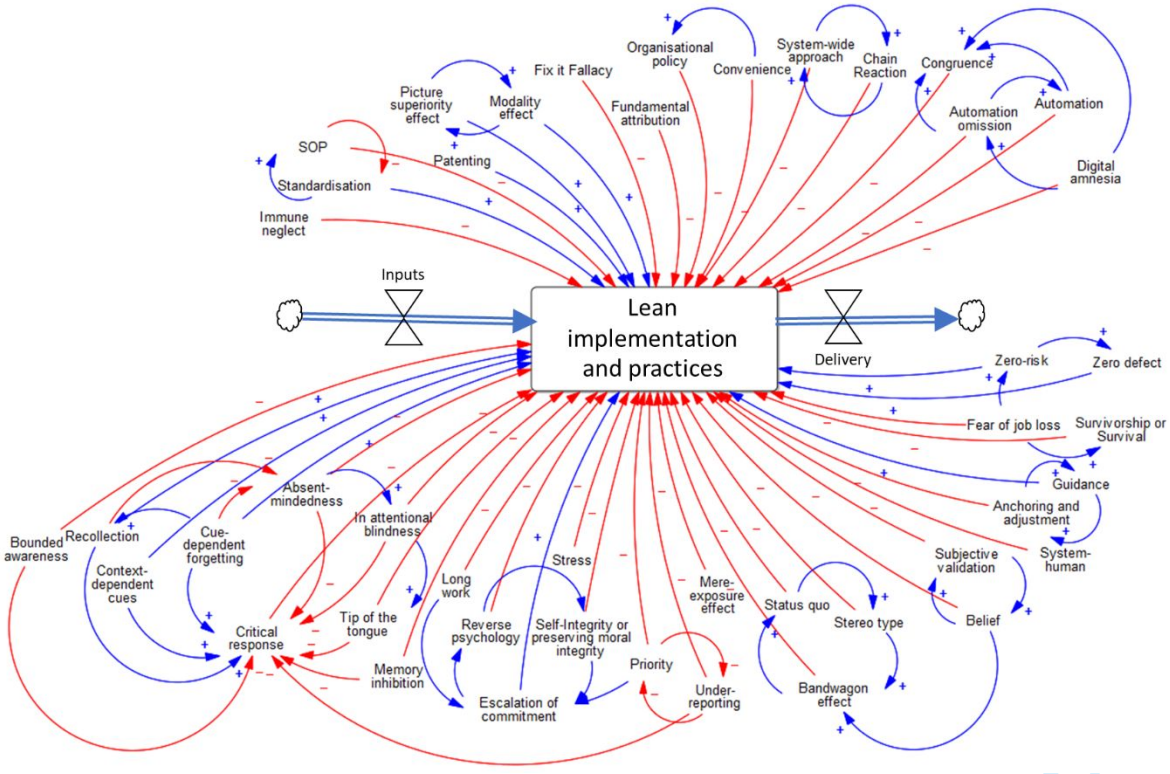

Figure 8: Cognitive Biases interaction and influence on lean implementation and practices in a multicultural environment

Cognitive biases that influence Lean implementation and practices in a multicultural environment

Table 1: Lean Barriers

Factor	Antony, Krishan, Cullen, and Kumar (2012)	Allaoui, Guo, and Sarkis (2019)	Kurilova-Palisaitiene, Sundin, and Poksinska (2018)	(Losonci, Demeter, & Jenei, 2011)	Elicianea, Ramos, Alexander, and Jabbour (2020)	Bierargel (2015)	Caldera, Desha, and Dawes (2019)	R. Jadhav, S. Mantha, and B. Rane (2014)	Helleno, De Moraes, and Simon (2016)	Abu, Gholami, Mat Saman, Zakuan, and Streimikiene (2019)	Sim and Rogers (2008)	Womack, Byrne, Fiume, Kaplan, and Toussaint (2005), (Pearce, 2014)	Chiarini and Brunetti (2019)	Leite, Bateman, and Radnor (2020)	DeSanctis, Ordieres Mere, Bevilacqua, and Ciarapica (2018)	(Yadav, Seth, & Desai, 2018)
Awareness							✓									
Behaviour														✓		
Collaboration		✓						✓								
Commitment								✓				✓			✓	
Credence				✓							✓					
Communication				✓												
Cost control									✓							
Cross-functional team conflicts								✓						✓		
Culture							✓								✓	
Decision making					✓											
Empowerment and engagement								✓				✓				✓
Expertise							✓									
Involvement								✓							✓	
Job change/security						✓										
Knowledge							✓	✓	✓	✓		✓				
Leadership											✓		✓			
Process thinking	✓															
People influence														✓		
Performance measurement system													✓			
Regulations and policies							✓									
Resistance								✓							✓	

Factor	Antony, Krishan, Cullen, and Kumar (2012)	Allaoui, Guo, and Sarkis (2019)	Kurilova-Palisaitiene, Sundin, and Poksinska (2018)	(Losonci, Demeter, & Jenei, 2011)	Elicianea, Ramos, Alexander, and Jabbour (2020)	Bierau gel (2015)	Caldera, Desha, and Dawes (2019)	R. Jadhav, S. Mantha, and B. Rane (2014)	Helleno, De Moraes, and Simon (2016)	Abu, Gholami, Mat Saman, Zakuan, and Streimikiene (2019)	Sim and Rogers (2008)	Womack, Byrne, Fiume, Kaplan, and Toussaint (2005), (Pearce, 2014)	Chiarini and Brunetti (2019)	Leite, Bateman, and Radnor (2020)	DeSanctis, Ordieres Mere, Bevilacqua, and Ciarapica (2018)	(Yadav, Seth, & Desai, 2018)
Resources							✓			✓		✓		✓		
Responsibility	✓			✓												
Skills and training					✓		✓					✓	✓			
Strategy and planning	✓		✓										✓			✓
Time							✓									

Table 2: Systematic literature review

Process		Individual steps	Analysis resulting	No. of articles
Search process and data collection	1	Identification of keywords: (Cognitive influence, cognitive bias, Lean)	Previous research and reviews	
	2	Development of exclusion and inclusion criteria, methodology	Quality of the article and limitations	30
	3	Specification of relevant search engines and execution of the search (5 engines: GOOGLE SCHOLAR, A WEB OF SCIENCE, EMERALD, SCIENCE DIRECT, SCOPUS)	Title and abstracts (automated based on keywords)	534,911
	4	Development of A-, B-, and C-list:		
		C-list	Key words w.r.t Cognitive bias, lean and cognitive influence	117,431
		B-list	Title and abstracts that referred to Cognitive bias, lean	11354
		A-list	Full text (strong focus cognitive bias)	1090
		Narrative inclusions in this article	Full text	115
Descriptive and thematic analysis	5	Descriptive categories (e.g., journals covered, methodologies applied)	Cognitive bias influence in Lean environment	1090
	6	Deductive and inductive categories to identify central themes and interpret results	Definition of bias, Cognitive bias influence in Lean environment	1090

