System Dynamics modelling of Organizational Culture Transformation:

A study of the organizational and technical factors that affect the implementation of Toyota production system in organizations

by

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ABSTRACT

Organizational culture is a vital source of competitive advantage. Nevertheless, it is often overlooked or given a lower priority due to its complex nature and the effort required to drive change. Existing change methodologies offer frameworks for implementing and sustaining organizational change, but success rates are low, with only one in three endeavours yielding favourable results. This research aims to adopt systems thinking approach to culture change. It utilizes system dynamics modelling to unravel the dynamics of change.

Initially, a hybrid change methodology is developed, incorporating the best aspects of models from literature and insights gained from organizational experiences in change efforts, including standard failure modes. This hybrid method serves as the foundation for building the system dynamics (qualitative) model. The developed model represents a shift from conventional linear methods to a circular system-based approach to change efforts. The qualitative (casual loop diagram) system dynamics model facilitates a transformative understanding of the interconnectedness and temporal dynamics. Leaders can gain insights into the complexity of these interconnected relationships and time dynamics.

Further research involves validating and updating the model through experimentation within a company, where key variables in the model can be measured easily. These measurements and the qualitative model together can be leveraged to produce an action plan to improve the variable. As we follow our action plan and track these variables repeatedly, the change implementation can be sustained.

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Acknowledgments

The research journey has been arduous and demanding. Countless hours have been devoted to mastering interview techniques, conducting interviews with individuals from partner companies and TSSC, engaging in thoughtful discussions with mentors, iteratively building models, and sacrificing sleep to scrutinize the model and check for any improvements. The value of research truly shines when new contributions are made to the existing body of knowledge and positive feedback is received from mentors. Although this report was reviewed many times, I apologize for any anomalies it may contain.

Primarily, I would like to express my gratitude to my mentors, Hazhir Rahmandad, Zeynep Ton, and Jamie Bonini, for their consistent guidance and valuable advice and for pointing me toward the right resources and directions. Working with these esteemed experts in their respective fields has been a privilege, and I am delighted to have surpassed their expectations. I am incredibly grateful to Jamie for allowing me to interact with multiple companies during the project, which not only contributed to my thesis but also enhanced my professional growth.

Secondly, I appreciate the partner organizations and their leaders and members who generously allowed me to visit their factories and invested their time in helping me gain a deep understanding of their processes. The feedback shared, and the insights provided strengthened my work and reaffirmed the research journey I embarked upon. My previous work experience at Toyota was also helpful in the research, and I appreciate those who helped me succeed there.

I express deep gratitude to my family - my dad, mum, and brother - whose unwavering affection and support have been instrumental in my growth. Their sacrifices, as they stood by their youngest child or younger sibling, cannot be quantified, and I am eternally grateful for their presence in my life.

Lastly, I extend my heartfelt thanks to everyone who has been a part of my journey over the past three years. Each person has played a significant role in my success, and I am grateful for the shared experiences and their impact on my life.

Note on the use of Generative AI:

I have leveraged ChatGPT to enhance the clarity of my explanations by correcting spelling, voice, and grammatical errors. Additionally, Grammarly was used for final grammar adjustments, ensuring adherence to academic writing conventions.

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Chapter 1: Research question and motivation for research

The research aims to investigate the influence of technical and organizational factors on the less successful implementation of the Toyota Production System (TPS) in various organizations. Specifically, the research focuses on organizations collaborating with the Toyota Production System Support Centre (TSSC) to receive training (“TSSC Workshops” 2023) on TPS and integrate it into their operations.

The motivation behind this research stems from the extensive investment of resources by TSSC to facilitate organizational culture change to introduce TPS. Despite these efforts, it has been observed that certain institutions abandon the implementation process midway, while others continue to struggle to fully adopt or sustain the TPS methodology change within their organizations.

Consequently, understanding the factors influencing successful and unsuccessful TPS implementation becomes crucial. This understanding can assist TSSC in identifying the specific drivers that require greater attention to bring about effective change and help analyse the organizational conditions to assess their readiness for TPS before initiating the training. By comprehensively examining the technical and organizational aspects, this research aims to provide valuable insights and recommendations that can enhance the implementation of TPS and facilitate a smoother transition toward lean operations. Furthermore, the findings of this research can contribute to companies' understanding of the commitments required to implement lean operations within their organizations. It can shed light on the roles and responsibilities of leaders in driving change, with the support of TSSC, to ensure a successful and sustainable adoption of TPS. Additionally, the mechanisms of this research can be applied to change initiatives more generally as well.

Chapter 2: Research Methodology

The research methodology consists of several vital components. Firstly, a literature study is conducted to review existing methodology of organizational culture changes and study common failure modes in change transformations. This helps to establish a theoretical foundation and gain insights from prior research in the field.

Next, interviews are conducted with partner companies of TSSC to gather first-hand information about their journey through the transformation process. Two companies were selected as research partners: Company A, a furniture manufacturer located in the USA, and Company B, a healthcare service organization based in Canada. In-depth interviews were conducted with various individuals from both companies, including top management and front-line members. A total of twelve individuals per company participated in the interviews. During each interview session, approximately two hours were devoted to understanding the status of TPS implementation. These interviews provide valuable qualitative data and allow for a deeper understanding of the challenges, successes, and lessons learned from real-world experiences. The interviews aimed to gather insights into the methodologies employed, the progress made, and the factors that either facilitated or hindered the implementation process. By delving into these details, the research sought to understand the challenges and successes encountered during the implementation of TPS in different organizational contexts.

The data collected from the literature study and interviews are then analysed and synthesized. The field observations are then analysed and compared with the change literatures to see if the mechanisms for success and challenges are covered or TPS implementation may require additional concepts to implement and sustain fully. This involves integrating the findings from the literature with the insights gained from the interviews to develop a hybrid methodology that captures the intricacies of organizational culture changes.

A system dynamics causal loop model is constructed further to enhance understanding of the complex interactions within the hybrid methodology. This model visually represents the dynamic relationships and feedback loops between numerous factors and variables involved in organizational culture changes. This model then allows us to see the interconnectedness and how problems in one variable/step could affect the steps; thus, both identifying emerging challenges and responding to them requires an understanding of those interrelationships.

The research steps are summarized below.

Step 1. Review existing literature on change or business transformation (Chapter 3)

Step 2. Study literature on the causes of transformation failure despite being established. models (Chapter 3)

Step 3. Conduct interviews with companies to understand their current progress and factors influencing change (Chapter 4)

Step 4. Develop a hybrid change methodology based on insights from steps 1, 2, and 3 (Chapter 4)

Step 5. Create a qualitative system dynamic (causal loop) model (Chapter 5)

Step 6. Validate the model by comparing it with the findings from step 2 (Chapter 5)

Step 7. Develop a generalized system dynamics model (Chapter 6)

Step 8. Insights, Recommendations, and Discussions (Chapter 7)

On-going / Future work: Develop a simple measurement system to measure key variables of the model in an organization and how to leverage the model to suggest action plan for organizations to implement and sustain change (Chapter 8)

Chapter 3: Literature review

3.1 What is organizational culture, and why is it important?

Toyota Production System (TPS) is an organizational culture of highly engaged people motivated towards problem-solving and innovation (Bonini Jamie 2023), and most literatures (Liker and Convis 2012; Byrne 2012) concur with the idea that TPS is indeed a culture. Thus, in this research, we start with understanding what culture is and build from the assumption that TPS is an organizational culture; thus, the implementation of TPS requires a change in culture.

Culture in its raw form is challenging to define. In a simplified sense, Culture can be defined as the way of life. Merriam-Webster defines Culture as the customary beliefs, social forms, and material traits of racial, religious, or social groups (“Culture” 1989). This definition implies that organizational culture can be defined as the concept of 'culture' when applied to an organization. Today, at most organizations, "culture" is loosely attached to anything that relates to a "certain way" of doing work, a "certain way" of thinking, a "certain set" of values and beliefs, "certain norms" of behaviour and even in the way the employees including leaders and managers interact with each other. Culture is considered a source of competitive advantage by specific companies (Aileron 2017). Toyota, Southwest Airlines, Costco, and Microsoft are companies where Culture stands out as a differentiator. Even with competitors having similar product or service, these companies with a unique work culture could deliver and sustain superior organizational performance. Thus, it can be safely concluded that irrespective of the accuracy of the definition of organizational culture, culture is present in every organization and can influence the performance of the organization.

Given that Culture is important to an organization, it is essential to ask, "whether organizational culture can be changed to achieve superior performance." To answer this question, we need to understand or define what organizational Culture is. Professor Edgar Schein of Sloan School of Management, in his article "Organization Culture" (Schein 1988), explains organizational Culture as ":

1) A pattern of basic assumptions,

2) invented, discovered, or developed by a given group,

3) as it learns to cope with its problems of external adaptation and internal integration,

4) that has worked well enough to be considered valid and, therefore

5) is to be taught to new members as the

6) correct way to perceive, think, and feel in relation to those problems. "

While it may not be the simplest definition of Culture, the definition by itself encompasses every aspect of Culture. From his definition, we can see that Culture is a set of assumptions shared by all members of the organization and that as the external or internal problems arise or change, the basic assumptions need to be adjusted with these problems to cope with (or overcome) them as well. In an article called "What is organizational Culture ? and Why Should we care ? by Michael Watkins (Watkins 2013), he gathered 300 responses to the question of what is organizational Culture. Most of the reactions aligns closely or overlaps with the above definition. Thus, in the document's reminder, any reference to Culture will refer to the above definition of organizational Culture.

Culture is not so simple. Many aspects of the organization shape culture. For example, a global organization cannot have the same organizational Culture in its different geographical locations. Some aspects of the corporate Culture may overlap; however, there may be some differences in Culture. Thus, Culture is shaped not only by the attributes of the organization but also by the context in which the organization operates. In the book " Culture Change Leadership " by Shein and Shein (Shein and Shein 2019), the authors break up the organization culture into five components : Subcultures, Social cultures, Micro Cultures, Technical Culture and, Macro Culture, which refers to the organizational Culture.

The book defines technical Culture as the "shared beliefs, values, and norms pertaining to

1. its basic mission, strategy, and goals.
2. the work structure, systems, and processes by which it accomplishes its tasks; and
3. the measurement and correction systems it used to stay on course."

Thus, the technical Culture is very closely related to the product or service the organization provides to its customer and the process by which it produces and delivers the product.

Microcultures are those related to groups within the organization that have a specific task to be performed and are not intricately connected to the other parts of the organization. (An example mentioned in the book (Shein and Shein 2019) is how operating rooms and intensive care units in hospitals can develop a micro-culture of their own which may be different from the Culture of the hospital. This makes sense intuitively as we defined Culture to be shaped by problems, and thus the problems faced by doctors in ICU or operating room may be different like challenges with respect to decision-making efficiency and speed) from problems faced by other doctors).

Social Culture refers to ways in which employees interact with each other. The book (Shein and Shein 2019) specifically describes social Culture as " (a) a common language, (b) an identity that defines the group boundaries, (c) a relationship system that defines levels of authority and intimacy, and (d) a reward and control mechanism that allocate status that can be legitimately be thought as the social Culture.". The technical and social cultures are heavily influenced by each other as people are required to bring together the product and process at every organization to deliver value to the customer.

The subculture refers to Culture that arises in different subunits within the organization. The sub-units could refer to different functions, geographies, products, and markets, and it is easy to see how each of these units could evolve certain subcultures, and thus the same organization operating in a different part of the world could have a different macro culture where in the differentiating factor is primarily related to the difference in subcultures. Thus, when we break down organizational culture into these buckets, we can see how culture is composed of multiple interrelated aspects of the organization.

Thus, Culture or Macro culture of an organization can be defined or viewed as an integration of technical Culture, microculture, social Culture and subculture. The element of sub-culture indicates that the macro-Culture need not be the same for the same organization across different countries, functions etc. The extend of influence of subculture on each of the other cultures subjective depending on numerous factors.

Once Culture is defined, the next big question that arises is how to change the culture in an organization. For this research, this was an especially important question because we wanted to observe how Toyota Production system (TPS) was being implemented at the organizations. This question will be answered during our research, but from what we could understand from TSSC – they wanted these companies to make TPS more like how it was for Toyota. TSSC in fact defined at "TPS as an organizational culture of highly engaged people. Solving problems or innovating drive performance that is created and sustained by a three part system of philosophy, technical and managerial role" (TSSC 2022).

From an outsider perspective , Culture can be seen in three angles : Espoused values, Cultural artifacts and Tacit Cultural Assumptions (Shein and Shein 2019). Cultural artifacts are what we see in organizations in the activities of the employees, the way the organizations treat customers, the layout of offices, the design of workflows, and even the organization's structure. The espoused values are what drives these cultural artifacts. The espoused values are those which values by which the organization lives and what is visible to the outside world in terms of slogans or mission

statements etc. When there is difference between what the espoused values expect the organization to do and what the organization actual does, that leads to the existence of the tacit cultural assumptions , which defines this divergence (Shein and Shein 2019) These assumptions eventually would have started out as values but over time they would have become assumptions and taken for granted (Schein 1988). This research is based on these aspects – what we expect to see based on the organization values and missions, what we observe, and what causes that divergence.

3.2 Is Toyota Production System (TPS) an organizational culture?

Toyota Production System (TPS) is often misunderstood as a tool kit of different tools or methods to achieve production efficiency (Liker, n.d.). Toyota Production System Support Centre (TSSC) defines “Toyota Production System as a culture of highly engaged people, solving the problem or innovating to drive performance that is created and sustained by a three-part system of (1) philosophy (2) technical and (3) managerial role” (TSSC 2022). This definition closely aligns with the definition of the culture that is mentioned in the section 2.1, and is consistent with the definition put forward by Schein (Schein 1988). TSSC visualizes the TPS as a triangle, as shown in Figure 1.

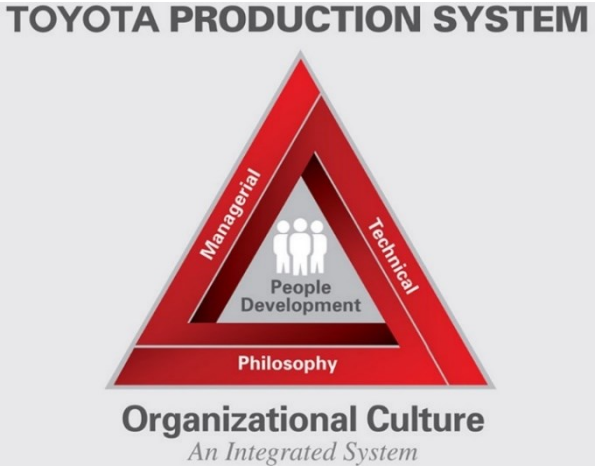

Figure 1 : Toyota Production System represented as a triangle by TSSC

Organizations implementing TPS can be assumed going through a corporate culture change or transformation to implement TPS in their respective organizations. However, sometimes TPS is mis-understood as a set of technical tools to achieve certain goals. The TPS house (*TPS Handbook*, n.d.) (Figure 2) represents that version and is often mis-understood by consultants and organizational leaders to be the real TPS. This TPS house represents the technical aspect (refer (Liker, n.d.) to get more in depth understanding of TPS) of the triangle shows in Figure 1. This apparent misunderstanding makes sense as it is easy to adapt tools, which generate returns in short term, then to adapt culture, which is beneficial in the longer term.

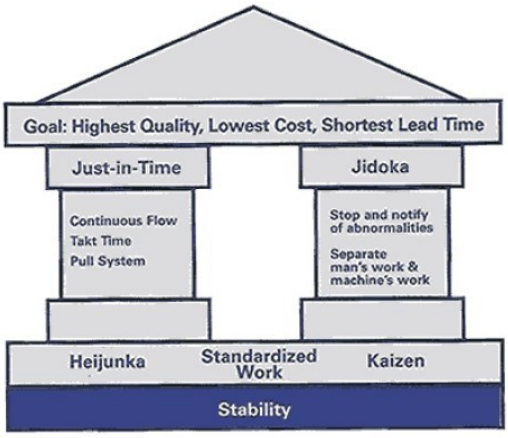

Figure 2 : Toyota Production system represented as a house.

3.3 Organization change methods

Once the culture is established as a defining factor, with its significance comprehended and acknowledged that TPS (Toyota Production System) is not merely a collection of tools but a culture that must be cultivated, the subsequent section entails delving into existing literature methodology that shed light on change methodologies. It is worth noting that numerous books have been written about leading change in organizations, but our focus narrowed down to four specific ones. These include two generic methods (Leading Change by Kotter (Kotter,John P 2012) and Win from Within by Heskett (Heskett 2022)) , one supported by scientific evidence (Critical Path to corporate renewal (Beer, Eisenstat, and Spector 1990)), and one based on the actual implementation of TPS (The Toyota way to lean leadership (Liker and Convis 2012)). Other methods or change literature or strategies referred were The lean turnaround by Art Byrne and Good Jobs Strategy by Zeynep Ton (Byrne 2012; Ton 2022). We would like to assume that these change methodologies can be applied to bring a change in organizational culture as well.