Table 3: Case studies

Company	Case Study	Industry	Number of People involved in the study	Turnover in NZD (million)
1	Alpha	Printing	1 management 1 staff 4 operators	5
2	Beta & Gamma	Electrical distribution	4 management 4 staff, 12 operators	350
3	Delta & Epsilon	Fast moving consumer goods	6 management 10 staff 28 operators	22474
4	Zeta		1 management 7 staff 1 operator	
5	Eta	Fruit cool store and packing	5 management 14 staff 1 operator	160

Table 4: Participants Cultural background

Culture	Percentage	Management	operator	Staff	Grand Total
European	45%	13	17	15	45
Asian	18%	2	1	15	18
Pacific	36%	2	20	14	36
Grand Total		17	38	44	99

Table 5: Biases that influence lean organisations

Bias	**Description**	**% Mean**			**% Response**		
		Experience	**Position**	**Case study**	**Positive**	**Negative**	**Nil**
Absent-mindedness	A tendency to forget events, situations, or facts (Tornas, Lovstad, Solbakk, Schanke, & Stubberud, 2016)	100.0	100.0	100.0	4.0	96.0	0.0
Anchoring and adjustment	The tendency to relate facts to a prominent person's view, prominent situation, or first information and later adjust to it while talking decisions (Y. Zhou, Chen, Xu, & Wu, 2018).	93.2	94.1	91.2	92.9	0.0	7.1
Automation	The tendency to rely on automation and ignore differing facts presented without automation (Dutilh & Rieskamp, 2016).	93.6	95.9	92.2	86.9	8.1	5.1
Automation omission	The tendency to miss information, events, data, and facts when not prompted by automation (Lyell & Coiera, 2017).	95.1	96.7	93.7	86.9	9.1	4.0
Bandwagon effect	The tendency to believe in data, facts, or situations to align themselves to the majority of people's beliefs in a particular way and follow them, irrespective of their own beliefs or the tendency to follow methods of previous success irrespective of their own beliefs (VandenBos, 2007).	92.8	94.9	86.5	92.9	1.0	6.1
Belief	A tendency to accept the method, solution, procedure, or process that matches their belief (Jonathan & Feeney, 2004)	93.3	94.9	86.5	93.9	0.0	6.1
Bounded awareness	The tendency of failing to notice the crucial information, options, roles, and parties involved (Elicianea et al., 2020)	100.0	100.0	100.0	100.0	0.0	0.0

Bias	Description	% Mean			% Response		
		Experience	Position	Case study	Positive	Negative	Nil
Chain reaction	The tendency of being unaware or unresponsive to the people's reactions happening in the process chain	100.0	100.0	100.0	100.0	0.0	0.0
Congruence	The tendency to rely on direct data and facts rather than derived data or the tendency to adopt direct hypotheses test instead of possible alternative hypotheses tests (Baron, 2008)	95.1	96.7	93.7	94.9	1.0	4.0
Context-dependent cues	The tendency to recollect in any situation after being nurtured with past examples or situations((Simon-Kutscher, Wanke, Hiller, & Schwabe, 2019)Godden & Baddeley, 1975)	92.2	94.1	85.7	87.9	5.1	7.1
Convenience	The tendency to miss or decline actions based on convenience of interpretation of instructions, policies, or procedures	95.4	97.0	95.7	93.9	1.0	5.1
Critical response	The tendency to miss or avoid critical responses with all stakeholders	100.0	100.0	100.0	100.0	0.0	0.0
Cue-dependent forgetting	The tendency to recollect after being served with past examples or situations (Pastorino & Doyle-Portillo, 2012).	96.8	96.4	94.4	90.9	6.1	3.0
Digital amnesia	The tendency to not remember information that is readily available in digital mode (Sparrow, Liu, & Wegner, 2011).	95.1	96.7	93.7	86.9	9.1	4.0
Escalation of commitment	The tendency to be more committed when the outcome is negative (Staw, 2002).	93.8	94.9	87.6	93.9	0.0	6.1
Fear of job loss	The tendency to fear job loss (Vujičić, Jovičić, Lalić, Gagić, & Cvejanov, 2015).	95.8	95.6	94.3	89.9	6.1	4.0
Fix it Fallacy	A tendency to hurriedly solve the problem with naive solutions (Hirshleifer & Hirshleifer, 2017).	95.9	97.4	94.4	96.0	1.0	3.0
Fundamental attribution	The tendency to value internal factors or characteristics more than external factors(Tukachinsky, 2020).	92.0	94.0	84.9	92.9	0.0	7.1
Guidance	The tendency to seek guidance from management, people, or consultants in ambiguous situations (Kotlyar & Karakowsky, 2007).	95.8	96.5	96.2	96.0	0.0	4.0

Bias	Description	% Mean			% Response		
		Experience	Position	Case study	Positive	Negative	Nil
Immune neglect	The tendency of being unaware of one ability to adapt to negativity ((S. M. Martin, Gerhart, Rochefort, Perry, & Hoerger, 2020)Gilbert, Pinel, Wilson, Blumberg, & Wheatley, 1998).	99.4	99.1	99.5	1.0	98.0	1.0
In attentional blindness	The tendency to miss obvious or visual information when focusing on a particular task (Simons, 2000).	97.9	98.4	97.1	98.0	0.0	2.0
Long work	The tendency to work long hours for productivity, quality, earnings, promotions, and job security(Kodz et al., 2003).	95.9	97.4	94.4	97.0	0.0	3.0
Memory inhibition	The tendency to not remember irrelevant facts or situations (Wade, Tavris, & Garry, 2012)	92.7	94.1	84.9	92.9	0.0	7.1
Mere-exposure effect	The tendency to positively judge based on familiarity (Zajonc, 2001).	100.0	100.0	100.0	98.0	2.0	0.0
Modality effect	The tendency to understand is based on the presentation method (Leahy & Sweller, 2011).	93.3	94.9	86.5	93.9	0.0	6.1
Organisational policy	The tendency to accept or decline based on the understanding of policies or legal requirements	95.4	97.0	95.7	93.9	1.0	5.1
Patenting	The tendency to believe that patents are unnecessary to gain returns (Sampat & Shadlen, 2017).	96.6	97.5	94.8	97.0	0.0	3.0
Picture superiority effect	The tendency to remember pictures or images better than words (Curran & Doyle, 2011)	93.8	93.8	87.1	93.9	0.0	6.1
Priority	The tendency to work based on priority, favour one of the response options or perceived urgent options (Dutilh & Rieskamp, 2016).	98.5	99.1	97.6	99.0	0.0	1.0
Recollection	The tendency to recollect information from the past for any situation(Botvinick et al., 2009).	98.9	99.1	98.4	96.0	3.0	1.0
Reverse psychology	The tendency to project negative factors to a situation to obtain desired results (Sinha & Foscht, 2006).	92.4	94.1	90.3	91.9	1.0	7.1
Self-Integrity or preserving	The tendency to preserve moral integrity in all situations (Kroon, 2008)	100.0	100.0	100.0	100.0	0.0	0.0

Bias	Description	% Mean			% Response		
		Experience	Position	Case study	Positive	Negative	Nil
moral integrity							
SOP	The tendency to miss, deviate or decline action stated in standard operating procedure	92.8	95.0	89.5	93.9	0.0	6.1
Standardisation	The tendency to adopt the same way of operations, every time(Ungan, 2006).	92.8	95.0	89.5	1.0	92.9	6.1
Status quo	The tendency to hold on to the current situation or method (B. H. Martin, 2017).	94.3	95.7	88.1	93.9	1.0	5.1
Stereotype	The tendency to follow certain beliefs and ways of execution (Cox, Abramson, Devine, & Hollon, 2012)	91.7	94.0	84.9	91.9	1.0	7.1
Stress	The tendency to decline actions based on predicted stress on oneself or the process	96.9	98.5	98.6	98.0	0.0	2.0
Subjective validation	The tendency to agree with a fact or data if it matches personal beliefs (Elicianea et al., 2020).	92.2	94.0	84.9	92.9	0.0	7.1
Survivorship or Survival	The tendency to believe in mechanisms that gave success in the past and neglect other options (Shermer, 2014).	92.8	94.9	86.5	92.9	1.0	6.1
System-human	The tendency not acknowledging system and /or human influences (Kolus, Wells, & Neumann, 2018)	96.6	97.5	94.8	86.9	10.1	3.0
System-wide approach	The tendency to discount or not consider stakeholders in the system for a situation, issue, or action	100.0	100.0	100.0	100.0	0.0	0.0
Tip of the tongue	The tendency to fail to recollect familiar events or situations (Schwartz & Metcalfe, 2011).	98.9	99.1	98.4	3.0	96.0	1.0
Underreporting	The tendency to underreport situations or facts (Drakos & Gofas, 2006).	92.2	94.1	84.9	75.8	17.2	7.1
Zero defect	The tendency to assume or insist on zero defects in a process (Ghosh, Mukhopadhyay, & Lu, 2006).	94.6	96.6	96.2	2.0	93.9	4.0
Zero-risk	The tendency to avoid complete risk or the preference for reducing a small risk to zero over a greater reduction in a larger risk (Raue & Schneider, 2019)	95.7	97.5	96.7	97.0	0.0	3.0

Table 6: Company 5 Gemba study stressors and associated biases

Process stressors	**Primary stressors**	**Remarks**	**Associated biases**
Direction for next work	waiting	The process was directed by staff, and people waited for instruction. Process errors were evident.	Absent-mindedness, bandwagon effect, automation omission, system-wide approach, and anchoring and adjustment.
Delay	Time	Delay and fear of missing processes were evident.	Bounded awareness, guidance, zero risk, and priority.
Time	Priorities	The team was under constant time pressure.	Bounded awareness, chain reaction, and priority.
Priority	Priorities	The team acted on priorities.	Priority, SOP and critical response

Table 7: Eta Gemba study improved process stressors and biases status

Process stressors	**Primary stressors**	**Improvement in Improvised process**	**Associated biases**
Direction for next work	Waiting	The flow was continuous, and everyone was working on a set task which eliminated the direction, absent-mindedness, provided an alternative solution, prompted information other than system generated and was a new experience for the participants.	Absent-mindedness, bandwagon effect, automation omission, system-wide approach, and anchoring and adjustment.
Delay	Time	Continuous flow within Takt time reduced delays and fear of missing a process step.	Bounded awareness, guidance, zero risk, and priority.
Time	Priorities	Visual information, data during the Gemba study aided the continuous flow and reduced the time required to perform the overall process.	Bounded awareness, chain reaction, and priority.
Priority	Priorities	Continuous flow within Takt time avoided priorities at this stage.	Priority, SOP and critical response

Annexure 1

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Absent-mindedness	A tendency to forget events, situations, or facts	People	Recollect	Forgot, fail to recall, be unable to remember, erase from the mind, overlooked, not remember, and not recalled
Actor and the observer	The tendency to credit those behaviours and temperaments to others, which one would not attribute to himself.	People	Correlation	Bad about others behaviour and temperament
Affective forecasting/ Variation of durability/ Hedonic forecasting	The tendency to over estimate time and value of the future events.	Cost, time and/ or energy	Valuate	Over estimating/ appraising time
Age	The tendency to consciously or unconsciously avoid equal opportunity based on the age of a person	People	Preference	Preference based on age
Agreement / Collective consciousness	The tendency to possess collective consciences for achieving a common goal.	Group	Preference	Agreeing, supportive, approving, like-minded, harmonising, in agreement, in favour, reach an agreement, come to an understanding, supplementing, concurring, consenting, or go along with team.
Alternatives	The tendency to choose a particular practiced or known option more often when there are additional alternatives.	Decision	Inclination	Known alternative/substitute process
Ambiguity effect	The tendency to decide with uncertainty or insufficient information.	Decision	Ability	Decide with limited, incomplete, imperfect, partial, inadequate, restricted, or insufficient information.
An appeal to probability or possibility	The tendency to take things for granted and assume that it would be a particular situation or case.	Decision	Belief	Assuming its only for a particular case
Anchoring and adjustment	The tendency to relate facts to a prominent person's view, prominent situation, or first information and later adjust to it while talking decisions.	People	Influence	Relevantly relate to superior, well-known, important, high-up, or top person views.
Anchoring or focalise	The tendency to incline on the first information while taking decisions.	People	Correlation	Believe first information
Anecdotal	The tendency to judge based on own experience or rare happenings instead of facts, data, or evidence.	People	Inclination	Trusting experience/ rare happening
Anthropomorphism	The tendency to relate human feelings to non-human beings or objects	Relate	Correlation	Machine issues related to human feeling.
Anti-trust	A tendency to suspect everything.	People	Belief	Suspect, doubtful suspicious, distrust, mistrust, disbelieve, and be wary of trust