3.3.1 Kotter's 8 step change method

In the book Leading Change (Kotter,John P 2012), first published in 1994 and later revised in 2012, John P Kotter established a set of eight steps to lead and implement change in any organization. In this book, he explains that one of the main reasons organizations fail to implement change is the non-preparation of the organization and its leadership for that change. While Kotter explicitly does not mention what is inferred by change or the scale of change, he has elaborated on the eight common errors he has observed in organizations that tried and failed to implement the change. The eight errors (Kotter,John P 2012) are:

1. Too much complacency in the organization
2. Not a strong coalition to lead change.
3. Lack of vision
4. Under-communication of vision
5. Obstacles in the organization
6. Declaring victory too soon, and
7. Not anchoring changes to Culture.

Based on the above errors, Kotter suggested an eight-step framework to initiate and lead organizational change. Kotter's method would be a good starting point to understand the change as most consultants use this method for any culture or change implementation in organizations. Additional culture change literature has been covered later to know how similar or different each change framework is.

The eight-step method is visualized in figure 3.

Step 1: Establishing a Sense of Urgency

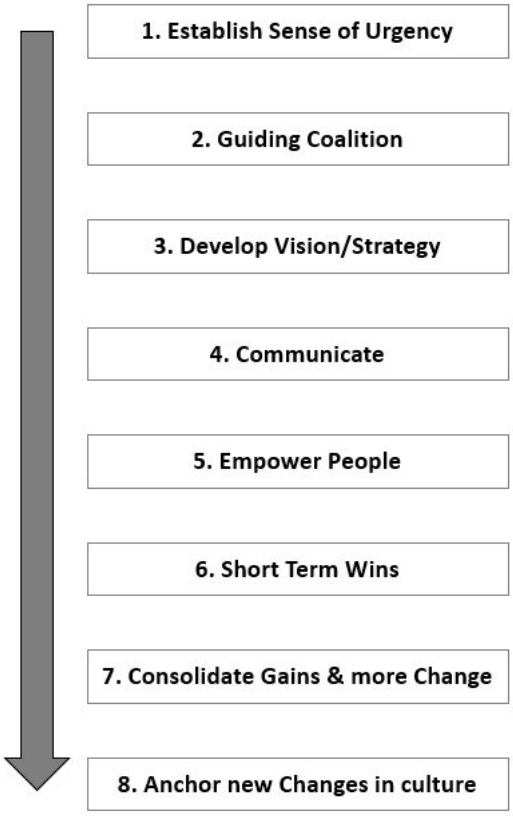

Figure 3 : Kotter's Change method

In his book (Kotter,John P 2012) ,Kotter argues that with urgency to change, any change implementation will succeed if there is more motivation and commitment from both leaders and the employees to implement the change. The organization goes into a state of being complacent which may arise from being a market leader for an extended period, not talking about real issues affecting the organization, having no crisis internally or externally, no threat of any downturns or layoffs, no good KPI to measure manager effectiveness, no robust feedback mechanism on performance, a disconnected organizational structure where information does not flow smoothly, goals being modified to what is achieved, plans being too easy to achieve, and having a fall sense of security. The reasons mentioned here are incomplete but gives an idea of a set of reasons why complacency sets in an organization.

Kotter argues that the first step to bringing change is to understand as an organization the need to change and the impact of not getting that change. This requires the leadership team to think beyond their business domain and look for ways their business can be disrupted. The leadership team should understand such possible external threats and covert that into potential urgency for the organization. Sometimes urgency can arise from crises. The dot com, pandemic, and GFC are all sources of problems that organizations could leverage to eradicate the sense of complacency and bring in a sense of urgency in the organization. In some instances, leadership can also create a sense of urgency through artificial crises. The key for the leadership team is to make every member of the organization unhappy with the status quo, motivate them to strive for perfection through a change management program. Without such urgency it will be difficult to get maximum engagement of the employees. It is essential to note that this sense of urgency needs to be sustained throughout the journey else the inertia might creep in.

Step 2: Creating the Guiding Coalition

More than one person or a leader is needed to bring change and, in every case, requires a team to bring changes in an organization. The key points to create the guiding coalition are finding the right people, building trust among the team, and developing and communicating the shared urgency and goal among the alliance. Another approach that most companies use is task force. The reason certain task force fails are due to a lack of power or autonomy or influence for the task force to change multiple aspects of the organization, and even with proper support, it can be challenging to get a task force to implement change, especially when there is a siloed organization in place.

For the guiding coalition, suitable membership refers to a mix of people with the power (position), expertise on technical and managerial aspects, credibility/reputation for bringing in change, and leadership capability to design and change the system. It is essential not to have people who are reluctant to change or have egos toward change and progress. Trust is absent in many organizations, and mutual consensus, respect, and caring are needed in the team to develop this trust. This can be achieved through team meetings or outdoor recreation events, which will bring together the team members. Once this coalition is established, step one of the senses of urgency allows us to profoundly deliberate and understand the need to change, forming a guiding team.

Step 3: Develop a vision and strategy.

Kotter (Kotter,John P 2012) argues that the traditional methods of authoritarian organizations or micromanagement, which were used to bring change, are generally helpful in maintaining the systems. Transforming systems requires a strong vision and proper communication attached to them, creating the force needed to break the support for the status quo. An idea is a picture of the future with some implicit or explicit commentary on why people should strive to create that future (Kotter,John P 2012). In other words, the vision should show a future map of the current business with a map of how to reach there as well, which should be communicated in a way that is understandable to both leadership and frontline workers. The vision should also define the necessary changes to be bought into how the organization works to succeed in the future. These changes must push the need for change in thinking across the organization. Kotter mentions that the characteristics of the vision should be imaginable, desirable, feasible, focused, flexible, and transferable. The benefits from reaching the vision goals must be beneficial to customers, employees, and investors. The vision is not a distant goal that is not reachable but, in fact, an achievable set of plans. Step 3 must be thought of in conjunction with the previous steps of creating a sense of urgency and guiding coalition.

Step 4: Communicating the change vision.

It is not surprising to see that most companies that want to transform already have the vision to change but still manage to fail. The primary reason is not communicating the idea across the organization. Vision is achievable only if the vision is comprehensible and transmitted to every part of the organization. It may be not easy in a vast organization as there are too many people or divisions. However, breaking any communication barriers is critical, and the vision should be communicated across. Kotter (Kotter,John P 2012) mentions that people do not listen in an organization as there may be no sense of urgency, so guiding collation, which is sharing the vision, is not the right group. The intermediate managers are the key proponents who must lead the banner for change. There are always limitations from employees to change which can be contributed to resistance to change and/or lower intellectual capability (Kotter,John P 2012).

Communication of vision should be a significant part of overall organizational communications. Communication is complex, challenging, time-consuming, and costly to implement and requires considerable time and energy across the organization. This is a crucial aspect most organizations miss, as the investment in time and money is significant. In times of external crisis, this investment also must be considered in necessary budgets. The critical elements in effective communication are simplicity, metaphor, multiple forums, repetition, leadership by example, expandability of seeming inconsistencies, and give and take (Kotter,John P 2012). While each aspect of vision is essential, the emphasis on leadership by example is significant. People aspire to change when their leaders or managers enact those changes by themselves, and thus each leader and manager needs to ensure that they align and act by the changed needs based on the vision. The aspect of give and take is also critical because the vision communication is a dialogue or two-way street. It is important to take feedback from employees on the vision, clarify any open queries, and ensure proper alignment in the organization.

Step 5: Empowering Employees for Broad-Based Action

Bringing significant changes in an organization or bringing transformation in culture in an organization is not possible only through solid leadership but also insists on the people's participation and assistance across the organization's depth and breadth. Thus, it is critical to realize that if people need to participate, they must also be empowered to take steps toward that change. This requires attacking typical organizational barriers, such as working in silos, lack of training, performance systems not aligned with the overall vision, supervisor relationships with subordinates, and lack of building confidence within members.

Working in Silos or departments/divisions/sections hampers the information flow across the organization and thus weakens any steps taken to change. Every organization member should

be aware of the change the company is planning to implement, and the leadership team should ensure that all the necessary training is made available to employees to accelerate the shift. In this case, it is important to note that engaging employees in the same while is essential will call for higher investment in terms of time and money. The behaviour and relationship between supervisor and team must also change to ensure a proper feedback mechanism on how to and what to change, and thus guide members towards the shared vision.

Step 6: Generating Short-Term Wins

Transformations take time, and patience is crucial for leadership and members. However, putting a lot of effort into a goal that may take a long time may be tiring and demotivating, especially if many failures happen on the way. Short-term wins are thus a mechanism in which there could be an opportunity for the team to celebrate small wins (for each smaller goal broken down from the more important goals) and celebrate with all employees. Such wins bring higher motivation and confidence in the change process and attract people's commitment and interest from people initially resistant to change. It is important to note that too many small wins can lead to the organization losing the sense of urgency. It is essential to keep the sense of urgency going even if most of the targets are met.

Step 7: Consolidating Gains and producing more change.

Consolidating gains refers to the process of ensuring that all the changes that have been implemented are not allowed to revert and are entirely sustained. These sustained improvements slowly develop into an interdependent activity that forms a culture in the organization with the implemented changes. The momentum increases with each change, and gradually organization can see more changes over time. It is essential to be aware of all significant changes; over this time, many other priorities or changes can occur. However, the above steps ensure that the urgency is kept high, and changes are continued to be implemented and sustained.

Step 8: Anchoring new approaches in the culture.

As changes are implemented, it is the responsibility of the organization to convert the new ways of doing work to the organization's culture. Culture can be defined as norms of shared values among a group. The culture aspect is essential because culture can be transferred across generations and from past to new employees. Over time, the changes implemented become part of the "normal" way of work in the organization, which develops as the organization's culture. Once it is part of the culture and relevant systems are built around the culture, then it is hard to revert. Thus, it is essential to realize the importance of the change that needs to be introduced in the organization. The change must make sense and must be rational. Differences in culture take time, but it is necessary to ensure a long-term benefit.

3.3.2 Heskett's Method

James Heskett in his latest book Win from within (Heskett 2022) explained a more detailed process flow for organizational culture change along with a timeline and a sequence of change steps, which was one of the drawbacks in Kotter's methodology. In section methodology comparison, a comparative analysis is completed on all different methods to see how each method overlaps and diverges from each other. An overview of the methodology, along with the steps, sequence and timeline is shown in figure 4 and further explained later:

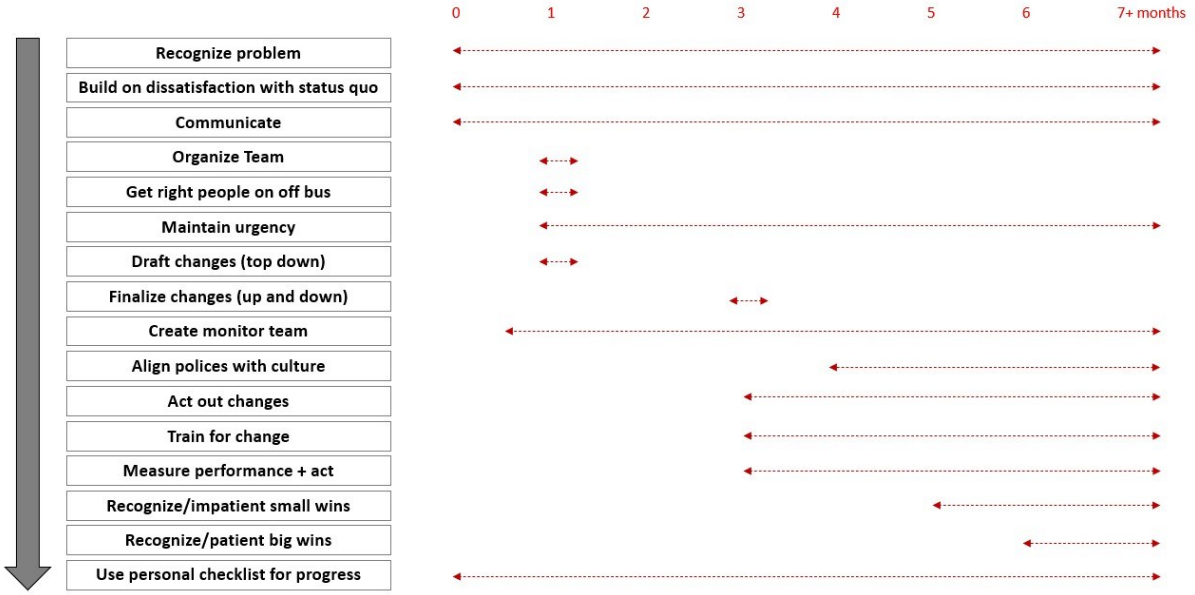

Figure 4 : Heskett method for change methodology

Action One – Recognize the problem: The first step in any change method is recognizing the problem and the need for change. It is the responsibility of the leadership to recognize the need for change, even if others in the organization cannot see the need. The need to change in culture comes from the change in strategy or goals in the organization. The goals include performance inputs, organizational trust, safety levels, and typical cost metrics.

Action two – Build on dissatisfaction with the status quo: This step builds on step one, where the entire organization builds on the need for change. This must happen first at the top, and more discouragement with the current organization status must be encouraged. This dissatisfaction later must be shared down the organization across both breadth and depth.

Action three – Communicate, Communicate, communicate: This is one of the critical steps in which there is an emphasis on the need to communicate actions one and two across the

organization. This action involves transparency and effectiveness in what is being communicated. If the communication is ineffective, members might add imagination to the change, creating new issues in the organizations. Thus, it is essential that the communication is clear and concise and take feedback on whether it was adequate and that recipients have understood it correctly.

Action four - Organize the team: If the organization is large, considerable effort is required to implement and manage the change process without losing control over the change. A good team is created that encompasses people from top to bottom and across the organization's breadth. This is to ensure that there is good representation across the organization and that team members are selected who have credibility, autonomy, and alignment with the previous steps.

Action five - Get right people on and wrong people off: Continuing with the above step, the team must consist of the right people who align with the change, not those who resist any change. Identifying the wrong people can be challenging as they may make themselves visible through the journey, so the change team should look out for such people. It is also essential for the team to attempt to buy into the non believes as the team can find important roadblocks for change propagation from these groups, which will eventually need to be resolved to make the change effective.

Action Six - Create and Maintain a sense of urgency: We have created a sense of urgency regarding the need to change from the initial steps. The next big challenge would be maintaining urgency across the changed timeline. Some changes can take years; thus, maintaining this urgency can be difficult. Any change implementation - big or small - stresses the organization. Thus, the leadership and change team must recognize this early in the process, identify measures to overcome them, and maintain this urgency. Urgency requires tight deadlines for change processes with little slack to accommodate delays. This tight deadline supports the maintenance of urgency. The key role of the leadership team to keep reminding through communication the change need, the progress, the motivation and to lead by example though their changed behaviours, values, and priorities.

Action seven - Draft Changes in Mission, Values, and Behaviours (Top Down): The primary role of the team (actions four and five) is to draft a set of values and behaviours that needs to be followed by the organization to push toward the change required in the organization. The vision development starts from the top and percolates across the organizations. The core team responsible for driving change must align entirely with the new vision as they are responsible for communication and buying the rest of the organization (Especially clarifying open questions about

the new vision and the need for such vision). The new behaviours also evolve from the updated mission and values, and the top leadership and the change team must reflect these behaviours in their actions and decision-making processes.

Action Eight - Finalize the statement (Bottom-Up and Top-Down): Through earlier steps, we have developed a vision through top-down, and bottom-up approaches where the revised vision or goals were communicated down the organization, and then the feedback was taken across the organization to finalize the vision. This is most important to realize as vision development should be a two-way process, not one way, as change is led by leadership but implemented by the members.

Action Nine - Create a Monitor team: Change, especially big, requires time, and all efforts are spread across the breadth and depth of the organization. Thus, such transformations require proper monitoring to ensure that the change process is implemented on time, reflections are correctly taken, the change process is modified appropriately, and results are realized and recorded. This monitor has not left the responsibility to the leadership or a corporate planning team but is spread across the organization at various levels.

Action ten - Align Measures, Incentives, Policies, and Process with desired culture: This is one of the most essential and ignored steps in any change process. The expected changes in values and behaviour from members should be measurable and tracked through performance review systems. To sustain changes, it is essential not only at the employee level changes be maintained but also at the organizational level. This calls for changes in systems, policies, and processes that should reinforce the changes proposed by the change and reinforce the expected behaviour.

Action Eleven - Act out the changes: Leaders need to walk the talk and be role models for the changed behaviour and values expected by the organization. Employees constantly look up to leadership and try to see consistent actions from the leadership team. This step goes hand in hand with the step on communication, where the leadership consistently communicates and acts out the changes expected in the organization, thus leading to employees implementing the changes. This calls for the organization to allow for proper psychological safety within the organization, where employees can call out their leaders who do not act on the change, and this together reinforces each other's commitment to the change.