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Appeal to novelty	The tendency to claim or believe a new modern approach is superior.	Relate	Belief	New approach, way, process, or methodology, are superior, exceptional, outstanding, notable, best quality, better, greater, advanced, improved or enhanced.
Argument from fallacy	The tendency to believe that since the view or fact has a mistaken belief its result or conclusion is wrong.	Decision	Belief	Results are wrong because of misconception, a mistaken belief or erroneous belief.
Asymmetric dominance effect / The decoy effect	The tendency to prefer an advantageous situation, thing, or person between the two choices after presented with lesser advantage third choice.	Decision	Correlation	A decision on advantageous initial choices.
Attentional	The tendency to judge based on selective attention to negative, positive aspects, data or facts, specifically to pay greater attention to sources of threat.	Cost, time and/ or energy	Correlation	Judgement based on positivity, negativity, threat, danger, risk, hazard, or warning
Authorisation	A tendency to overestimate the risk of unauthorized actions.	People	Valuate	Unauthorised action risk, danger, hazard or threat
Autocratic	The tendency to assume having complete knowledge on the subject and irrespective of the requirement dominating the judgment, process, and directing others.	People	Belief	Control, direct, manage supervise, or regulate every process step.
Automation	The tendency to rely on automation and ignore differing facts presented without automation.	Automation	Valuate	Automation, computerisation, robotics or mechanisation focus to get data and facts.
Automation adherence	The tendency to adhere to automation though better alternatives are available.	Automation	Preference	Automation, computerisation, robotics or mechanisation focus for process step though other options are available
Automation omission	The tendency to miss information, events, data, facts when not prompted by automation.	Automation	Omit	Miss, neglect, forget, overlook, ignore, skip, exclude, or leave out data and facts when not prompted/ notified by automation, computerisation, robotics or mechanisation.
Availability heuristic	The tendency to make decisions based on recalled experience or examples.	Decision	Decision	Based on experience, knowledge skill, practise, or familiarity examples
Bandwagon effect	The tendency to believe in data, facts, or situations to align themselves to majority people belief in a particular way and follow them, irrespective of their own beliefs or the tendency to follow methods of previous success irrespective of their own beliefs.	People	Believe	Believe and follow the way that others believe as successful, fruitful, positive, effective, profitable, or productive
Barnum / Forer effect	The tendency to accept vague universal data or facts as	Relate	Relate	Trust vague, unclear, imprecise, or ambiguous universal data

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
	correct and/ or relate universal vague descriptions to oneself.			
Base rate fallacy	A tendency to consider specific information and ignore base or general information in decision-making.	Decision	Decision	Considering specific info
Belief /prior hypothesis	A tendency to accept the method, solution, procedure or process that match their belief.	People	Belief	Accept the method, solution, procedure or process when belief/ faith match.
Bizarreness effect	The tendency to remember odd situations more than normal situations, while making decisions.	Decision	Decision	Remembering/recalling odd, abnormal, unusual, peculiar, weird, or uncommon situation/ examples while making decisions.
Blind spot	The tendency to understand other people bias and fail to recognise own biases.	People	Belief	Identify other's bias and miss their own
Bounded awareness	The tendency of failing to notice the crucial information, options, roles, and parties involved.	People	Omit	Missing crucial information, options, roles, and parties involved.
Chain of command	The tendency to follow the rules, policy, procedure, methods or technology after direction or approval from the management.	Management	Preference	Follow the rules, policy, procedure, methods or technology after direction or approval from the management.
Change blindness	The tendency to overlook or not noticing changes.	People	Omit	Not noticing changes, modifications, transformations, or amendments.
Change dilution	The tendency to continue the existing process, procedure, or method and simultaneously implementing the required changes for correcting the issues or the tendency to believe in not diluting the current status when change is happening.	Management	Preference	Prefer to undertake changes, modifications, transformations, or amendments while the process is live.
Change of job	The tendency to have anxiety on the known or unknown job change.	People	Believe	Concerned on job change, alteration, modification, amendment, exchange, or swap
Cheerleader effect	The tendency to believe that people as a group are more attractive or effective.	Group	Believe	State attractive as a group
Choice-supportive	The tendency to attribute success to the decision made by oneself.	People	Believe	Self-praising/ attribute success to the decision made by oneself
Clustering illusion	The tendency to see imaginary patterns or erroneously interpret patterns from random samples as non-random.	People	Imagine	Imagine or incorrect interpretation of patterns.
Confabulation	The tendency to fabricate or modify own memory unintentionally.	People	Recollect	Memory modification
Confidence	The tendency to overestimate own skill, ability to control oneself or environment.	People	Overestimate	Overestimate one's skill and ability.

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Confirmation	The tendency to interpret facts or data's as per self-beliefs.	People	Belief	Interpret data/ fact based on self-belief/faith
Confirmation evidence trap	The tendency to explore information, data, events, or facts that confirm the initial choice.	People	Explore	Find information, data, events, or facts that confirm the initial choice
Confirmatory	The tendency to search or interpret information in a way that confirms own preconceptions.	People	Search	Search information, data, events, or facts that confirm the preconceptions/ predeterminations.
Congruence	The tendency to rely on direct data and fact rather than derived data or the tendency to adopt direct hypotheses test instead of possible alternative hypotheses tests.	Automation	Belief	Relying on direct data, information, facts, records or statistics.
Conjunction fallacy	The tendency to assume that specific conditions are more probable than general ones.	People	Belief	Specific conditions are more likely, possible, apparent, evident or noticeable
Conservatism	The tendency of not grasping negative facts to one's beliefs.	People	Omit	Dose not obtain, collect, accept, or gather negative facts.
Context-dependent cues	The tendency to recollect in any situation after nurtured with past examples or situation.	Examples	Recollect	Recollect after giving examples
Cross-race effect/Own-race	The tendency to recognise persons of the same origin.	Group	Preference	Recognising person of the same origin
Cryptomnesia	The tendency to believe recalled memory as new and original.	People	Recollect	Past incidence as new.
Cue-dependent forgetting	The tendency to recollect after served with past examples or situation.	Examples	Recollect	Remembering after providing an example of the situation.
Curse of knowledge	The tendency to predict with the knowledge one possesses instead of predicting from others view or fact presented.	People	Predict	Relying on self to judge based on knowledge/ experience without considering others views fact or data
Declinism	The tendency to value the past positively and future negatively	Relate	Valuate	Past work/ job environment/opportunity good and future is bad.
Default	The tendency to choose pre-determined options negating superior options	Decision	Decision	Pre-determined choice.
Defensive attribution	The tendency to defend one's self-esteem in any situation.	Performance	Defend	Defend self-decision, performance, routine, or functioning.
Denomination effect	The tendency to prefer spending large sum rather than its equivalent small sums.	Relate	Preference	Spending a large amount verses small equivalent.
Denying value trade-offs.	The tendency to over-value favoured alternative by denying value trade-offs.	Decision	Valuate	Over value their option
Devaluation	The tendency to de-value alternatives.	Relate	Valuate	Devalue alternatives.

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Diffusion of innovation theory / Pro-innovation	The tendency to ignore limitations or weakness of own innovation.	Decision	Omit	Ignoring one's own innovation weakness or limitations
Digital amnesia	The tendency to not remember information that is readily available in digital mode.	Automation	Recollect	Not remember information, data, statistics, facts, figures, or report when available digitally.
Disagreement	The tendency of not stating disagreements in a forum.	People	Disagreement	Not disagreeing in form/group.
Disaster neglect	The tendency of constructing negative scenarios that do not reflect the correct magnitude of the disaster.	Relate	Construct	Constructing fallacious, misleading, erroneous, deceptive, false, wrong, or untrue negative scenarios.
Disposition effect	The tendency to dispose of the value appreciated things and retaining the depreciated things.	Decision	Dispose	Positive value things passed and negative held
Distinction	The tendency to distinct two opinions while considering at the same time or relating closely when viewed at different time.	Relate	Time	Distinct two different options of the same time or relating two different options of different time.
Dunning–kruger effect	The tendency to overestimate one's ability based on illusion.	People	Ability	Imaginary overestimation of one's ability
Durability	The tendency to overestimate the duration of the emotional impact.	People	Valuate	Overestimating emotion
Duration neglect	The tendency to judge on positivity or negativity ignoring their duration.	People	Time	Judgement on situation, problem, process, procedure, method, practice, or activity ignoring time.
Easy study	The tendency to take the easy and unproblematic area/time for a study to prove the subject worthiness.	Management	Consider	Easy, stress-free, comfortable, simple, unproblematic, or painless area/ time for a study
Effort justification	The tendency to overvalue the results while involving self-effort or contribution.	Relate	Valuate	Overvaluing self-results.
Egocentric	The tendency to overemphasises, unduly trust, or overestimate one's belief as reality.	People	Belief	Overemphasise ones idea/ belief as reality
Empathy gap	The tendency to underestimate own or others emotions while taking decisions.	Decision	Underestimate	Emotions during the decision process.
Endogeneity.	The tendency to omit erred variables.	Decision	Omit	Omitting erred variables, information, statistics, facts, figures, numbers, records, documents, or files.
Endowment effect / Divestiture aversion / Mere ownership effect	The tendency to over valuate own creations or things	Relate	Valuate	Over valuate, appreciate, respect, cherish, or assess ones idea/creation.
Escalation of commitment	The tendency to be more committed when the outcome is negative.	Negativity	Committed	Working intensely, vigorously, rigorously, relentlessly or fast when results are negative.

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Ethnic	The tendency to have a positive or negative outlook because of the ethnicity.	Group	Outlook	Based on ethnicity.
Expectancy	The tendency to distort to achieve one's expectations.	Decision	Distort	Distorting facts for ones benefit, prospects, opportunities, anticipations, or expectancies.
Experimenter	The tendency to consciously or unconsciously influence participants to achieve the believed data's or results.	Decision	Influence	Researcher influencing others for achieving ones believed data's, results, benefit, prospects, opportunities, anticipations, or expectancies.
External influence	The tendency of being influenced by external agencies.	External	Influence	Influenced by auditors, consultants, government and legal authority, or other external agencies.
Extrinsic incentives	The tendency to believe that others motive is more coinage than to gain skill or knowledge.	Relate	Belief	The motivation of others is money, income, funds, assets, cash, or currency.
Fading affect	The tendency to forget negative events faster than positive events.	People	Negativity	Forgetting negatives
False-consensus	The tendency to believe that their belief is normal and similar to others.	People	Belief	All think alike/ agrees with their belief and it is normal.
Fear of failure	The tendency to minimise the risk of failure at the cost of success.	Negativity	Avoid	Minimise risk always.
Fear of job loss	The tendency to fear job loss.	Negativity	Fear	Fear to loose job
Fix it fallacy	A tendency to hurriedly solve the problem with naive solutions.	People	Resolve	Quickly solve problem/ issues
Focusing illusion	The tendency to attach importance to a single factor, information, or event while neglecting unavailable information or other important events.	Relate	Importance	Attach importance to single factor, information or event while neglecting unavailable information or other important events.
Framing effect	The tendency to frame an opinion based on the presentation method.	Relate	Presentation	Importance to presentation method.
Frequency illusion	The tendency to notice things or their similarities, which come into own thoughts.	People	Notice	Similarity observing, or people repeat the same answer for different questions.
Functional fixedness	The tendency to believe that the data, fact, or view is to be used only in a traditional way, as previously used, or as per the original intended purpose.	Decision	Belief	Using data only to the purpose intended / not using data for other solutions/ideas.
Fundamental attribution	The tendency to value internal factors or characteristics more than external factors.	People	Valuate	Estimating internal factors more than external.
Gambler's fallacy/ Monte carlo fallacy/ The fallacy of the maturity of chances	The tendency to believe frequent occurrences indicate that it would occur less in the future and vice versa.	Decision	Belief	Predicting future occurrences based on the frequency

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Gender	A tendency to impart unequal treatment based on gender of an employee or group of employees	People	Preference	Discriminating, distinguishing, differentiating, favouring, or victimising based on gender
Generation effect	The tendency to remember own generated ideas more than acquired.	People	Recollect	Remembering own idea more than acquired.
Group attribution error	The tendency to believe or relate an individual's view or behaviour to the group.	Group	Relate	Relate, connect, or associate individual views or behaviour to his group.
Group escalation of commitment	The tendency to continue support to the group during a negative outcome.	Group	Support	Support group during a negative outcome.
Group formation	The tendency to form small groups within a team and discuss an issue on side-line.	Group	Form	Forming small groups
Group polarization Majority	The tendency to incline to the majority view, irrespective of fact and data.	Group	Incline	Incline to the majority view.
Group think	The tendency of inclining to garner the support of a group.	Group	Incline	Incline and get group support.
Guidance	The tendency to seek guidance from management, people, or consultants in ambiguous situations.	Management	Guidance	Seeking guidance or approval from superiors or management
Halo effect	The tendency to have an opinion on view, situation, or people as an observer and later use appropriately. The decision maker sees a story as more emotionally consistent than it really is.	Decision	Opinion	Stay as an observer of a problem and use it at an appropriate time/ else ware.
Herd instinct	The tendency to adopt the opinions and follow the behaviours of the majority to avoid conflict or be secure.	Group	Opinion	Inclining to a majority to be safe or avoid conflict/ disagreement.
Hindsight	The tendency to relate one's non-factual prediction to its prior predictability or believe the result all along the process.	Relate	Believe	The result is based on non-factual prediction.
Hot-hand fallacy or phenomenon	The tendency to believe that random success has subsequent success with more attempts.	Relate	Believe	Random success has subsequent success with more attempts.
Hyperbolic discounting	The tendency to inconsistently discount, the fact, or evidence based on the duration of time. The tendency to have a stronger preference for immediate payoffs rather than later payoffs.	Cost, time, and/ or energy	Time	Inconsistently discount, the fact, or evidence based on the duration of time, emphasising its applicable only to past or future
Identifiable victim effect	The tendency to compensate individual higher than the group in a similar situation.	People	Inclination	Individual compensation higher than group