Action Twelve - Train for Change: The changes in the organization require every member to act the same way. This requires the organization to impart the necessary competency and

capability to every organization member on the proposed change. This training includes the critical aspects of the changes and changes in the organization's policies to review these changes, such as strategic communication and performance review system. External trainers can be leveraged to quickly scale the change implementation, which can be used for employees and leadership.

Action thirteen - Measure Performance and Response: It is known that what gets measured gets improved. Defining critical metrics across products, processes, and people that can track and measure the effectiveness of change implementation in the organization is essential. Further, a sound feedback system should reflect on what went wrong and take necessary corrective actions and countermeasures to bring the journey back on track. This could lead to some bold actions such as changing managers, reorganizing departments, and letting go of members who are unwilling to corporate in the change process.

Action fourteen - Recognize, Reward, and be impatient for small wins: Success is not defined as one or zero but as a summation of smaller steps of minor achievements. Small wins are essential as they keep employees consistently motivated to continue the effort toward achieving the big win.

Action fifteen - Be patient for big wins: substantial changes usually take time, and the impact of these changes in profits and growth requires an even longer time to reflect. Thus, there must be patience across the organization to hold through the changes and wait for the results. Some change transformations can take years, but organizations must display patience to bear the fruits of the change, which will be a dramatic win for the organization. By waiting for the big wins, the journey, and the changes implemented in the process, people and products will slowly engrain into the organization's culture.

Action Sixteen - Use personal leadership reminders to measure how things are going: The leadership and the change team need to keep reminding themselves of the above fifteen steps to track and measure the culture change journey continuously.

3.3.3 Lean (TPS) Method

In the last chapter of the book Toyota way to lean leadership (Liker and Convis 2012), one of the authors mentions the journey he took to implement Toyota way or Lean principles at Dana corporation, which was a supplier to Toyota and was at that time going through some crisis both from an operational and financial perspective. While the book's details may partially encompass all the steps and sequences in the change effort, a base method of the change could be developed from the chapter, which is presented below. In a later chapter, this method is compared and contrasted with the previous methods that were discussed by Kotter (Kotter,John P 2012) and Heskett (Heskett 2022).

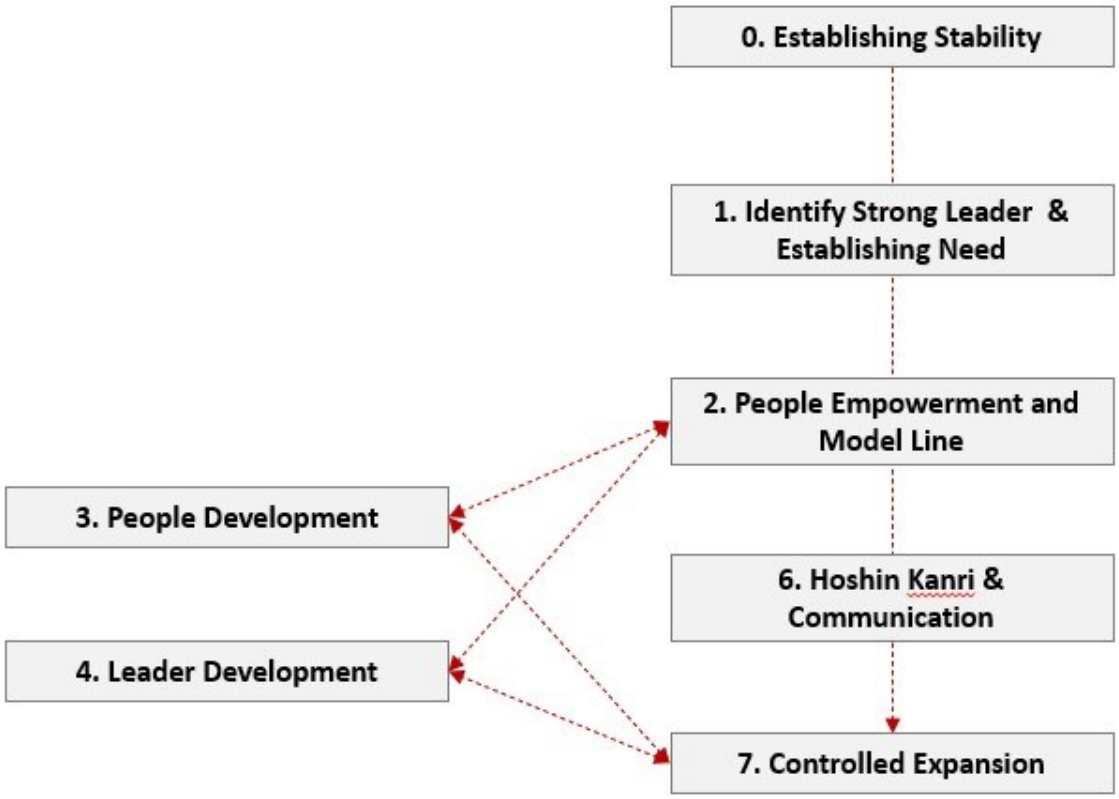

Figure 5 : Lean method for culture (TPS) change

Step 0: Establishing Stability

One of the first critical steps in building a lean culture (or any change) would be to establish a stable foundation, especially on financials and management ways, so that a culture change can thrive. In Toyota, stability is defined on four aspects: man (People), method, machine, and material (commonly referred to as 4M at Toyota).

Gary mentions that introducing lean in an organization requires enormous courage from the leader driving this change. Some instances (in the situation Dana is in) may require management shake-ups, layoffs, and aggressive cost reduction to build that stable foundation required for sustained lean implementation. It is important to note here that in the case of Dana since they were going through a crisis (Driven by both internal and external factors), lean implementation required layoffs, however in a company that had no crisis so bad, layoffs would be an aspect that any expert on lean would not even allow to happen. The core of lean is to reduce the non-value-added time in the system, free up resources, and leverage those resources for more value-added work. A stable foundation only happens after some time, and it takes time. However, it is essential to note that there is a need to ensure a "base" stable foundation to start with. This does not mean that unless a stable foundation is developed, only then the next step of change can be implemented. It is a mutual and continual process of establishing stability while implementing the lean methodology simultaneously. This can be seen in figure 2, where the stable foundation keeps happening throughout the journey.

Step 1: Identifying a Strong leader and Establishing Need

A strong and committed leader is critical for any transformation and especially important for lean leadership, as lean calls for thinking from a systems perspective and looking at non-value elimination across the total product lead time. This requires breaking down silos in an organization and thinking about a holistic view rather than a local one. Culture and leadership are complementary and must work to ensure that a strong culture is developed from lean implementation. In the book (Liker and Convis 2012) the authors refer to leadership as encompassing four stages,

i) Self Development

ii) Coach and Develop others

iii) Support Daily Kaizen (improvements)

iv) Create Vision and Align Goals

These four stages are required for every leader and thus become a framework to identify potential leaders who can ensure to commit and display the above stages throughout the implementation journey. At Toyota or any company that practices true lean, one common aspect noticed is that leadership is not "an individual driven" but by a group of leaders equally motivated to live by the above four stages. This critical mass of leaders spread across the breadth and depth of the

organization is the mechanism through which the lean transformation needs to be implemented. In Toyota or Lean, each of the above stages has specific tools and methods that can be used to evaluate the effectiveness of the leadership and as a tool for self-improvement for leaders (refer chapters 1 to 4 in (Liker and Convis 2012)). It is important to note that while most organizations use extrinsic motivation (Such as financials) to drive commitment, Toyota leverages intrinsic motivation to drive lean transformation. This has been true at every level of any leader at Toyota, and every lean transformation at any company should embrace it. This intrinsic motivation drives the leader to walk the talk and be a role model for the organization and employees to look up to.

The need to change is a tricky question, and this question is sometimes evident from the firms' performance compared to the firms past performance or benchmarked with similar companies. Some companies want to change their trajectory to be better than their current condition - a concept commonly referred to as True North by Toyota and other similar companies. The leadership group identifies the need to change and what changes need to be bought in the organization. These changes are not trivial to identify and require an in-depth analysis of the organization's various aspects of the people, product, and process. This identification requires a lot of deep thinking and introspection into the gap between the current condition and where the organization wants itself to be. Such analysis requires a strong vision, leadership, and good metrics to see the gap between current and future conditions. As lean requires analysis from a systemic perspective, the leadership must analyse the system close to the problem (commonly referred to as genba at Toyota) and take feedback from the people closest to the product and process (customers and employees). This feedback process helps establish mutual and two-way communication across the organization, instilling employee trust in the organization. Especially in lean, trust is critical if the culture needs to survive not only during good times but also in tough times. The trust comes from the leadership's actions of empowering the members to own the transformation and the process of building the culture. The more participation of the employees, the higher the chances of success in the change journey. Many problems may need attention, but the leadership team needs to scrutinize and prioritize where they need to focus now, which helps them bridge the gap.

Step 2: People Empowerment and Model Line

Empowering people includes training people (members and leaders) on the basics of lean tools and methods. Lean can be learned only by practice, not by listening or reading. Also, genuinely imbibing the spirit of lean requires the organization to be ready. Readiness refers to the readiness of all aspects of the organization (4Ms) to identify and visualize problems, quickly resolve

problems through a root cause analysis, and work toward enhancing the level of the organization through a continual improvement mindset. The leadership team leads this empowerment, while a sensei (An expert in lean processes) coaches the leadership team in the beginning stages.

A model cell approach works best for Lean since the organization lacks the maturity and capability required for an organization-wide implementation; it helps implement in a small area and then takes it up for expansion. This also allows for testing the different lean tools and designing the right approach (set of methods, visual tools, and metrics) to help the organization implement and sustain changes. In addition, a model cell also throws up challenges (related to 4M, product process people, or even foundational related) that must be overcome in the organization to implement a companywide implementation. The model cell allows for early identification and resolution of such challenges to strengthen the foundation before the following implementation. The chosen area must also be strategic so that the results are easier to achieve, the benefits visible, and the impact of the benefit should be high enough to attach other leaders and members who may not believe in the transformation to witness and get pulled into the transformation process.

Step 3 & 4: People and Leader Development

The journey through each model cell trains the members and the leaders on different vital aspects of lean. The members are trained to practice the different lean tools (such as following standard work, identifying abnormalities, and helping in problem-solving). The leaders get trained to solve problems quickly and coach others. It is essential to realize that lean requires a particular hierarchy level in the organization. Each level in that hierarchy has defined roles and responsibilities that must be practiced and trained upon during each model cell implementation. While implementing the lean tools and solving abnormalities, a good amount of training was completed for both members and leaders, thus becoming a training ground for training new members on lean and allowing the trained members to act as coaches or mentors in the subsequent model cell implementation. It is important to note that model cells are taken up individually based on the organization's capability and capacity to implement a new line. It is better to keep practicing in model cells without enough capacity to expand or take expert support to level the capability.

Step 5: Strong and Stable Foundation

Through the lean implementation in model cells, two types of problems are identified - one is explicitly related to the cell, and another is related to the organization in general (discussed earlier

as foundational related). It is easier to progress through the lean journey by resolving each abnormality and implementing countermeasures so that the problem never repeats. Certain problems may be related to business or management policies, such as incentives mechanisms, performance measurement, and people growth-related, which may take longer to solve. However, the leadership team makes a resolution to solve these problems through hoshin kanri, discussed in the next step. This commitment to solving brings trust to the process. Over time, solving all these issues builds an excellent foundation in the organization, which makes employees more motivated and engaged in the transformation.

Step 6: Hoshin Kanri and Communication

Hoshin Kanri is a term used by Toyota in which Hoshin refers to a direction, and kanri refers to control (In most companies, it is referred to corporate strategy document or vision document) As it means, hoshin kanri stands for the vision or direction that Toyota wants to focus on and how to ensure that the organization is moving in the right direction. As explained earlier, communication is bi-directional. The development of Hoshin kanri requires conversations across the organization where most visions come from the top-down, but enough feedback and reflection move bottom-up. The leadership team is responsible for the hoshin. The team ensures that the hoshin is broken down from top to bottom so that each manager or member can see how their work contributes to the mission or vision of the organization. This breakdown also ensures that the goals are aligned across the organization while allowing each manager and member to innovate and bring innovative ideas for achieving that goal. The hoshin development is an annual activity, and the hoshin looks both inwards (problems that may take longer to solve, such as those related to a stable foundation of the organization) and outwards (both from the current competitive landscape and a futuristic roadmap). Usually, hoshin consists of ten-year plans, broken down into five-year plans, and finally, an annual plan developed that aligns with the long-term plans. The hoshin is updated when significant changes exist in the organization's context (Covid or CASE transformation, for example). However, once the process of hoshin development is established in the organization, the modifications in hoshin can be easily communicated across the organization and quickly align the organization with the new direction.

Step 7: Controlled Expansion

Expansion of lean should be taken up cell by cell and solve each problem within each cell one at a time. The marginal difficulty in implementing lean across each cell reduces as the organization builds the capability and capacity to take more expansion. The sequence of cells identified for

expansion is defined based on the difficulty of implementation or the scale of the benefits that can be achieved. The hoshin kanri can be an efficient tool to define and manage the sequence of expansion. Expanding simultaneously can be taken up as long as the organizational capability, capacity, and leadership to guide the team are available. More problems can lead to better problem-solving and correct countermeasures implemented. More exposure to the problems allows members and leaders to practice and level up their skills.

3.3.4 Critical Path to Corporate Renewal Method

Organizations must realize that competitive advantage goes beyond product, process, and technology and encompasses work culture too. Work culture mostly starts with the organization's people; thus, competitive advantage starts at the people's level. The book “Critical Path to corporate renewal” (Beer, Eisenstat, and Spector 1990) mentions that every organization needs to have three critical dimensions (3C) to deliver a value-creating advantage,

i) Coordination - The teamwork and interaction between different individuals in the organization.

ii) Commitment - The intensity of motivation required by the organization towards any action (here, action refers to any effort to solve a challenge related to a product, process, or people)

iii) Competence - The skills (business, technical or interpersonal) the organization requires to continue delivering a competitive advantage.

Thus, any change effort in the organization (which is targeting product, process, or technology) is primarily about enhancing these dimensions in the context of the change required. These factors are majorly affected by the formal structure of jobs, the type of people in the organization, and the level of informal understanding of roles and assignments by the people in the organization. The depth of each of the above dimensions depends on the nature of the change required in the organization. If change is required across the organization, then the level of coordination should also be measured in terms of the overall organization.

Most companies delegate change management responsibility to external consultants or trainers, commonly called corporate programs. However, according to the book's authors (Beer, Eisenstat, and Spector 1990), such efforts often need to catch up since bringing about change, particularly regarding culture, must be organic and internally driven. Successful change initiatives must be implemented on the job. Although change can be brought about through mergers and acquisitions, cost reduction, technology investment, sustainability, and cultural integration require a more significant investment in an organization's human and employee aspects.

Change programs often fail for several reasons (Beer, Eisenstat, and Spector 1990):

1. Organizations often impose change from the top down rather than allowing it to be an organic process driven from within.
2. Change programs are often launched as part of a suite of initiatives aimed at many people, making it difficult for individuals to engage with the change fully.

3. Off-the-shelf training programs are often used instead of custom programs tailored to the organization's specific needs.
4. There is often a narrow focus on one or a few aspects of the organizational structure rather than a holistic approach.

In many companies, change programs are driven by functions such as HR or Continuous Improvement teams, which are often disconnected from the core of the change and need more leadership oversight. The ownership of the change needs to be clarified, and training teams are often focused on completing the training rather than ensuring that participants fully understand and embrace the change. This misalignment of incentives means that both the trainer and the trainee may see the need for training as irrelevant to their goals, leading to a failure to change behaviour and, the culture of the organization.

Outside training can be irrelevant, as it may not be connected to the work needed. However, some hands-on training is essential to ensure that participants can apply the knowledge gained in training to their work. The challenge with external training is often in transferring the knowledge from the training into the actual work. Even traditional approaches, such as Q circles, can only succeed if the focus is on quality rather than quantity.

Some companies attempt to supplement training programs with revisions to the appraisal and pay systems. However, these programs can also fail, as they create barriers between individuals with different skills and hinder the coordination of change efforts. Appraisal systems can only succeed if the people responsible for appraising others are fully qualified and capable of giving appropriate feedback, which defeats the purpose of the appraisal or feedback system.

Organizations are using reorganizations as another solution. Although many companies have tried implementing a matrix organization, they fail because of dysfunctional reactions to reorganizations. Even though there are a few drawbacks, many companies today still resort to these techniques. The book (Beer, Eisenstat, and Spector 1990) mentions some of the reasons:

i) it offers a quick fix to a problem like a band-aid

ii) it has done because others are doing it, like FOMO (fear of missing out) since other companies are doing it,

iii) Tangible - the training can be measured, such as the number of hours attended, the number of trainings per year, etc., without regard to the quality of training content.

iv) Top management does not get involved and transfers all responsibility to managers for training.

This shifts the responsibility to the managers to run training, which is sometimes not aligned with what the organization might need at the time. One aspect is that as the organization conducts

more training that is not directed and effective, it leads to making an organization that is immune to the training methodology. Employees start to disbelieve in these programs and begin to see every perfect and terrible program equally and become less interested in these programs. As such, programs with little motivation to join start showing results of no change. The leadership team realizes they cannot change the culture so much, but only manage the status quo, leading to lower investment in people. This is a vicious cycle that most companies reach.

The authors propose a framework for initiating change within an organization. The framework involves the following steps:

Step 1: Need for Revitalization

The first step is to understand the change required in the organization (related to the product, process, people, or culture) to maintain the competitive advantage and then identify the alignment between the three dimensions and the change goals. The organization can rely on external business challenges or internal perfection targets as a change source. The authors recognize that to maintain competitive advantage continually, the organization should always be under pressure to be better and drive for perfection, especially when there is so much uncertainty in the external environment. This ensures that the organization never falls under complacency. All this takes time and requires much effort from everyone, and thus trust becomes very crucial across the depth and breadth of the organization. Trust is developed over time and is influenced by the level of communication, employee satisfaction & safety in the organization.

Step 2: Mobilize Energy

In general, people dislike change and like the status quo. If the status quo does not contribute to the competitive advantage, it is a problem that needs attention. Every challenge (small or big) is an opportunity for change for the organization. As explained in the previous step, the organization can rely on external business challenges or internal perfection targets as a change source. These problems can be an incredible source of energy for the organization. However, to make the entire organization understand the impact of the problem and get every energy available requires persuasive communication across the organization. Every member should know the challenges to the organization and their impact on the organization. The leadership team should involve all the people and make the responsibility to solve the challenge more organizational than to an individual or smaller units. Sharing information and getting (and respecting) feedback from every member helps bring this organizational responsibility and trust (explained in step one). This step is closely related to the coordination dimension discussed earlier.

Step 3: Task Aligned Vision Development

Vision refers to an image of the organization's future focussed on where it sees itself. In the title, the task relates to the change expected in the organization. The vision is developed by taking inputs from external challenges and internal perfection targets and considering feedback from all members through the previous step. Once the vision is defined, it is also vital that the vision is communicated across the organization and the goals are broken down across the organization so that each member understands which purpose their role contributes to. It is also essential to recognize that the vision is a direction, and based on changes, there can be changes in the vision, and the organization needs to be flexible. The broad involvement across the organization brings in the organizational responsibility toward the change (an assumption here is that the feedback from across the organization is taken and reflected). Throughout the vision development, the leadership should note that the vision includes the overall business goals and the changes required in the organization.

Step 4: Task Alignment and fostering 3Cs

Task alignment refers to redefining roles, responsibilities, and relationships within a unit to enhance coordination, competence, and commitment and achieve a specific business unit target (Beer, Eisenstat, and Spector 1990). The target refers to the goals mentioned in the vision, and the task relates to achieving that goal. The unit refers to a group of individuals or a plant, depending on the change goals. A committee or group can be formed to implement the change. This group will have representation from related parts of the organization (who can bring the change) and will have repeated interactions to solve the business challenges, which then slowly start to build the expected behavioural change in the organization. It is also important that this team also has strong leaders to ensure that the effort is in the right direction and the problems are solved together without blaming each other. This ad-hoc team structure is an experiment to figure out which method works and fine-tune as the progress of the efforts. Over time, this team will have a proven method to bring the change successfully, which is then standardized through the formalizing step. There must also be systems in place to ensure that the changes proposed by the team are put into action and that there are fewer resistances to the same both from the leadership and from the other functions or departments. The reward and recognition system should also be aligned with the team's progress to ensure that people are rewarded for their effort and motivated to continue the journey. It is important to note that rewards need not be financial. Still, the reward should be made so that the people are intrinsically motivated to do more than extrinsically motivated (through financial rewards or gifts). The idea behind task alignment is to

change individual behaviour through the power of social context (Beer, Eisenstat, and Spector 1990), and that repeated behaviour brings the necessary attitude and knowledge to other people outside the team.

Team building (Coordination) is required to bring in the change. It is essential to have a culture that allows for information to flow across the organization and for members to access critical information to make the necessary decision. If the organization's coordination levels are insufficient, a team-building exercise is needed, which can be taken up through internal or external trainers. The key is to ensure the team building exercise is in the direction of the change expected in the organization. This team building can take the team to an external site, where people are far away from the current organizational context and allow for more outside thinking. One example in manufacturing or quality could be establishing quality circles through which problems are solved by the circle (a team of diverse individuals) through the new ways of the change expected in the organization. Team building requires integration across both horizontal and verticals of the organization. The team building exercise also allows for identifying the resistors to the change. It will enable the organization to buy into these resistors by exposing them to the new way of work and understanding why the resistors resist the change. Rather than turning away resistors, the organization needs to understand the reasons behind the resistance and then try a way to buy them into the change (not all attempts can be successful, but every attempt adds to the level of trust and commitment within the organization).

In implementing change, the organization begins by testing and observing the challenges associated with the change in a small or isolated area. This allows the organization to implement the change in that specific area and understand what policies or systems of the organization need to be changed to fully implement the change. The team does not need to implement all policy or organizational-level modifications immediately, but over time, such changes must be implemented as part of establishing a culture. The organization takes up expansion one step at a time, which will be explained in the subsequent step. One key aspect is that through the journey of change, the leadership should continuously the people through job security, training to improve competence, and helping to bring up the level of commitment.

When organizations aim to continue their efforts towards improvement, adopting a perfection-oriented strategy with continuous improvement goals is advisable, often referred to as a "better than before" system. This approach acknowledges the impossibility of achieving true perfection and creates a virtuous cycle of "continuous improvement".

Determining the most effective methods for different units or groups may require experimentation, but this process is crucial to success. Although failures, delays, and challenges may arise, it is essential to maintain motivation and commitment from the change team and leadership. Implementing a perfection-oriented approach can create a learning organization that fosters continuous growth. However, if an organization solely focuses on short-term cost reductions, it may experience significant gains in the short run. Yet, neglecting investments in people may lead to negative impacts in the long term. Building and maintaining trust is essential for any organization's success, and it requires effort and time from all members, including leadership.

Step 5: Spread Revitalization

The organization must prioritize directed participation to ensure a spread of knowledge across the organization and encourage more participation leading to lower resistance. As we begin replicating the change across the organization, it is crucial to transfer the ability and the people necessary to allow teams to progress faster on the learning curve and avoid reinventing the wheel. Replication of the process must occur across each unit of implementation. The change team's primary responsibility is to ensure that people are brought closer together, and that participation and critical mass are present in each area where the change is implemented. The critical mass is established in the preliminary stages, but going through repeated cycles allows it to grow. The change leader and team must follow the methodology and achieve and sustain the expected behaviour change, resulting in the desired results or goals.

If the efforts need to be continued, then the best approach is to adopt a perfection-oriented strategy with goals aimed at continuous improvement (a "better than before" system). This assumes that achieving true perfection is impossible and creates a virtuous cycle of ongoing improvement. It may require experimentation to determine the most effective methods for different units or groups, but this is part of the journey. There may be failures, delays, and challenges along the way, but it is essential to maintain motivation and commitment from the change team and leadership. Adopting a perfection-oriented approach can help create a learning organization.

Step 6: Consolidate by formalizing

Until now, the implementation has been ad-hoc and done unit by unit. However, as we continue to implement changes, it is now essential to start implementing necessary system modifications or organizational policies to ensure that the momentum of change brought about by the team is sustained. This requires redefining procedures based on feedback from changes implemented across various parts of the organization. After each implementation, the change team learns about

the company's comprehensive implementation challenges and consolidates all learnings to design the new system or policies. While the team or specific departments may design this formalizing process, the organization should adhere to the new processes. This may require continued reminders to members about the change and its purpose.

Step 7: Monitoring and Strategizing

The change implementation journey is not a one-time event; it needs continual support and feedback from the change team. As change is implemented, there will be issues of loss of power to certain people, and the organization must substantiate this with additional responsibility and targets. This also allows the freed-up resources to be used for more expansion in product, process, and people. The organization can now ensure that it maintains realistic expectations with its employees, increasing participation and ownership of the organization's problems by the people. Course corrections are part of the process and journey, and as things change, the course must be corrected to ensure that the organization moves toward the required direction. The above steps allow the organization to be flexible to any change, creating a learning organization where people learn to work for recent changes.

In contrast to other methods, this method surprisingly places little emphasis on the role of a leader. However, in contrast to other method, this method surprisingly places little emphasis on the role of a leader. However, the authors (Beer, Eisenstat, and Spector 1990) do mention the expected traits and role of a leader in transformation efforts. The authors (Beer, Eisenstat, and Spector 1990) do mention the expected traits and role of a leader in transformation efforts.

The leader must commit to breaking traditions and the current status quo to achieve the organization's goals. Transformational leaders do not necessarily need to be in top management or CEO. Still, they should have sufficient knowledge and control over the organization to influence decision-making and have links to the top and bottom to move information seamlessly. Transformation requires a line of leaders and managers who can interchangeably take on the role of a leader and manager.

There are key attributes that the leader should possess, such as persistent belief, articulate conviction, implementing the vision, and leadership development (Beer, Eisenstat, and Spector 1990). The leader should persistently believe in the relationship between revitalization and the increasingly competitive environment and must encourage greater employee participation and engagement to bring about change. The leader must know what the future will look like and ensure that these visions are deliberated and articulated to the people to convert them into meaningful

targets. To lead effectively, the leader must also be able to receive feedback for the vision or changes and increase communication, trust, and span of control.

Implementing the vision must be consistent over time and failures, which is critical to building trust within the organization. Consistency of belief, personal introspection, and willingness to learn from failures are essential for building these leadership traits. Inconsistency at the top management can lead to poor efforts and incomplete results.

Leadership development is critical as knowledge brings capability, and the leader must be competent enough to lead the change and possess the right interpersonal skills. It is challenging to find such leaders, and the best thing is to grow them. However, retaining them is also a challenge, and leaders should be allowed to grow in leadership traits and technical knowledge.

2.3.5 Comparison of all methodologies

The Kotter method (Kotter,John P 2012) serves as the benchmark for comparing different change models – Heskett (Heskett 2022) , Critical Path (Beer, Eisenstat, and Spector 1990) and Lean Leadership (Liker and Convis 2012). While each method possesses distinct features, a considerable overlap exists among them. Kotter's (Kotter,John P 2012) approach, as previously discussed, offers a more general framework for implementing change. In contrast, other methods like lean leadership (Liker and Convis 2012) and critical path (Beer, Eisenstat, and Spector 1990) models specifically address an organization's implementation of certain changes. Examining Figure 6, a high level comparison of all the models reveals that Kotter's principles (Kotter,John P 2012) are present in the other methods, albeit more in spirit than in strict adherence to each point. However, the critical path (Beer, Eisenstat, and Spector 1990) model distinguishes itself by having evidence-based support, while the lean leadership (Liker and Convis 2012) methods draws on real-world implementation of TPS within a company. Both the critical path and lean leadership methods emphasize Kotter's eight steps while prioritizing stability, solid foundation, and employing a model cell approach (As highlighted in figure 6). In addition, implementation of lean focusses additionally on specific leadership skills and the hoshin kanri methodology to develop and communicate goals across the organization (Refer chapter 2).

Kotter (Kotter,John P 2012) and Heskett's (Heskett 2022) methods take a more theoretical approach, the critical path and lean leadership models shift their focus toward practical implementation. Hence, it is possible to develop a hybrid method that combines the most beneficial aspects of each method since the research is primarily focussed on how TSSC can better train partner companies to implement and sustain TPS in the organization.

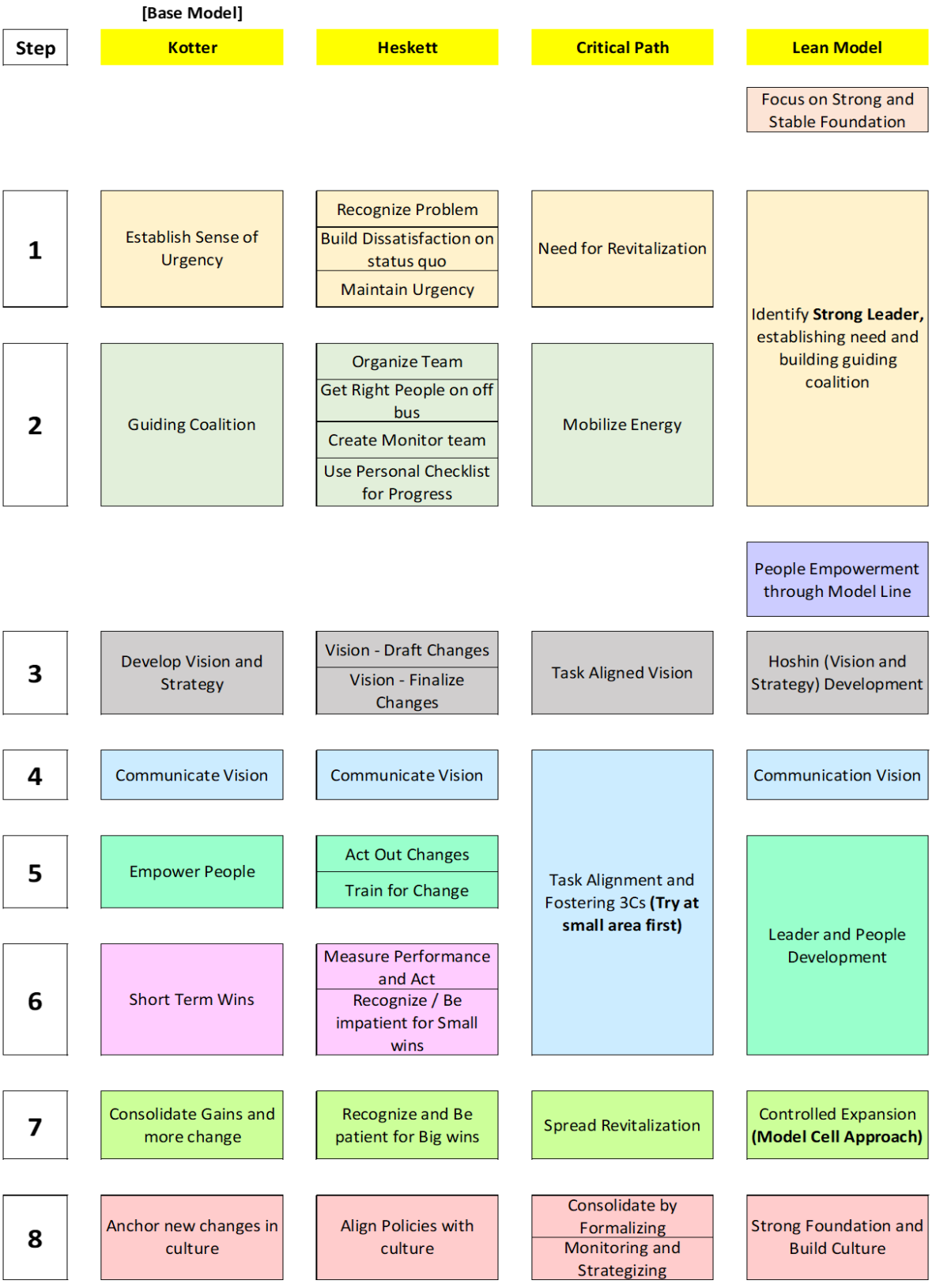

Figure 6 : Comparison of different change methods

3.4 Why change efforts fail?

Even with established methods of changes in literature, there is research evidence to show that one in three change program fails (Dewar and Keller 2009; “Why ‘Corporate Culture Change’ Fails, And How To Succeed” 2017; Lyons 2017) . These transformations do not solely pertain to lean practices but can be considered change transformations related to lean, digitalization, problem-solving, and other initiatives. While the purpose of change may vary, the failure modes often uncover shared challenges encountered in any transformation process. Therefore, conducting a literature survey on failure modes can provide valuable insights for the research project. Furthermore, through interviews conducted in this research, additional failure modes can be identified and incorporated into the existing list. It is important to note that the following list is not exhaustive; however, it collectively represents the most commonly occurring failure modes in change transformation (the list also includes failure modes captured in literature review of change methods in Chapter 2).

Literature Evidence on common failure modes on change transformation are listed below.