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Illusion of asymmetric insight	The tendency to influence people or situation with knowledge, to gain an advantage.	People	Influence	Influencing others with knowledge, skill, expertise, or familiarity on the subject.
Illusion of control	The tendency to overestimate one's ability to control or influence outcomes that they clearly cannot	People	Ability	Overestimating one's ability to control or influence outcomes.
Illusion of external agency	The tendency of being influenced by an external or unfamiliar participant or situation.	External	Influence	External influence.
Illusion of transparency	The tendency to overestimate others' ability to know them and their ability to know others.	People	Ability	Ability to judge others
Illusion of validity	The tendency to overestimate own ability to judge outcomes based on a steady pattern.	People	Ability	Ability judge outcome based on a steady pattern.
Illusory correlation	The tendency to believe in the fallacious correlation among facts, people, or situations.	People	Believe	Believing a false correlation of facts, people, or situations.
Illusory superiority/Leniency error/Sense of relative superiority/The primus inter pares effect	The tendency to overestimate one's ability based on illusion, relatively to others.	People	Overestimate	Ability to understand the illusion.
Illusory truth effect	The tendency to trust data after considerable experience or continuous disclosure.	People	Trust	Trusting data after experiencing or continuous display.
Immune neglect	The tendency of being unaware of one ability to adapt to negativity.	Negativity	Ability	Ability to adopt negativity or negative situation
Impact	The tendency to predict others future emotional state or behaviour and overestimate the emotional impact	People	Predict	Predict/overestimate another person's emotional impact.
Implicit stereotype	The tendency to point certain characteristics or situation to a person of a specific unit.	Relate	Relate	Relate characteristics or situation to a particular person
Impossibility	The tendency to spend the effort to identify negative fact to convince oneself that it is impossible to achieve desired outcome.	Negativity	Effort	Finding/ providing negative facts, evidence, particulars, specifics, statistics, data, or circumstances to convince it is impossible.
In attentional blindness	The tendency to miss obvious or visual information when focusing on a particular task.	People	Omit	Missing visual information.
Information	The tendency to seek more information though it is irrelevant.	Relate	Correlation	Seeking irrelevant information, data, evidence, report, statistics, or facts.
In-group favouritism/In-group–out-group	The tendency to favour members of the liked group.	Group	Correlation	Group favour.

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Insensitivity to sample size	The tendency to judge without considering sample size.	Decision	Decision	Decision without sample size consideration
Intensity	The tendency to overestimate the initial intensity of the emotional impact.	Relate	Overestimate	Overestimate emotional impact.
Irrational escalation	The tendency to decide irrationally, based upon previous rational decisions or to justify actions already taken.	People	Decision	Justifying actions already taken.
Just-world hypothesis	The tendency to believe in fate for positives and negatives.	Relate	Belief	Believe in fate.
Lack of control	The tendency of not focussing effort to control events, person, or situation.	Management	Focus	Not controlling events, events, person, or situation.
Lack of systemicity	The tendency to overestimate own ability to retain all the pieces of information collected.	People	Overestimate	Overestimating one's ability to store all info with him
Lack of trust	The tendency of not trusting the stakeholders.	Trust	Trust	Lack of trust.
Lake wobegon effect	The tendency to believe that all subjects and situations are above average.	Group	Believe	All people/situations are above performing above average.
Lead	The tendency to not take the lead to expose a complicated issue for discussion.	People	Challenges	Who will tell the management, superior or the group?
Less-is-better	The tendency to prefer smaller alternative when evaluated separately instead of collective evaluation that yields a larger alternative.	People	Preference	Smaller alternatives preferred instead of major changes.
Levelling and sharpening	The tendency to recollect the smallest details and omit certain details to convenience.	People	Omit	Leave out details for convenience.
Levels-of-processing effect	The tendency to recollect or store in memory more details post in-depth analysis.	People	Recollect	The memory of in-depth analysis details.
Long work	The tendency to work long hours for productivity, quality, earnings, promotions, and job security.	People	Belief	Working long hours.
Loop hole	The tendency to identify loopholes and pass the blame.	People	Correlation	Blame others/ weak link
Loss aversion	The tendency to avoid the loss or the disutility of giving up an object is greater than the utility associated with acquiring it.	Cost, time, and/ or energy	Inclination	Avoiding loss while making decisions or operating.
Magical number seven, plus or minus two	The tendency to believe that the average number of items that comes to the memory of average human is 7 ± 2	People	Ability	Quoting about 7 instances
Masked-man fallacy Intentional fallacy Epistemic fallacy	The tendency of unlawfully arguing or judging a phenomenon or people with different qualities and properties as equal.	Performance	Unlawful	People are equal

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Memory inhibition	The tendency of not remembering irrelevant facts or situation	People	Recollect	Not remembering irrelevant facts.
Mental accounting	The tendency to mentally bifurcate and categorise economic factors.	Cost, time, and/ or energy	Calculation	Mentally bifurcate economic factors.
Mere-exposure effect	The tendency to positively judge based on familiarity.	People	Relate	Familiar things positive
Misattribution of memory	The tendency to attribute facts or situations to the wrong source.	Relate	Relate	Facts to the wrong source.
Misinformation effect	The tendency to recollect less accurate information on a situation based on post event facts or information.	Example	Recollect	Memory recall of less accurate information of a situation based on post event facts or information
Modality effect	The tendency to understand clearly based on the presentation method.	People	Presentation	Understand based on presentation method.
Money illusion	The tendency to provide or evaluate nominal financial value instead of real value in the decision process.	Relate	Valuate	The nominal value provided instead of a real one.
Moral credential effect	The tendency to establish oneself as a person to decide based on consensus but later prove otherwise.	Management	Belief	Not being a decision maker based on consensus against the associated people belief.
Moral luck	The tendency to relate moral connection to an outcome.	Relate	Relate	Moral connection to outcomes
Motivated blindness	The tendency to ignore readily available information that contradicts their preferences, when motivated.	Decision	Omit	Ignore available information if contradicts preference
Murphy's law	The tendency to believe that things, which can go wrong, wil eventually go wrong.	People	Belief	If it is, things will go wrong.
Myside Diagnostic	The tendency to selectively gather and interpret evidence that confirms own diagnosis and ignoring evidence that might disconfirm it.	People	Belief	Selectively gathering and interpreting data, information, statistics, facts, records, or documents based on self-belief.
Naive cynicism	The tendency to predict others to be more selfish than actual.	Relate	Predict	Others are selfish.
Naive realism	The tendency to believe demonstrable things around us, and judge those with disagreement as mind-set person or ignorant.	Relate	Judging	Judging that others who disagree have mind set, ignorant, uninformed, unfamiliar, inexperienced, or illiterate.
Negativity	The tendency to incline towards negativity when both positive and negative have the same weightage.	Negativity	Incline	Incline to negativity.
Neglect of probability	The tendency to judge without considering probability.	Decision	Omit	Not considering probability

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Next-in-line effect	"When subjects are next in line they may ignore cues not related to performing"	People	Ability	Ignoring unwanted cues.
No response	The tendency of waiting, watching and being unresponsive.	People	Response	Not responding to change or improvement.
No time and energy	The tendency to overestimate or believe non-availability of time and/or energy for performing a process or activity.	Cost, time, and/ or energy	Time	No time and energy
Non-rational escalation of commitment	The tendency to escalate the non-rational support or commitment to the decision.	People	Support	Support for a decision.
Normalcy/ Normality	The mental state of people in a disaster situation or tendency to fail to prepare for disaster.	People	Negativity	Not preparing, planning, training, or coaching for a negative situation.
Not invented here	The tendency to ignore views and/or facts that come from an external origin.	External	Omit	External views omitted.
Occam's /Ockham's razor	The tendency to select a solution with fewer assumptions.	Decision	Preference	Selecting option with fewer assumption.
Occupational	The tendency to incline or distance based on people occupation.	People	Inclination	Considering the profession of suggestion maker.
Omission/ Opportunity	A tendency to unconsciously avoid equal opportunity	Group	Preference	Not providing equal opportunity.
Optimism	The tendency to believe that one is at comparably at reduced risk or overconfident in own ability to avoid or avert a negative situation.	Negativity	Negativity	Thinking, judgement, belief, reasoning, or deliberating that risk in a negative situation is low.
Ostrich effect	The tendency to avoid presenting negative financial information.	Negativity	Omit	Not giving negative financial information
Out group	The tendency to avoid or misalign with non-familiar or non-genetically related individuals.	Relate	Avoid	Avoiding no familiar person
Outcome	The tendency to err in evaluating the known outcome or blame others for unfavourable outcomes and ethical violations and gain credit for the positive outcome or be influenced by an expected outcome while evaluating probabilities.	Cost, time, and/ or energy	Decision/ blame	Err outcomes, blame others for an outcome, taking more credit from positive outcome, being influenced by expected outcome.
Out-group homogeneity effect	The tendency to believe that members of the disliked group are similar and liked group members are diverse.	Group	Believe	Believe disliked group are alike and disliked group members are diverse.
Overdo	The tendency to overdo process, procedure, method, system, or technique.	People	Valuate	Over doing process, procedure, method, system, or technique

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Overconfidence effect	The tendency to overestimate, over emphasise, or over precise on subjective factors like the probability of correctness of actions, beliefs, and experience than objective factors while giving a decision.	Management	Valuate	Overestimate, over emphasising, or over precise on subjective factors or the probability of correctness of actions, beliefs, and experience.
Pareidolia	The tendency to believe non-existing familiar pattern when prompted by a situation, image or sound.	People	Recollect	Believe non-existing familiar pattern by situation, image, or examples.
Parkinson's law	The tendency to believe that effort is adjusted to the difficulty of the task.	People	Belief	The effort needed depends on the task
Parkinson's law of triviality	The tendency of the organisation to give over value to trivial issues.	Cost, time, and/ or energy	Concentrate	Organisation to devote time and effort to trivial issues greater than needed.
Part-set cuing effect	The tendency to remember the highlighted facts or events while making a decision.	Decision	Decision	Remember the highlighted, emphasised, or stressed facts or events while making a decision.
Patenting	The tendency to believe that patents are unnecessary to gain returns.	Automation	Patent	Focus on exclusive technology that needs to be patented for future business.
Peak–end rule	The tendency to form an opinion based on experience with extreme results.	Decision	Opinion	Opinion based on experience with extreme results
Person -environment fit	The tendency to believe people-environment fit has consequences and change the person if a process in not working.	Management	People change	Change the person if a process in not working.
Person identification	The tendency to identify a person to appreciate or blame	People	Identify	Blame or appreciate others
Picture superiority effect	The tendency to remember pictures or images better than words.	People	Recollect	Remember pictures/images better than words
Placebo	The tendency to believe successful methods as incompetent.	People	Belief	Believe successful methods/ technology as incompetent
Planning fallacy Hofstadter's law	The tendency to underestimate task-completion times. The tendency to predict the optimistic time required for task completion.	Cost, time, and/ or energy	Time	Underestimate / optimistic task-completion times
Positivity effect	The tendency to value positively negative situations, failures or errors created by oneself, own group or the people of own choice.	Relate	Valuate	Project/ argue positively the negative situations of own or own group.
Prejudice	The tendency to form an opinion ahead of analysing or receiving information about a person or situation.	Decision	Opinion	Form an opinion ahead of analysing.

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Primacy effect	The tendency to remember the beginning of a situation better than the middle events.	People	Recollect	Remembering the situation beginning better than in middle events.
Priority	The tendency to work based on priority, favour one of the response options or perceived urgent options.	People	Preference	Working based on priority, not on first in first out or a set pattern.
Problem set	The tendency to repeat one tactic and restrict developing alternative tactics.	Management	Preference	Using the same tactics, strategies, policies, procedures, schemes, methods, approaches, or ways repeatedly
Project success project short comings	The tendency to accept the success of a project when it achieves base requirements rather than the predicted level.	People	Accept	Accepting base results than the predicted level
Pseudo certainty effect	The tendency to make risk-averse choices if the expected outcome is positive, but make risk-seeking choices to avoid negative outcomes. The tendency to keep outlook positive under uncertainty.	Decision	Negativity	Outlook positive under uncertainty
Reactance	The tendency to enthusiastically react in self's unfavourable situation.	Negativity	Negativity	Enthusiastically, actively, willingly, devotedly, strongly, readily, or whole-heartedly react in self's unfavourable situation.
Reactive devaluation	The tendency to devalue facts and views of contender or competitor.	Relate	Valuate	Devaluate, undervalue, degrade, or fail to recognize not considering competitors/ contender views.
Reasoning by analogy	The tendency to apply simple analogies and images to guide problem definition.	Relate	Problem definition	Using an analogy, comparisons, resemblances, and visual aids
Recency illusion	The tendency to believe a long-standing concept, fact, or data as a recent one.	Relate	Beleive	State old concept as a new one.
Recollection	The tendency to recollect information from the past for any situation.	People	Recollect	Recollect information from the past for any situation
Regret	The tendency to be suspicious of omitting certain diagnosis and thereby overestimating the negative probability of analysis to avoid regret.	Negativity	Avoid	Avoid regret overestimating the negative probability
Representativeness	The tendency to overgeneralise certain characteristics or observation or overemphasise evidence that resembles and represents a particular range of events.	Relate	Emphasise	Overemphasise evidence
Restraint	The tendency to overestimate one's self-control to irresponsible actions	People	Overestimate	Overestimate one's self-control to irresponsible actions
Reverse psychology	The tendency to project negative factors to a situation to obtain desired results.	Performance	Projecting	Projecting or focused stating of negative factors