1. Insufficiently establishing a sense of urgency (Kotter, John P 1995) within the organization and people being satisfied with the status quo (Kotter, John P 1995),
2. Failing to create a powerful guiding coalition to support change (Kotter, John P 1995) (Eaton 2010),
3. Lacking a clear vision and strategy towards change (Kotter, John P 1995),
4. Under-communicating the vision and the need for change (Kotter, John P 1995) (Emerson 2022) (Ramesh and Delen 2018),
5. Not identifying (or anticipating risks) and removing risks (obstacles) to the new vision (Kotter, John P 1995) such as fatigue from prolonged transformation efforts (Eaton 2010; Schramm 2021).
6. Inadequate planning for short-term wins (Kotter, John P 1995) (Emerson 2022) ,
7. Prematurely declaring victory (Kotter, John P 1995),
8. Failing to anchor changes in the company culture (Kotter, John P 1995),
9. Neglecting informal structures of the organization (Schramm 2021) (Kee and Newcomer 2008),
10. Starting with an poorly defined vision or strategy (Emerson 2022)
11. Following a strategy that is too rigid and flexible (Emerson 2022)

12. Inadequate understanding of organization culture and the disconnect between culture and strategy (Eaton 2010; Ramesh and Delen 2018; Schramm 2021; Kee and Newcomer 2008),
13. Insufficient advocacy for the change, not fully committed or failure to understand responsibilities in the change initiative by the leader (Kee and Newcomer 2008) (Ramesh and Delen 2018)
14. Not engaging critical or all necessary stakeholders affected by change initiative (Kee and Newcomer 2008)
15. Inadequate understanding of organizational capability, capacity, and improvement needed to implement and sustain change (Kee and Newcomer 2008) (Eaton 2010)
16. Managers leaving it to higher ups to explain rationale for change (Eaton 2010)
17. Organizations often impose changes from top down rather than allowing it to be an organic process driven from within (Beer, Eisenstat, and Spector 1990)
18. Change programs are launched as part of suite of initiatives aimed at many people, making it difficult for individuals to engage with change fully (Beer, Eisenstat, and Spector 1990)
19. Off the shelf training programs are used often instead of custom programs tailored to organization specifics (Beer, Eisenstat, and Spector 1990)
20. Timing of transformation is also important and key leaders use timing as an important lever to implement transformations at organizations (Ramesh and Delen 2018)
21. There is poor psychological ownership for the employees to raise problems, solve issues , make decisions and control the outcome of the process (Ramesh and Delen 2018)
22. Viewing transformation (including lean) as a project (short term tool) rather than a continual process (Kee and Newcomer 2008) (DeLuzio C 2020)
23. Narrow focus on one or more functions or aspects of organization than on a holistic approach (Beer, Eisenstat, and Spector 1990) (DeLuzio C 2020) (Example: Organization sees lean as a manufacturing convention that does not apply beyond manufacturing and across the organization)
24. The change effort (example lean) is not connected to the overall corporate strategy (DeLuzio C 2020)
25. Leadership is off hand or unwilling to revisit the organization basics. (DeLuzio C 2020)
26. Offloaded responsibility to external parties or consultant (Beer, Eisenstat, and Spector 1990)

Chapter 4: Hybrid Change Method Development

To develop a comprehensive hybrid method that encompasses the best practices from various literature sources, the research team engaged in capturing reflections from TSSC (Toyota Supplier Support Centre), drawing upon their extensive thirty-year journey with three hundred organizations. The reflections obtained from TSSC at a higher level were meticulously documented in section 4.1. While these points provide a more generic overview, they effectively summarize key relationships that may have been overlooked during the transformation process.

4.1 Reflections from TSSC on change efforts

TSSC's President Jamie Bonini, in a recent interview with the research team summarized his reflections of working with many companies to implement a model cell/line of TPS to be,

1. Be clear: TPS is an organizational culture of highly engaged people solving problems to drive performance. The philosophy underlies the technical tools that require the managerial role to build and sustain TPS culture (Bonini Jamie 2023).
2. Model Lines: Learn by doing by building the culture through model lines to a) develop leaders to then guide spreading where , how and who and b) expose real challenges to address in spending (Bonini Jamie 2023).
3. TPS must be an organization (not operations) strategy with strong leadership that addresses business needs (E.g. quality speed productivity or engagement) (Bonini Jamie 2023)
4. Build a strong, small, full time, internal TPS team to support spreading (Bonini Jamie 2023).
5. Company values must fit with TPS philosophy (4 points) (Bonini Jamie 2023)
6. TPS is difficult, Expect setbacks and successes. Learn mostly by doing (Bonini Jamie 2023).
7. Stability is must. If low build it first. Practice and build problem solving capability (Bonini Jamie 2023).
8. Build managerial role, behaviours , and problem solving (Bonini Jamie 2023).

4.2 Interview outcomes

The subsequent step involves capturing potential failure modes through interviews with two organizations. It is important to note that these organizations do not exemplify implementation failure. Instead, in this context, failure refers to a shortfall in speed or a discrepancy between their status and the envisioned progress they anticipated at this stage. Throughout the interview

process, valuable insights were gathered, including points that proved beneficial for the implementation phase. These points were utilized to construct the hybrid method and subsequently develop the system dynamics model. The following list presents categorized hypotheses of potential failure modes specific to each company.

4.2.1 Hypothesis from Company A

HA-1. The attrition of trained employees, including team leaders, team members, and managers, hinders the implementation and expansion process, thereby requiring additional lead time to hire or train new replacements. This can potentially cause a slowdown in the implementation.

HA-2. The lack of a designed organizational structure for lean, such as having team members (TM), team leaders (TL), and group leaders (GL) with the necessary span of control and adequate free time to work, except for in model cells, creates a bottleneck for expansion.

HA-3. In certain model cells, team members do not have sufficient slack time to complete problem-solving tasks or to ensure proper problem-solving through prescribed methods.

HA-4. The lead time required for training, which is 13 weeks, is quite high, and there is a lack of trainers to meet the needs of implementation or expansion. Furthermore, the training group is distinct from the continuous improvement (CI) group, which raises concerns. The Toyota Production System Support Centre (TSSC) team primarily trains the CI team, whose responsibility is to train others in the organization. However, "official" training is conducted by another team.

HA-5. The performance evaluation system fails to capture the expected behaviour resulting from Toyota Production System (TPS) implementation, which is more personal and informal in nature.

HA-6. Being a public company, the leadership is influenced by stock prices and financial performance. However, Toyota Production System (TPS) takes time to show financial returns, and its effects on culture change are not immediate. Unfortunately, the urgency to demonstrate financial results sometimes takes precedence over the need to change the culture, exacerbated by the impatience of leadership to see quick results.

HA-7. The career growth or promotion process is interview-based. As a result, certain skilled members may (voluntarily or because of lack of positions) prefer to remain in their current positions for an extended period. However, from an organizational perspective, it may be more beneficial to develop/train such members to assume higher positions and allow for organic growth, instead of letting them stay where they are comfortable. This requires organization to

challenge and grow their members. Also bring people from outside should not demotivate the people already inside. This is where alignment of HR and leadership is key.

HA-8. During the initial implementation of Toyota Production System (TPS), the buy-in was done from the middle-up. As a result, there was no top management buy-in, and initially, top management leadership could not be involved or provide support when needed.

HA-9. The urgency to change was not sustained. Currently, there are only a few model cells in place (one in every plant). With the recent expansion of the organization, there is a need to revitalize the implementation of Toyota Production System (TPS) which bought back the urgency. Without this expansion, the urgency was not present.

HA-10. The implementation of Toyota Production System (TPS) felt like it was primarily focused on manufacturing rather than being an organizational aspect. Non-manufacturing teams were not fully involved in the TPS implementation process, nor did they provide adequate support throughout the journey.

HA-11. The level of Toyota Production System (TPS) implementation varied across different model cells and plants and was bit subjective to the managers in the model cell, resulting in diverse performance and standards. This is again due to varying interests and motivation from the team leader or group leader or leader for implementation and variation in training and skill level of different team and groups leaders. This is also linked to the point of continuous improvement team where in if the team is unable to validate or certify the condition of the line and to HA-5.

HA-12. It is not clear whether the implementation of Toyota Production System (TPS) is desired at cultural levels within the organization. While Continuous Improvement (CI) is expected to shape the culture, the definition of culture itself is not well-defined.

HA-13. A change in leadership during the TPS implementation journey had a significant impact on the journey. The transition in leadership disrupted the resources allocated for implementation and expansion, thereby slowing down the implementation journey.

HA-14. Leadership changes in priorities or tools for improvement, such as shifting from Lean to Agile or Lean Six Sigma, affects the TPS implementation process also the trust in system on the leadership as consistency aspect of leadership is lost in the process. (Links to HA-6)

HA-15. Not focussing on all the three aspects of the TPS triangle (Figure 1)

HA-16. A critical mass of TPS knowledge and skills was not available across the organization, and communication about TPS was incomplete. As a result, some employees were not aware of the purpose and intent of TPS.

HA-17. Reflections from model cells were not institutionalized, such as the hierarchy structure, which is now being addressed as expansion is required. Otherwise, the TPS implementation is left as it is.

HA-18. The expansion of TPS in organization was slowed down due to the limited trainers and the longer training time required. The model cells were not utilized for training personnel, which could have helped in the speed of expansion.

HA-19. The composition and role of Continuous improvement (CI) team with respect to the implementation and sustenance of TPS was unclear in the point of ownership of implementing model cells, implementing improvements etc. The concern here is that there is a lack of resources to move into the CI team from the line and then CI team hired externally and then train them to get exposure to TPS and to line conditions. However, people should not be demotivated because of lack of opportunity to move into the CI team. HR alignment and leadership is required. The reporting hierarchy of CI team and the core operations teams are also different and difference in goal alignment between core and CI team.

HA-20. There was a lack of awareness regarding the overall roadmap for change and implementation. TPS was not considered a part of the organization's strategy or appraisal process, resulting in a lack of focus on TPS implementation.

HA-21. Discipline in following the change flow varied in intensity throughout the TPS implementation process.

4.2.2 Hypothesis from Company B

HB-1. Span on control is extremely high especially for leaders near to frontline members.

HB-2. Supervisors have limited slack time available for regular jobs and for continuous improvement, leading to more focus on meeting regular jobs rather than improving processes through continuous improvement.

HB-3. Scheduling issues led to a shortage of staff for work, and members were not scheduled based on demand.

HB-4. The limited slack in the system may result in insufficient resources to handle unexpected emergencies or problems that require immediate attention.

HB-5. (Same as HA5)

HB-6. (Same as HA20)

HB-7. The lack of clarity in the breakdown of goals and the limited awareness of front-line members and team leaders (TL) regarding the goals and their linkages to work are critical issues for organizations. Ineffective communication and unclear expectations can lead to

confusion and ambiguity, hindering the achievement of organizational goals. As such, it is crucial for leaders and managers to establish a clear and concise goal framework and ensure that all members of the organization are aware of it. Additionally, it is important to establish mechanisms for regular communication and feedback to ensure that everyone is aligned and moving towards achieving the common goals.

HB-8. The lack of critical mass or buy-in was a significant issue, as the primary focus was on the model cell alone and not expanded to involve necessary external agents.

HB-9. (Same as HA11)

HB-10. The complete communication of the need for TPS was lacking across the organization.

HB-11. The process did not fully engage the front-line workers, resulting in an initial lack of buy-in. Later, efforts were made to explain the purpose of TPS to them and ensure that they had proper knowledge of the system to secure their buy-in.

HB-12. (Same as HA1)

HB-13. The front-line employees were not provided with any training apart from their participation in improvement projects.

HB-14. The implementation of TPS was expanded without properly addressing stability or foundation-related issues.

HB-15. The implementation of TPS was viewed as a project rather than a continuous and regular process.

HB-16. Core production team required CI for improvements and CI team decides whether it is improvement or not. Not clear on what is the role and responsibility of CI team vs daily operations team.

4.3 Cross Validation between Literature and Interviews

The initial step involves checking which of the hypotheses can be correlated with the failure modes identified in the literature. By doing so, we can validate the hypotheses based on the existing literature findings. This process will assist in narrowing down the action plan or recommendations for the companies involved.

4.3.1 Cross Validation of hypothesis with literature on failure modes

A correlation matrix was created to perform cross-validation, which mapped the literature failure modes to the hypotheses. The rows represented the identified literature failure modes (rows in pink refers to the in section 3.4 and the row in green refers to the eight points in section 4.1), while the columns represented the hypotheses from the companies (Section 4.2). Each black dot on the matrix represented the relationship between the hypotheses and the literature, capturing their

alignment rather than exact correspondence. The number mentioned at the end of the columns and rows indicates the strength and these could be the focus points for the organization to focus on support, speed up or sustain implementation. The recommendation for the organizations will be assimilated at the end of this report after studying the system dynamics model. The colours indicated in the matrix is explained in the next section.

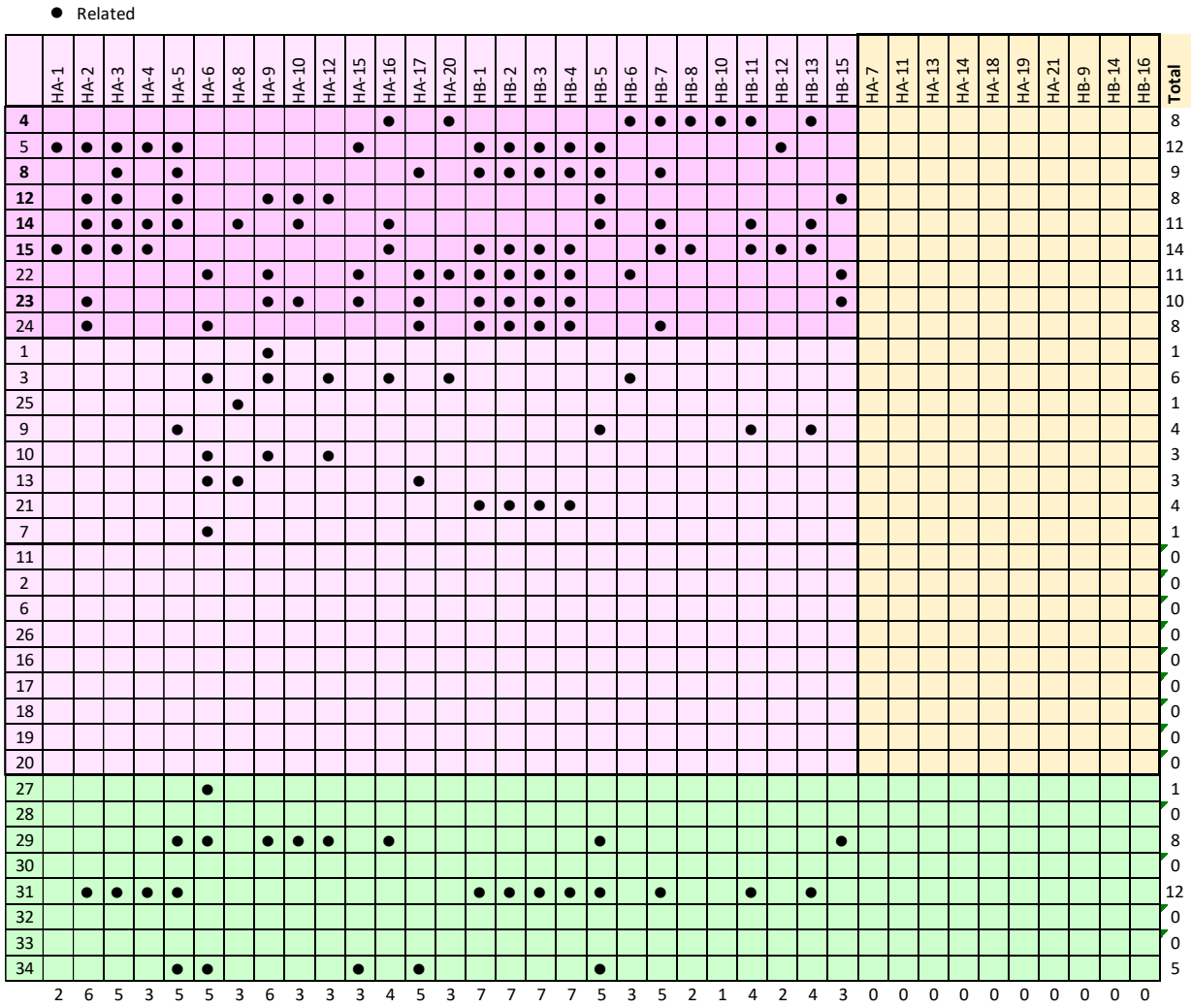

Figure 7 : Correlation matrix between literature failure points and hypothesis from organization interviews

4.3.2 Key insights from the Cross Validation

Insight 1: The dark pink box in the correlation matrix highlights the failure mode (in rows) most frequently observed within the organization, which aligns with the failure mode represented in the literature. This failure mode should be considered an initial focal point for the organization to

prioritize and address promptly. By addressing this commonly occurring failure mode, the organization can immediately mitigate its impact and improve its overall performance.

Insight 2: The light pink box in the correlation matrix represents failure modes from the literature that were not observed within the organization. This suggests that either these specific failure modes were absent in the organization or that the sample size of the interviews needed to be more extensive to capture them. It is also possible that the individuals interviewed were not aware of these specific literature points, and had they been aware, they might have included them in the interview discussions. This highlights the importance of considering a broader range of literature and ensuring awareness among interview participants to capture a more comprehensive understanding of potential failure modes.

Insight 3: The light green box in the correlation matrix represents the reflections observed by TSSC (Toyota Supplier Support Centre) over the course of fifty years, which are also reflected in the hypotheses from the organizations. This insight suggests that despite TSSC's ability to identify and reflect on these issues, similar observations persist within the organization in recent times. This may indicate a weak translation of observations and reflections from TSSC into the organization, or it could signify a lack of clarity in terms of accountability and responsibility between the partner organizations and TSSC.

Insight 4: The yellow-coloured regions in the top right of the correlation matrix highlight the hypotheses observed within the organizations that were not reflected in TSSC's observations or the existing literature. This does not necessarily imply that these hypotheses are completely absent from the literature but may not be explicitly described in both letter and spirit. These hypotheses deserve focused attention from the organization as they present unique insights or perspectives that may not have been previously explored.

One of the critical challenges identified in this exercise is the multitude of insights and areas to focus on. Even with a prioritization rule in place, there may still be redundancy in addressing the root causes of these issues. Determining whether the organization is targeting the root causes or merely addressing surface-level causes is essential. Instead of creating an endless list of priorities, combining these insights with a system dynamics model may be beneficial. Such a model can help identify the key drivers that significantly impact resolving multiple issues. This approach resembles a Pareto focus, where the emphasis is placed on the 20% of drivers that can address 80% of the issues. By leveraging a system dynamics model, the organization can gain

insights into the interconnectedness of numerous factors and identify leverage points for impactful interventions.

4.4 The "Hybrid" Method:

Contrary to an amalgamation of the positive aspects of each change methodology, the hybrid method, as previously explained, combines the essence of each methodology with insights derived from potential failure modes documented in the literature. It represents a selective set of focal points that the organization must prioritize and adhere to ensure that change efforts are both fruitful and sustainable. (Certain points may be repetitive or cross referenced to earlier sections)

Focus 1: Stability and Strength of the Foundation

Except for Lean Leadership (Liker and Convis 2012), most change methods do not explicitly specify the factors related to the foundation of an organization. However, it can be assumed that these factors must be present for successful business operations. To this end, these factors related to People, Machines, Methods, and Materials (commonly called the 4M at Toyota) must be present and widely adopted throughout the organization. An additional stability based on financial factor has been added.

People related:

The People factor can be classified into basic and advanced factors (Ton, Zeynep 2023) (Joly 2022).

Basic factors include.

- Pay and Benefits - Fair for the work and compared to others, meets needs,
- Schedule - Stable and predictable schedules, adequate hours,
- Career Path (growth) Clear and fair advancement to higher pay, and
- Security and Safety (Psychological and Physical) Keep job if perform well, safe conditions,

while advanced factors include

- Meaningfulness of the job – Work itself and significance to the customer,
- Personal growth and learning opportunities,
- Recognition - High expectations, feedback from others and job,
- Achievement -Have autonomy, tools, time, and resources to do great work, and
- Sense of belonging. - Team, pride for working at the company, mutual respect

In the context of Lean implementation, it is also essential to consider whether workers have the right skills for the job, is assigned to the appropriate tasks, and are trained to be problem-conscious and take ownership of resolving concerns. A clear hierarchy should be established to facilitate problem-solving and ownership.

Machine related:

Organizations need to ensure that the machines can handle their intended tasks, and thus, it is imperative to maintain their capacity and capability. This involves ensuring that adequate machines are available and in optimal working condition. A maintenance plan with readily available spare parts must be in place to facilitate quick repairs (TSSC 2022). Additionally, it is essential to consider the human element, ensuring that the person (or a separate team is available) has sufficient time to monitor and maintain the machines.

Material related:

The production process requires direct and indirect materials, which must be free from impurities, irregularities, and damage. Moreover, the timely availability of sufficient materials from reliable suppliers is essential to ensure uninterrupted production. Therefore, efforts must be made to establish supplier processes during the development or mass production stage. Failure to do so may result in problems for the plant's production line, leading to demotivation among plant members. Therefore, synchronization is crucial for the success of the process.

Method related:

The chosen methods for a process must be both adequate and safe, with a strong emphasis on ensuring the safety of personnel. Additionally, the methods selected should support TPS's single-piece or smaller lot size flow aspect if transformation is related to TPS. The process should align with the organization's desired nature of transformation. The methods employed should allow for the most efficient flow of work and encourage the effective utilization of personnel. The work area should also be well-lit, accessible, and equipped with necessary safety measures to ensure the continued well-being of personnel. The success of the people aspect mentioned above strongly depends on the methods, and this relation is of prime importance.

Apart from the formal processes mentioned above, critical informal processes should be focused on. These include promotion processes, feedback mechanisms, goal communications, feedback gathering, and employee participation in various organizational processes. Developing and sustaining these basic processes related to the organization will support the people aspect

mentioned earlier. Although these factors may not be explicitly mentioned in existing literature, they are assumed to be included. However, it is essential to capture and address these aspects explicitly. There formal process (and informal processes) can help reducing the turnover and retain the trained talent in the organization helping in further helping in change and sustaining the change in the organization.

Financial Related:

For an organization to sustain its operations or bring about transformative change, it must maintain financial stability and have access to cash. Leaders and members must invest time, effort, learning, and training, as well as the capital, to acquire the necessary new resources (the 4M's) needed for transformation. Thus, the organization must possess a certain level of financial resources that are stable enough to support regular operations and change methods. It is also important to note that the process of establishing policies, expanding communication across the organization, and any similar formal or informal process development also required an investment of time, which is, in turn money (in terms of employees' time and salary).

Cash cannot be a bottleneck for implementing change when everything else is running smoothly. While the significant upfront investment may not always be necessary, specific change programs, such as lean, provide benefits over the long run, such as increased efficiency, reduced inventory, shorter lead times, and more efficient use of machines. These benefits generate more resources, thus reducing the long-term cash requirement. Long term stability and security for the organization also requires investment by organisation into innovative technology and products that aligns with the desired culture.

Focus 2: Strong leadership

Leadership is key for any transformation. Even for a sustained and continues business operations role of leadership is fundamental for the success of the organization. However, when it comes to change or transformation, leadership plays a key role. Some key attributes of a leader summarized from different methods are:

- Visionary and Pragmatic – Leadership is critical in managing organizational change. A leader must exhibit visionary and pragmatic qualities to manage the transition process effectively. To achieve this, a comprehensive understanding of the current context and challenges faced by the company is necessary, along with an assessment of potential future obstacles that may arise. The decision to implement change is based on the determination that the organization

is unprepared to handle these challenges. This can be due to a clear and present danger that poses a risk to the company or a long-term vision to scale up the organization. Regardless of the reason for the change, an ideal leader must clearly understand both the present and the future and have a well-defined vision for how the organization can effectively manage these challenges.

- Reputation and Credibility – In an organizational context, having a clear vision alone is insufficient if the leader cannot effectively communicate and obtain buy-in from stakeholders such as investors, customers, and employees. The reputation of a leader is heavily influenced by their ability to initiate and drive change successfully. Leaders who have a history of merely discussing change but failing to act will struggle to earn the trust and respect of their team members. Therefore, an effective leader must possess a strong reputation and credibility to gain the organization's support and drive necessary change. This requires a leader to articulate their vision and effectively communicate how it will be achieved and take the necessary steps to bring about the desired transformation. An academic thesis on this topic must critically analyse the role of effective communication and credibility in achieving successful organizational change.
- Competence – Competence, or the capability of a leader to perform the necessary skills for change, is an essential component of effective leadership. Leadership skills are developed over time, and a competent leader can navigate the challenges and complexities of change management. Implementing change can be difficult, involving multiple steps and obstacles that must be overcome. A leader with sufficient competence can lead the change process, manage the associated risks, and address any challenges that arise along the way. Competence also encompasses the ability to identify and leverage opportunities that can facilitate change and the aptitude to mobilize resources and effectively allocate them to achieve desired outcomes, including removing barriers across departments.
- Influence – In an organizational context, influencing others is a fundamental skill every leader should possess. Influence refers to effectively communicating ideas and persuading others to support them rather than relying on authoritarian approaches. This skill is essential in driving change initiatives within an organization. A leader's reputation and credibility, developed over time, contribute significantly to their ability to influence others. An effective leader must be capable of influencing individuals at all levels of the organization, including top and bottom, and across teams. Successful change initiatives require the collaboration and alignment of all team members toward a common goal. A leader plays a crucial role in driving this change by creating a shared vision and engaging team members to work together toward its

achievement. It is essential to note that while a leader may receive support from a coalition team, the ultimate responsibility for driving change rests with the leader.

- Learning – An effective leader should demonstrate a willingness to learn and continuously acquire new knowledge and skills. This ability is critical in the rapidly changing business environment, where innovation and adaptation are essential for organizational success. A leader willing to take risks and experiment with innovative ideas demonstrates a growth mindset, essential in driving innovation and fostering a culture of creativity within an organization. While taking risks and experimenting with innovative ideas may be challenging, a leader's intent to embrace new opportunities should remain unwavering.
- Commitment – Intrinsic motivation is a critical component of successful organizational leadership. Influential CEOs are intrinsically motivated to perform at a high level, regardless of financial returns or extrinsic rewards. This intrinsic motivation is crucial, as any solely extrinsic motivation loses its value when those rewards are no longer available. A leader's motivation and commitment should be driven primarily by their passion for their work rather than external factors such as financial rewards or recognition. Intrinsic motivation is sustained by a sense of purpose and fulfilment that comes from pursuing meaningful work and positively impacting the organization and beyond.
- Coach – In addition to being an effective leader, a successful CEO should possess exceptional coaching skills and a passion for working with others to teach and learn collaboratively. When organizational change occurs, there is significant activity and upheaval, and many individuals may require training to adapt to new processes and procedures. A leader who understands the importance of being a good coach can ensure that the necessary training is provided to all organization members. Coaching, in this context, goes beyond technical training and includes developing the next generation of leaders or managers who will ensure business continuity. A leader who is an effective coach can provide guidance, support, and mentorship to help individuals and teams develop the necessary skills and knowledge to succeed in their roles.

When it comes to lean implementation, the organization is usually considering an inverted hierarchy concept and a sense of servant leadership comes in.

Servant leadership is a leadership approach that places the needs of others above the self-interest of the leader. The concept of servant leadership was first introduced by Robert K. Greenleaf in 1970. Servant leadership is rooted in the belief that leadership is not about power or control but rather about service to others.

The principles of servant leadership include listening, empathy, healing, awareness, persuasion, conceptualization, foresight, stewardship, growth, and community building (Spears 2010). Leaders who practice servant leadership prioritize the needs of their followers and strive to create a positive and supportive work environment where individuals are empowered to grow and develop. The paper (Spears 2010) gives a broad explanation of how each of these contributes to developing the organizational capability and to practice such skills, the organization also needs to be designed to support such systems.

Focus 3: Need Establishment and Sense of Urgency

The primary responsibility of a leader or leadership team is to gain a thorough understanding of the current state of their organization and identify the need for change. This need for change can arise from external pressures such as market demand, disruption, and competition or internal factors such as underperformance in meeting market requirements. In some cases, leaders or companies may set a "true north" target. This ambitious goal is difficult to achieve but serves as a continuous driving force for improvement in products and processes. This approach helps to prevent complacency that can arise when a company dominates the market or holds a market leader for an extended period. Prolonged success can lead to complacency and inertia, making it crucial to maintain a sense of momentum by continually striving towards true north targets.

Once the leadership team has gained a thorough understanding of the organization's current state and identified the need for change, the next step is to establish a clear vision for the desired future state. This process requires extensive deliberation and discussion among the top teams and soliciting input from other members of the organization. The success of getting these inputs again depends on the stability and strength of the organization's foundation discussed previously. The success of this step hinges on the quality and comprehensiveness of the previous step of understanding the organization's current condition. The vision should provide a clear picture of the organization's desired state, addressing the concerns identified in the previous step. The above two steps should give the gap between what is the current condition and where that condition should be.

After identifying the gap between the current and desired future, the leader or leadership team must determine what to change to bridge the gap. In the context of Lean implementation, this involves adopting the Toyota Production System culture within the organization. Similarly, in other change processes, the change must be clearly defined. The leadership team must be fully committed to this idea and remain committed throughout the change period, which can last for

years. While it is possible for the process to change later, frequent changes can undermine people's confidence in the leader and the process, resulting in a loss of trust. Therefore, it is essential to conduct thorough planning and research to understand the value of the change for the organization and the effort required to implement it. This requires significant planning and deliberation to determine what changes are necessary.

It is crucial to complete the above steps within the organization and seek feedback from different layers to gain consensus. The most important aspect is ensuring that a critical mass of people at the top who buy into the change journey from the beginning. Without their support, there can be many issues later. Even if the change is specific to a department, there must be a consensus among all top leaders that the change is necessary, and that support must be provided. In the case of Lean implementation, this is especially critical, as Lean affects every aspect of the organization. Therefore, there must be unanimous and critical mass support from the top leaders to ensure the success of the change.

The next step is to create a sense of urgency across the organization. As discussed in the first step, the true north target always ensures a sense of urgency. However, if that is not there, based on the above steps, there must be consistent communication to all members, customers, and stakeholders on the need to change and on the impact of staying the same. This communication must not only inform but also build consensus on the critical mass of the organization that understands the need for change and buys into the methodology of change. This is typically easy when the change journey is defined based on inputs from different teams. The key output is to make the change process a collective responsibility rather than a leader or group-level responsibility. Creating a sense of urgency involves communication and getting everyone at all levels to buy into what, why, and how to change.

Focus 4: Guiding Coalition Team

Changing culture can be challenging, and it requires collective responsibility from the organization rather than individual or group responsibility. To drive change across the organization, a coalition team should be established. Once the change effort is communicated, some people will be interested in joining the journey while others may resist. It is important to understand both perspectives and bring some members from both parties into the coalition team. This will allow supporters to learn about the change process and for resistors to be reasoned with and find solutions to overcome their resistance. Involving some of the resistors can be helpful as if the

team succeeds in the journey, these resistors transformation can be a perfect pull to bring in the other resistors in the organization.

The mix of the coalition team is crucial, as it involves multiple dimensions. One of these dimensions is the sense of power and autonomy the team possesses. The team must have a certain level of empowerment to identify issues, raise ideas, and be given some power to resolve them, with or without the support of leadership. The speed of this process will depend on the establishment of need and the critical mass obtained in the previous step.

Another dimension of the coalition team mix is representation from various parts of the organization, including frontline members, managers, general managers, and members from different departments. This ensures that the change process captures both visible and invisible networks and relationships within the organization, while also identifying weaknesses during the change process and finding ways to make it more effective. The greater mix of representation brings more experience and expertise, providing more opportunities to identify unknowns and challenges in the process.

The more challenges identified during the change process, the more problems can be solved, which contributes to both trust in the organization and the commitment of leadership to solve every problem that arises. It also enhances the problem-solving capability of the people in the organization.

Transparency and openness are crucial in sharing all necessary information about the change process. However, the organization must balance sharing everything and only what is required. Providing the team with enough information to make the right decisions and solve problems is essential. These builds trust in the organization and contributes to the foundation's strength.

Finally, the coalition team must be provided with training on the change process and how to implement it effectively. These members must be the flag bearers and carry the change across the organization. Thus, training the team on the change is necessary. This will ensure they have the necessary skills and knowledge to lead the change process and drive it forward successfully.

Focus 5: Model Cell

Implementing lean practices in an organization can be challenging if the leadership or guiding coalition simultaneously attempts to introduce the change across the entire organization. Implementing significant changes such as lean requires time to develop, mature, and sustain. The implementation timeline is crucial, as the success of the implementation is key to future success.

To successfully implement lean, organizations can start with a model cell. In this designated area, all necessary lean tools can be tested and implemented to identify and solve problems in the production line, following the guidelines of TPS. The role of sensei or TPS trainers is crucial, as lean can only be implemented through practice and not simply by reading. Even trained individuals may find it challenging to implement lean, and the model cell allows trained personnel to practice what they have learned. Additionally, leaders can practice their problem-solving skills by bringing people together, identifying the right resources, and ensuring all resources are used for problem-solving.

Lean practices can vary from one organization to another, and the model cell allows one to define that uniqueness. Lean introduces several tools that may require modifications to meet specific conditions of the organization's products, processes, and people. The model cell allows organizations to capture these unique requirements and develop standard operating procedures (SOPs) around them. These SOPs serve as the basis for training trained and untrained personnel on lean implementation when expanding to other areas.