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Risk compensation	The tendency to adjust their belief or situation based on the level of risk.	Relate	Belief	Adjust based on the level of risk
Rosy retrospection	The tendency to enhance the value of past events.	Relate	Valuate	Enhancing value to the past situation
Saliency	The tendency to find confirming data and elaborate a single alternate.	Relate	Belief	Finding confirming data for particular alternate.
Selection	The tendency to incline to particular participants in a selection process.	Group	Inclination	Inclining towards a choice of people.
Selective perception	The tendency to ignore or not notice views, data, or facts contradicting one's belief.	People	Omit	Ignoring contradicting data, information, statistics, facts, figures, records, or documents contradicting one's belief.
Self-consistency	The tendency to overestimate consistency in outlook and belief, and rejecting ideas inconsistent with their experience, belief or outlook.	People	Overestimate	Overestimating consistency in outlook, viewpoint, stance, and belief
Self-integrity preserving moral integrity	The tendency to preserve moral integrity in all situations	People	Integrity	Preserve moral integrity in any situation or the fear that one's integrity is under questioning when he performs his duties or process.
Self-perceived job insecurity	The tendency to fear job loss due to innovation, improvement, or an alternate process.	People	Fear	Fear of technology, innovation, improvement, or alternate process related job loss.
Self-reference effect	The tendency to understand the information in relation to self.	People	Understand	Understand information, data, information, statistics, facts, figures, records, or documents in relation to self.
Self-serving/ Self – interest	The tendency to favour oneself or enhance self-esteem or engage in self-enhancing attributions in successful situations, and engage in self-protective attributions in negative situations.	People	Belief	State self interest
Semmelweis reflex or effect	The tendency to reject new evidence that contradicts one's belief.	People	Belief	Reject new evidence, information, data, information, statistics, facts, figures, records, or documents that contradict one's belief.
Serial position effect	The tendency to recollect start and end in a situation better than the middle sequence.	People	Recollect	Recollecting start and end of the situation better than the middle sequence.
Social comparison	The tendency to believe disliked and dejected after facing a stronger situation or contender.	Relate	Challenges	Lowness during negativity
Social desirability	The tendency to answer in a manner that is advantageously viewed by others rather than reflecting their real opinion.	People	Answer	Answer advantageously or favourably viewed by others

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Spacing effect	The tendency to understand a situation clearer when it is accessed over a period.	Relate	Time	Understanding a situation, issue, problem or difficulty after considerable experience or over a period.
Spotlight effect	The tendency to overestimate the level of attention one gets.	People	Valuate	Overestimate the level of one's attention
Standardisation	The tendency adopts to same way of operations.	Standardisation	Actions	Work in the same way as followed by others.
Status quo / Situation	The tendency to hold on to the current situation or method.	People	Embrace	Hold on to a current situation
Stereotype	The tendency to follow certain beliefs and ways of execution.	People	Embrace	Follow certain beliefs and ways of execution.
Subadditivity effect	The tendency to believe the collective probability of occurrence is less than the sum of individual probabilities.	Relate	Belief	Believe the collective probability of occurrence is less than the sum of individual probabilities
Subjective validation/ Personal validation effect	The tendency to agree with a fact or data if it match personal belief.	People	Belief	Agree with a fact, data, information, statistics, if it match personal belief.
Suffix effect	The tendency to get distracted when irrelevant information is presented.	People	Distracted	Distracted by irrelevant information
Suggestibility	The tendency to accept untruthful believable facts or data from others while recollecting a situation or incident.	External	Accept	Accept untruthful believable facts
Sunk cost	The tendency to consider invested cost while making decisions or invested cost irrationally influence on future decisions.	Cost, time, and/ or energy	Decision	Consider invested cost
Survivorship/survival	The tendency to believe in mechanisms that gave success in past and neglecting other options.	Management	Belief	Believe on the process, procedure, and methods that gave success in past.
System- human	The tendency not acknowledging system and /or human influences	Automation	Influence	Not acknowledging system and /or human influences
System justification theory	The tendency to have favourable value to oneself, own group and own social system.	Relate	Valuate	Have favourable value to oneself one's team.
Talent misjudgement	The tendency to misjudge talent and expect extraordinary results in their function.	Management	Talent	Expect extraordinary results from all people.
Technology aversion	The tendency of aversion to using technology without understanding what the technology offers.	Automation	Aversion	Aversion to using technology
Telescoping effect	The tendency to believe the recent event occurred in distant past and vice versa.	Relate	Believe	State recent event occurred in distant past and vice versa.

Bias	Description	Primary code	Important word, action, or behaviour	Connected words, actions, and behaviour to be observed during data collection.
Testing effect	The tendency to devote time to recollect events or situation to enhance knowledge.	People	Recollect	Devote time to recollect events or situation to enhance knowledge
The IKEA	The tendency to overvalue one's partially created things.	Relate	Valuate	Overvalue one's partially created things
Third-person effect	The tendency to believe that publicised messages impact or effect more on others.	External	Believe	Believe that publicised messages impact or effect more on others
Thyme-as-reason effect/ Eaton-rosen phenomenon	The tendency to believe things more accurate when it is rhymed.	People	Presentation	Things more accurate when it is rhymed
Tip of the tongue	The tendency to fail to recollect familiar events or situation.	People	Recollect	Fail to recollect events or situation in work place.
Trait ascription	The tendency to estimate one as predictable more than others in different situations.	Relate	Valuate	Estimate one as predictable more than others in different situations
Ultimate attribution error	The tendency to believe that group positivity is due to people character and negativity is due to the situation.	Relate	Belief	Group positivity is due to people character and negativity is due to the situation.
Unacceptability	The tendency to refuse or evade questions that may embarrass or invade privacy.	People	Refuse	Refuse or evade questions that may embarrass or invade privacy
Underreporting	The tendency to underreport situations or facts.	People	Report	Underreport situations or facts
Weber–fechner law	The tendency to recall odd situations more than normal situations while making decisions.	Decision	Recollect	Recall odd situations more while taking a decision
Well-travelled road effect	The tendency to estimate time, based on one's familiarity.	Cost, time, and/ or energy	Time	Estimate time, based on one's familiarity
Wishful thinking	The tendency to underestimate the impact or consequences based on the analysis.	Decision	Underestimate	Underestimate risk, impact, or consequences
Wrong information	The tendency to provide wrong information or wrong classification.	People	Information	Provide wrong information, data, evidence, facts, or report
Zero defect	The tendency to assume or insist on zero defects in a process.	Zero (risk or defect)	Insist	Insist on zero defects in a process.
Zero-risk	The tendency to avoid complete risk or the preference for reducing a small risk to zero over a greater reduction in a larger risk.	Zero (risk or defect)	Avoid	Avoid complete risk
Zero-sum	The tendency to believe the effect of positivity and negativity equals zero.	Zero (risk or defect)	Believe	Believe the effect of positivity and negativity equals zero