Establishing model cells within an organization is a crucial step toward implementing lean practices. However, to achieve success, it is imperative to consider all the requirements of foundation and stability discussed earlier. When applied to model cells, these foundations can reveal technical problems that can be easily solved and organizational problems that require significant attention. As such, it is the responsibility of the leadership or guiding coalition to prioritize and recognize these issues to be solved.

Recognizing these foundational issues is essential as it becomes the basis of trust within the organization and a pathway to winning over people to implement the change. Although solving these issues may take more time than the actual model cell implementation, including these points in the overall goals or hoshin, can build trust and buy-in within the organization.

Once established, the model cell becomes a model for other cells within the organization. Additionally, it can serve as a training ground for new members to expand the idea across the plant. As such, the role of the leadership or guiding coalition is crucial in identifying and resolving any issues that may arise during the establishment of the model cell. This recognition and resolution of issues become the basis for developing trust and buy-in within the organization, which is essential for the successful implementation of lean practices.

The model cell is crucial to confirm whether lean practices or proposed changes work and whether the organization is ready. While many organizations desire to implement lean practices, they may not be willing to put in the effort or commitment required to make the necessary changes.

The model cell provides direct and indirect indicators of member and leadership commitment to lean practices. This helps organizations determine whether they should continue with lean practices, consider alternative tools, or change programs. By doing so, the model cell helps organizations refrain from investing time and resources in a program that may not be successful or sustainable in the long term.

In addition, the model cell identifies any issues that may arise during the implementation process. This allows organizations to address these issues early on and make any necessary changes to ensure the successful implementation of lean practices.

The model cell is a platform for frontline and management development, enabling them to identify and solve problems. The frontline personnel play a critical role in problem identification and resolution. On the other hand, management should actively engage and participate in most problem-solving activities, providing feedback on the quality of solutions to ensure preventive measures are implemented effectively.

Additionally, it is the responsibility of management to dismantle any silos that hinder problem-solving efforts. Reflections on these challenges should be anchored through policies or organizational restructuring to ensure a collaborative and cohesive approach. The model cell is a powerful and indispensable tool, serving multiple purposes, as mentioned above, and its practical implementation is crucial for overall organizational success.

Focus 6: Vision / Goals or Hoshin Kanri

Hoshin Kanri, a tool utilized by Toyota, enables the design and direction of goal definition and communication across the organization, also referred to as corporate strategy in other firms. As detailed in Chapter 5 of (Liker and Convis 2012), Hoshin Kanri involves soliciting input from external competitors and industry trends to develop a long-term vision statement broken down into annual goals at various levels, including country, company, and individual goals. Effective communication of these goals is imperative, with sub-goals broken down for managers and individuals. In contrast, feedback on goals from the breadth and depth of the organization should be considered to address any underlying problems related to the organization's stability or foundation while also building trust and inclusivity in the organization. The objective is to ensure

that every organization member understands how their work contributes to their growth, intrinsically motivating them to work towards the company's values and goals. Importantly, goals should encompass foundational issues raised during previous implementation steps, including stability issues, if identified.

Setting challenging annual goals with the necessary resources available is crucial to maintaining a sense of urgency. A strong relationship between the foundation and goals is essential to prevent any erosion of trust within the organization due to a lack of resources. As the organization takes on more challenges, it must also improve its capabilities in alignment with its vision and mission.

Focus 7: Controlled Expansion

To successfully expand a lean implementation, adopt a controlled expansion strategy by expanding one model cell at a time. This approach enables the organization to realize and utilize the benefits from each cell to advance further. Before expanding, ensure that the previous model cell is established, all necessary standardization is done, and any bottlenecks identified during the model are resolved through problem-solving at all levels. This establishes the foundation and stability of the implementation, preventing the deterioration of improvements.

Establishing a continuous improvement team is crucial to train new members and expanding the implementation. The team's autonomy and alignment with the goals are essential and should be intricately linked to the point of implementation and the leadership team. Expose the team to the plant's lean concepts and implementation to fully comprehend the implementation journey. Recognize the importance of the value system, philosophies, and necessary hierarchy, such as team members, team leaders, and group leaders. The leadership and guiding coalition teams must take ownership of these aspects to ensure support and buy-in from the organization before expansion.

During expansion, unfamiliar problems may arise that require problem-solving efforts, enhancing the organization's capability, capacity, and trust. Enhance intrinsic motivation by recognizing and rewarding employee efforts through policies that offer goals incrementally achievable through small steps toward improvement.

Focus 8: Anchor changes

In the realm of change management, anchoring the changes within the organization is a vital decisive step. This involves ensuring that the principles and practices of lean thinking are embraced by all functions, resulting in sustained change across various areas, such as technical,

product-related, people-related, and policy-related domains. The key to maintaining these changes is effectively embedding them within the organization, where the benefits accrued from lean implementation are reinvested further to develop processes, products, people, and culture.

Several investment opportunities may facilitate effective anchoring, including IT systems that promote lean thinking, performance appraisal systems that track behavioural change and link it to growth and promotion, and growth opportunities for individuals who adopt the values of the implemented change. Regular audits and Key Performance Indicators (KPIs) are also crucial in ensuring that problem-solving continues, leading to continuous improvement in line with the organization's vision.

However, it is essential to note that even though the changes must be anchored within the organization to become cultural and sustainable, they are flexible. Instead, they require regular updates and improvements while remaining aligned with the organization's core values. The organization must establish a reinforcing loop where new hires are aligned with the values, while members who fail to adapt are replaced.

It is important to emphasize that implementing changes is a challenging and time-consuming process that requires patience and effort from the leadership and guiding coalition. Once the benefits of change are observed, they must be reinvested to anchor the changes, creating a sustainable, open culture. Eventually, this approach facilitates growth, allowing for the continuous development of products, processes, and profits while building a solid culture.

A comparison of four methods choses for literature study with the hybrid method developed is shown in figure 8. The hybrid method encompasses the spirit of each of the previous method while it is not complete or exhaustive.

Step	[Base Model] Kotter	Heskett	Critical Path	Lean Model	Hybrid Model
				Focus on Strong and Stable Foundation	**Stability and Strenght of foundation**
1	Establish Sense of Urgency	Recognize Problem Build Dissatisfaction on status quo Maintain Urgency	Need for Revitalization	Identify **Strong Leader,** establishing need and building guiding coalition	**Need establishment and sense of urgency**
2	Guiding Coalition	Organize Team Get Right People on off bus Create Monitor team Use Personal Checklist for Progress	Mobilize Energy		**Strong Leadership** **Guiding Coalition Team**
				People Empowerment through Model Line	**Model Cell**
3	Develop Vision and Strategy	Vision - Draft Changes Vision - Finalize Changes	Task Aligned Vision	Hoshin (Vision and Strategy) Development	**Vision Development & Communication (Follow Hoshin Kanri)**
4	Communicate Vision	Communicate Vision	Task Alignment and Fostering 3Cs **(Try at small area first)**	Communication Vision	
5	Empower People	Act Out Changes Train for Change		Leader and People Development	**People and Leader Development through Model Cell Approach**
6	Short Term Wins	Measure Performance and Act Recognize / Be impatient for Small wins			
7	Consolidate Gains and more change	Recognize and Be patient for Big wins	Spread Revitalization	Controlled Expansion **(Model Cell Approach)**	**Controlled Expansion**
8	Anchor new changes in culture	Align Policies with culture	Consolidate by Formalizing Monitoring and Strategizing	Strong Foundation and Build Culture	**Anchor Changes**

Figure 8 : Hybrid method compared with other methods from literature review.

4.5 TSSC's Training Approach

Toyota Production System Support Center (TSSC), a non-profit organization under Toyota North America, supports and mentor companies interested in learning and implementing lean systems in their organizations. TSSC has been operating for 30 years and has worked with over 300 companies in the USA, including manufacturing, service, and non-profit organizations (Bonini Jamie 2023).

TSSC's methodology for training companies on lean is explained below. Most of the details were gathered through interviews (Bonini,Jamie 2022) and discussions with Jamie Bonini (President of TSSC) and other managers at TSSC. Additionally, attending a team leader training session in July 2022 with TSSC's partner companies provided some insights into the methodology. TSSC does not work with every company that applies to the program and an initial evaluation is done both organization and its leadership to evaluate the fit to the new culture.

Step 1: Value Stream and Business Challenge Mapping

TSSC's first step is to visit the organization's gemba, accompanied by its leadership team, to understand the value chain and identify critical organizational challenges. The visit is intended to provide an in-person feel of the value chain, including the product, process, and people in the plant, and to determine the challenges the company seeks to address through implementing lean principles.

The gemba visit also allows TSSC to assess whether lean principles are the right tool for the process and to determine the level of commitment from the company's leaders towards a change to the spirit of lean, which requires a considerable time commitment from the organization. TSSC seeks to understand whether the organization is looking for a short-term win using some lean tools or is committed to a more comprehensive and long-term adoption of lean principles.

Typically, TSSC begins by creating a value stream map for the organization, capturing as many details as possible, such as inventory across the value chain, manufacturing or service lead times, supplier bases till the last tier, customer journey maps, and lead times. This map is usually filled in an A3 sheet, which gives a comprehensive idea of the organization's complete process.

TSSC and company officials will identify the critical business challenges to work on and prioritize which challenges to tackle first to address immediate business needs related to safety, quality, production, or cost. The value stream map serves as a tool for TSSC and the organization to identify areas for improvement and establish a plan for implementing lean principles.

The critical question is whether implementing lean principles is an appropriate solution to the organization's challenges. If the issue can be addressed through a temporary solution, lean principles may not be suitable. Conversely, lean principles are the appropriate approach if the objective is to establish a culture of problem-solving. The decision to adopt lean principles is made jointly by the Toyota Production System Support Center (TSSC) and the leadership team following a comprehensive value stream mapping exercise. Concurrently, TSSC facilitates engagement between the leadership team and prior partners to ascertain the commitment and depth required to embark on the TPS journey. This is a crucial step as some companies may misinterpret lean principles as tools solely aimed at obtaining immediate benefits in KPIs instead of cultivating a culture.

Step 2: Model Line Selection

After creating the value stream map, TSSC selects a key priority area to implement lean principles, which is known as the model line. They implement the necessary tools, methods, and ways of working on this pilot line, providing an experimental area to assess whether the organization is ready for such a transition and whether the organizational system can support this change. If the company successfully implements lean principles on the model cell and is committed to implementing lean organization-wide, then the model cell becomes a training ground for making more members aware of lean principles. It serves as a lab for practicing lean tools and training new members, enabling the transfer of members to new lines to expand the use of lean principles. Additionally, the model cell becomes a vision for members to see the potential benefits of lean and to become motivated to participate in the journey. However, successfully implementing the model line is crucial for all of this.

Model line selection is not trivial and depends on several factors (Bonini 2022) such as

i) Strong business need for improvement in quality, lead-time, and productivity
ii) Feasible to make significant improvement in 9-12 months.
iii) Strong operation leaders that are humble, eager and will learning TPS by doing.
iv) Good learning area to develop TPS Kaizen leaders and top management to spread TPS.

TSSC believes that the best way to implement lean principles is through hands-on experience and learning rather than solely relying on reading or observation. Thus, they meticulously choose members who can help implement lean in the model line, including change leaders and frontline workers. The model line team comprises individuals from the model area and other areas to

increase participation in the transformation process. The team also includes leadership (up to senior executives), and each member has specific roles to play in the transformation, which will be further discussed in the next step.

Step 3: Training Leaders and Change Team

The subsequent stage of implementing lean principles involves training both the leadership responsible for leading the change and the change team, which TSSC identifies in collaboration with the company leadership during the initial stages. To select the team, individuals with the highest level of motivation and commitment to effect change both in the model cell and the organization are chosen.

In most cases, the team comprises the following roles (Bonini,Jamie 2022):

i) Sponsor - A top management leadership representative who sponsors the lean implementation and resolves any organizational challenges.
ii) Champion - The lead for TPS implementation companywide.
iii) Operations Leader - The leader for TPS implementation in the model line
iv) Members - The team responsible for implementing change in the model line
v) TSSC Staff - To support all the other members in coaching all the above teams.

After assembling the team, TSSC provides training on lean principles to all members of the team.

To achieve effective implementation of lean principles in the model cell, a specific organizational hierarchy design is necessary, consisting of front-line workers or team members, team leaders, and group leaders. Above the group leaders, there are managers, general managers, and top management to support this transformation. TSSC arranges periodic training workshops for team leaders (or kaizen leaders) and top management, referred to as W1 and M1 workshops, respectively (“TSSC Workshops” 2023). These workshops cover in-depth different tools and methods (such as 3 Charts, FMDS, Daily Hurdles, etc.), focusing on the role of each layer of hierarchy. However, in most cases, such training is arranged on-site and conducted inside the model cell as on-the-job development (OJD). TSSC believes that this approach is more effective.

The role of top management is defined in (Bonini 2022) as 3+1, which encompasses the following:

i) Strong, visible TPS commitment
ii) Learning and understanding TPS correctly (principles and details)

iii) Defining accurate KPIs related to business challenges and making problems (the gap between current condition and ideal condition) visible (building a culture to expose and solve problems)

iv) (+1) Genchi Genbutsu - going to see the shop floor regularly to grasp the actual condition.

To achieve the role mentioned above, the leadership needs (Bonini 2022) to do the following,

i) Understand the problem.

ii) Diagnose problem solving effectiveness.

iii) Problem solving themselves.

iv) TPS self-develop by hands-on approach.

The sponsor and champion assume the top management role in the change team.

The change team is characterized by clearly defined roles and expectations for team member, team leader and group leader.

Step 4: Model Line Implementation and Review of Organizational Commitment

This step builds upon Step 2 and primarily involves a review of the progress made in the model cell's performance while implementing lean systems. This review typically takes place three to four months after the model cell's kick-off. The first model cell is always continuously supported by a mentor from TSSC who visits once a month and stays with the company for a week to ensure that the team is following correct practices, coaching members on lean tools, helping the team to think from a lean perspective, and aiding wherever possible.

The critical review points of the model cell, including the change and leadership teams, encompass:

i) Correct implementation of lean tools.

ii) Visualization of all problems, both model cell-related and organizational, and developing action plans, root cause analysis, and countermeasures to address them or prioritizing and making plans to solve them.

iii) Tracking problem-solving trends and recurrence prevention.

iv) Improve member skills and leadership levels against their expected roles over time.

According to TSSC, the model cell is an excellent source of a lot of information. As explained earlier, the role of the model cell is not to simply try out lean tools and see their benefits but to

understand the challenges in implementing them. Once the challenges are identified, the leadership team can see what effort in terms of time, money, and commitment is required from them and the organization's members to implement lean. A lean implementation may require investments in people (such as establishing a hierarchy, creating kaizen cells, and making the organization respond quickly to change requests) investments in processes (such as modifying layouts and machines to make them safer and facilitate single-piece flow) and investments in products (such as making products easier to manufacture or assemble).

The model cell gives companies a glimpse of benefits of lean and the effort required for lean implementation and enables them to decide whether to extend its company-wide or abandon the effort altogether. In the past, some companies have opted out after the model cell phase, citing a need for more bandwidth in terms of time, money, and organizational capability to pursue lean implementation (Bonini,Jamie 2022). TSSC uses the model cell as a proxy to gauge the level of commitment of the team and organization toward lean implementation. However, no rigid guidelines are in place, and the decision is mostly based on TSSC's countless experiences over the years.

Step 5: Focus on Stability and Expansion One by One

Upon the decision to expand lean implementation beyond the model cell and into the organization, the initial step is to conduct a comprehensive analysis of the model cell journey, with particular emphasis on identifying any key systemic-level issues that may need to be addressed to ensure success for company-wide implementation. An essential requirement for effective lean implementation is a stable process, including key aspects such as the availability of human resources, performance review systems, and measures to address absenteeism, as well as the availability of appropriate maintenance plans and spare parts for machinery. Additionally, a stable supply chain that facilitates the smooth flow of high-quality materials, together with the active support of suppliers toward lean implementation, is critical for success. Finally, company-wide policies and procedures must be standardized and implemented to ensure consistency and alignment with lean implementation journey. This is not under the responsibility of TSSC but with the partner company.

The process of achieving stability before implementing lean on an organizational level may prove time-consuming, as it involves addressing a multitude of factors simultaneously. Leadership buy-in from other areas of the organization is often necessary, as lean cannot be isolated solely to manufacturing or a specific area. A cohesive organizational approach is paramount for long-term

success, requiring alignment at the highest levels of the organization. This alignment can be achieved by the sponsor and champion who drive organizational-level issues to support the journey. As highlighted in step 1, once the reasons for implementing lean have been established and determined as the way forward, it must be integrated into the organization's goals to prioritize implementation and overcome any obstacles.

The approach to expanding lean implementation is typically carried out one model cell at a time. This approach is taken primarily due to the need for the organization's capability to be developed over time. As each model cell journey is completed, the team's actual capability to handle different problems becomes more evident. Additionally, tackling multiple model cells simultaneously requires more significant resources within the team and can lead to disagreements among resource owners.

TSSC believes in implementing model cells one by one and solving problems within each model cell as they arise. Although this approach incurs a cost in terms of time, the benefits of learning and freeing up resources from each model cell can be used to expand lean across the organization can outweigh the costs. Furthermore, some members from the original model cell move on to new model cells, and in combining with new teams, enable more coaching and learning to solve new problems. With each subsequent model cell, TSSC mentor involvement reduces, and the internal teams take more ownership of the implementation.

Step 6: Sustenance and Rooting of Changes

The Toyota Production System (TPS) maintains its momentum by constantly facing and overcoming challenges that stem from the pursuit of True North targets and the ingrained culture of continuous improvement established by Toyota leaders throughout the organization. The establishment of lean requires not only standardization and institutionalization of all changes across the organization but also the development of new challenges by leaders driven by external competition or internal true north targets. These challenges foster continuous improvement and allow the organization to leverage its changed processes and workforce toward this goal. The realization of continuous improvement is the outcome of a successful lean implementation.

At a higher level, the six steps give a summary of TSSC approach. TSSC approach is more hands-on approach of core tools of TPS implementation while the other aspects are more hands-off approach.

4.6 Comparison between TSSC and “Hybrid” Method

A comparison between the TSSC (Toyota Supplier Support Centre) approach and the hybrid method is depicted in the figure 9. One of the key insights is that the hybrid methodology requires collaboration between TSSC and the partner organization.

HYBRID METHOD = TSSC EFFORT + PARTNER COMPANY EFFORT

This comparison is not a straightforward "apples to apples" analysis. However, it does highlight an important insight: TSSC's commitment to successful lean practices implementation and value creation should extend to all areas of the hybrid methodology, even those where TSSC's engagement may be limited currently.

To address this, TSSC should continue monitoring those areas in the hybrid methodology where their involvement is not as extensive, while the partner organization must also be dedicated to monitoring their responsibilities and supporting the change efforts. The TSSC methodology in the figure illustrates the impact of their current efforts on different boxes within the hybrid methods. The red dotted arrow signifies the connection between relevant boxes, while the gap between the height of the box indicates areas where TSSC's coverage is incomplete. These gaps require the company's focus and attention.

In Figure 9, the company's effort is represented in blue, indicating their full accountability for the change effort. However, the light blue shade signifies the areas where TSSC provides support and guidance. This underscores the significance of a collaborative commitment (handholding) between TSSC and the partner organization in implementing and continuously improving lean principles throughout the organization.

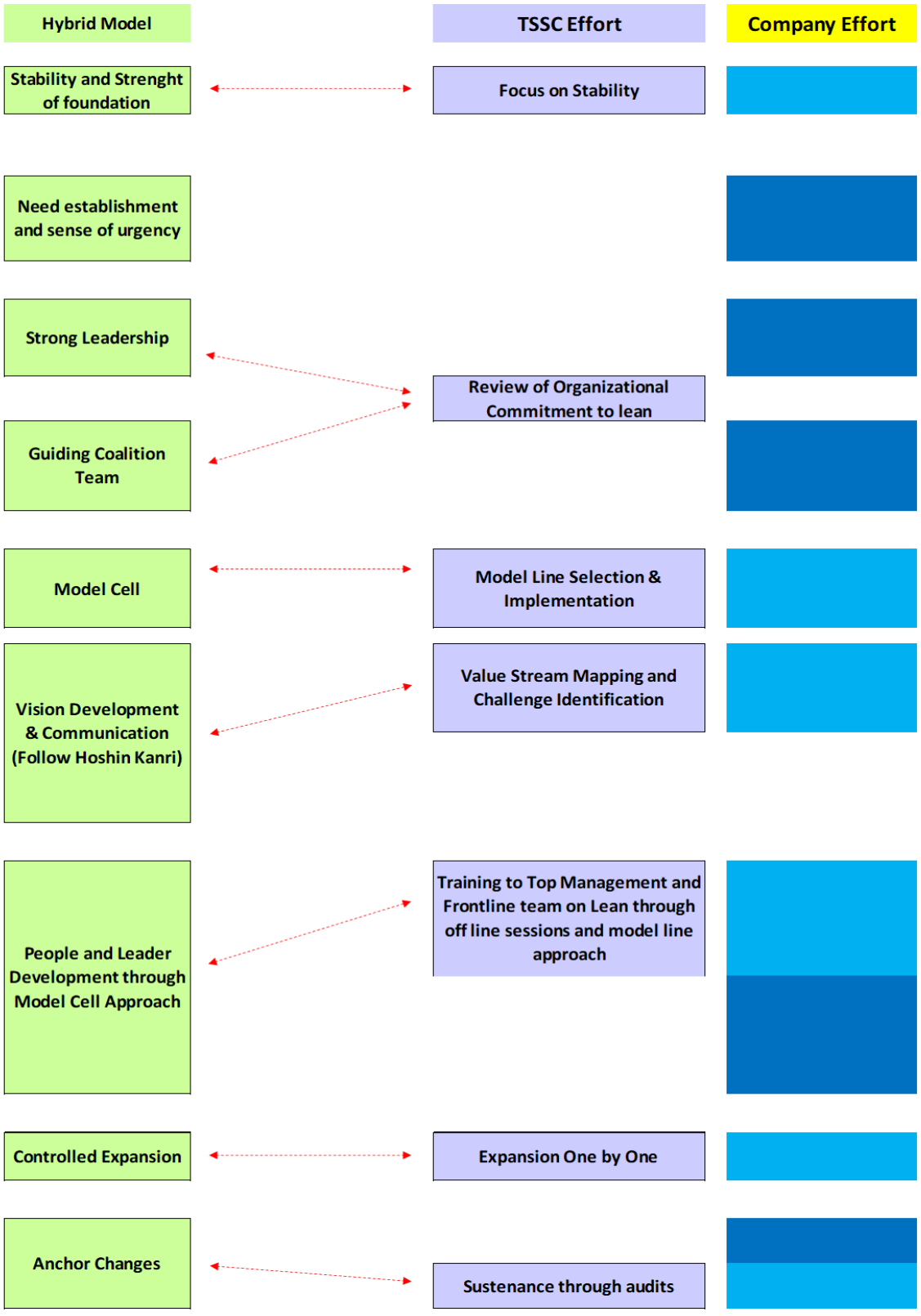

Figure 9 : Comparison of Hybrid method and TSSC Effort

Chapter 5: System Dynamics Model Development

5.1 Why need a system dynamic model.

The literature review (Chapter 2) and hybrid methodology (Chapter 4) highlight a crucial insight: Organizational change is a complex process that requires time and consistent evaluation to ensure successful implementation and sustainability. The complexity involved often undermines confidence and accountability (Senge 1990) , as leaders need help comprehending why their desired changes are not being realized despite their efforts. In such instances, leaders may attribute the shortcomings to the inherent complexity and rigidity of the system, perceiving it as incapable of transformation. Consequently, the system becomes trapped within its structural limitations.

To address this challenge, adopting systems thinking mindset or model can offer a solution. Systems thinking enables us to perceive the organization as unified and identify the underlying structures that drive complex situations (Senge 1990) . By applying systems thinking, change leaders can recognize the interdependencies among various elements of the organization and the extensive collective efforts made by them and employees to drive change. We can also appreciate the time-related dynamics of change, including potential delays or the delayed manifestation of the effects of implemented actions. Additionally, systems thinking helps us comprehend the feedback loops (Senge 1990) that arise from our actions.

Shifting to a systems approach allows us to move away from linear thinking, characterized by a sequential flow of events, towards circular thinking that incorporates feedback mechanisms involving reinforcing and balancing reactions. This mental model enables us to navigate the complexity associated with change more effectively. It also grants us a deeper understanding of the substantial effort required to bring about any meaningful change and the ability to track the progress of change over time. Moreover, it guides us in identifying areas of focus when things do not go as planned or when external shocks impact the system. Thus, a system dynamics model can overcome few challenges associated with traditional methods, which becomes a motivation for using system dynamics technique to model change efforts. In this research, only a qualitative system dynamics (causal loop diagram) model is developed, unlike a conventional simulation model.

5.2 Introduction to System Dynamics

To gain insights into what key levers drive impact in organizational culture change, explain why a particular lever does and does not have specific impacts, and create a testable hypothesis (Schweuger, Stouten, and Bleijenbergh 2018), a system dynamics-based causal loop diagram is proposed to model the organizational change dynamics (Sterman 2000). The casual loop diagram captures the inter-process complexities and non-linearities in the change journey and helps visualize both through a set of loops – reinforcement (giving positive feedback) loops and balancing (negative feedback) loops. The nature of system dynamics causal loop diagrams allows us to see the time dynamics perspective. An example of a system dynamics model with a casual loop diagram is explained in figure 10 with labelled reinforcement and balancing loops. This example is borrowed from (Sterman 2000) directly.

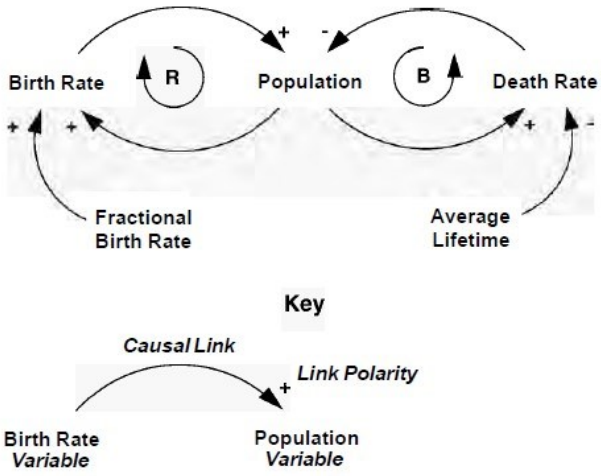

Figure 10 : Casual Loop diagram example

Each arrow or link is attached with a "+" or a "- ". The "+" can be interpreted as all else equal. A higher birth rate leads to a higher population, and a lower birth rate leads to a lower population. The "-" can be interpreted as all else equal; a lower birth rate leads to a higher population, and a higher birth rate leads to a lower population (Sterman 2000). The reinforcement loop "R" refers to the reinforcement loop of a higher birth rate leading to a higher population and a higher population leading to a higher birth rate given a constant fractional birth rate. The balancing loop "B" refers to a balancing loop in which a higher death rate lowers the population, which drives a lower death rate given a constant average lifetime (Sterman 2000). The population variable is a stock variable that can be measured anytime. Suppose the population value is plotted over time. In that case, we can see that if the population increases, the reinforcing force is stronger than the balancing

force, which causes the population to rise. Certain links may feature a dual-line marker, signifying a delay in the anticipated outcome. This implies that although the cause may be present, the effect might take some time to manifest. (The Book the Fifth Discipline (Senge 1990) can be referred by the reader to understand more on causal loops)

5.3 System Dynamics Model for Change Implementation

5.3.1 Overall Model

The overall causal loop model for culture changes is illustrated in Appendix 1. The model was developed using Vensim DSS 9.4.0 under the academic license granted by MIT.

5.3.2 Model Explanation

The explanation of this model follows a module-wise approach, where each module builds upon the previous one. At the beginning of each module, a figure is presented to emphasize the core explanatory variables, while non-relevant areas are visually highlighted by greying them out. The previously greyed-out variables are progressively highlighted throughout each module to demonstrate their relevance to the current stage and their interconnectedness with the previous modules. (The overall model in A3 paper size is attached in Appendix 1).

5.3.2.1 Module 1: Goals Setting and avoiding capability trap.

In most organizations, competitor performance, vision, and philosophy influence the organization's goals. This relationship is widely discussed in various literature and books (Porter, n.d.; Lafley and Martin 2013). Philosophy at Toyota is defined by i) Respect for people ii) Genba iii) Continuous Improvement and iv) Customer Focus (TSSC 2022). These philosophies drive the goal setting at Toyota. Likewise, every organization can cultivate its own philosophies, which evolve through the company's experiences and priorities. These philosophies are shaped by capturing what has worked for them and embodying the principles that they hold dear. It is crucial to acknowledge that the philosophy of one company may not apply to others, as variations in products, culture, and market dynamics can create disparities. Many failure modes resulting from a poorly defined vision has already been captured in literature and is mentioned in section 2.4. The variable “clarity and difficulty of goals” captures these goals and is a proxy for “desired performance level” in the organization.

The term "performance" in the context of "low-performance production lines," "high-performance production lines," and "average performance level" refers to the intended Key Performance Indicators (KPIs) targeted for improvement through organizational changes. For instance, when companies aim to implement lean or Toyota production systems, performance can refer to factors

such as quality, costs, productivity, or a combination of these. These performance goals may vary depending on the specific change objectives. The “goals” set targets for each performance KPI.

The "average performance level" is determined by a ratio of the "high-performance production lines" to "low-performance production lines" and becomes an indicator of the change implementation. The “performance gap” represents the difference between the “average performance level” and the “difficulty and clarity of goals.” As changes are implemented within the organization, the "low-performance production lines" transition into "high-performance production lines." With an increasing number of "high-performance production lines," the “average performance level” rises, lowering the “performance gap.” This relationship is captured in the model through loops between the “Low/High performance production line” and “average performance level” in the model.

It is important to note that even though improvements happen, there is decay as well that once improved high performance line can decay back to low performance line. The reasoning for this will be discussed in later sections.

The performance gap drives two urgencies or pressure in the organization – “Pressure to improve performance” and “Pressure to maintain performance.” The “Pressure to improve performance” pushes “the workforce time spent for improvement,” while the “Pressure to maintain performance” pushes the “workforce time spent on work.” The total time an employee has must be divided between improvement and work. This trade-off is captured by the paper on organizational capability (Sterman, John D 2015). As workers spend more time on the work, the average performance level increases and lowers the performance gap, thus forming the balancing loop of “work harder.” As workers spend more time on improvement, then average performance level goes up as changes are implemented in the organization. This balancing loop is termed “work smarter.” Each of these loops is important as working harder can, eventually, lead to a plant full of unsolved problems (This is a summary if capability trap where no new learnings occur in the organization), and work will need to be done with overtime or extra resources. Over time the speed of change implementation from “low” to “high” slows down.

In any change initiative, the first important lever is the leadership to commit resources or motivate workers to spend time on improvement rather than work. In both Company A and Company B, a need for more commitment to allocating resources was observed. While most leadership expressed a desire for improvement efforts, executing these initiatives using existing resources proved challenging. It may be possible to push employees to invest time and effort into these

endeavours. However, over time, the risk of burnout increases, undermining improvement efforts and hampering overall productivity.

During interviews with employees from both companies, it was reported that there needed to be more time or flexibility to engage in improvement projects. Consequently, without slack time to improve, these projects were treated as separate endeavours rather than being integrated into the daily routine (in TPS, any problem is solved without delay through stop-call-wait rule). Furthermore, delays in improvement projects were occasionally attributed to resource constraints arising from increased demands or shortages resulting from absences or delays in HR recruitment processes. These factors contribute to a cycle of working harder without substantial improvement.

Therefore, the significance of leadership commitment to the change and allocation of resources for change cannot be understated, as it serves as a pivotal driver for change that benefits the organization. In addition, the leadership must display certain behaviour which is detailed in the hybrid model chapter.

These resources can create slack through additional resources in the production line, separate teams, or stopping lines (like quality circles) to resolve issues (shown as Resource commitment loop) As leadership commits resources, more workforce time is spent on improvement. The variable “organizational capacity and capability for change” is a variable that captures the total organization's capacity and capability for improvement. The capacity comes from workforce time spent on improvement and cross-training benefits (this is explained later).

The frontline and leadership capabilities are responsible for implementing organizational change, contributing to the capability portion. The initial capability stems from the mentioned frontline and leadership capabilities in the bottom right. External consultants like TSSC often assist in developing frontline capability by providing initial training or supporting team collaboration in developing the model cell. TSSC also conducts leadership and manager-level training, facilitating exposure to other organizations for lean implementation to build the initial capability and commitment from leadership.

These training opportunities and exposure foster the initial capability required to initiate change. It is crucial to note that both frontline and leadership should concurrently engage in this process, as both play essential roles.

Evidence from interviews conducted in Company A revealed that most frontline or middle management employees initially received training, while the leadership lacked lean training.

Consequently, there was a lack of leadership support, resulting in additional barriers, longer buy-in times for leaders, and a lack of top-down approaches to overcome silo barriers.

In contrast, Company B focused more on training leadership in lean methods, with less emphasis on frontline or team member training. However, apart from training, there needed to be more exposure to the need and purpose of the change. This resulted in the inability to leverage their capability or motivation effectively. The motivation aspect is further addressed in separate loops, as explained later. As a result, there needed to be more clarity regarding what must be done and why the change was necessary across the organization. Therefore, the overall organizational capability becomes crucial, as illustrated in the model through the links. Over time, the organic growth or promotion of frontline staff contributes to building organizational leadership capability.

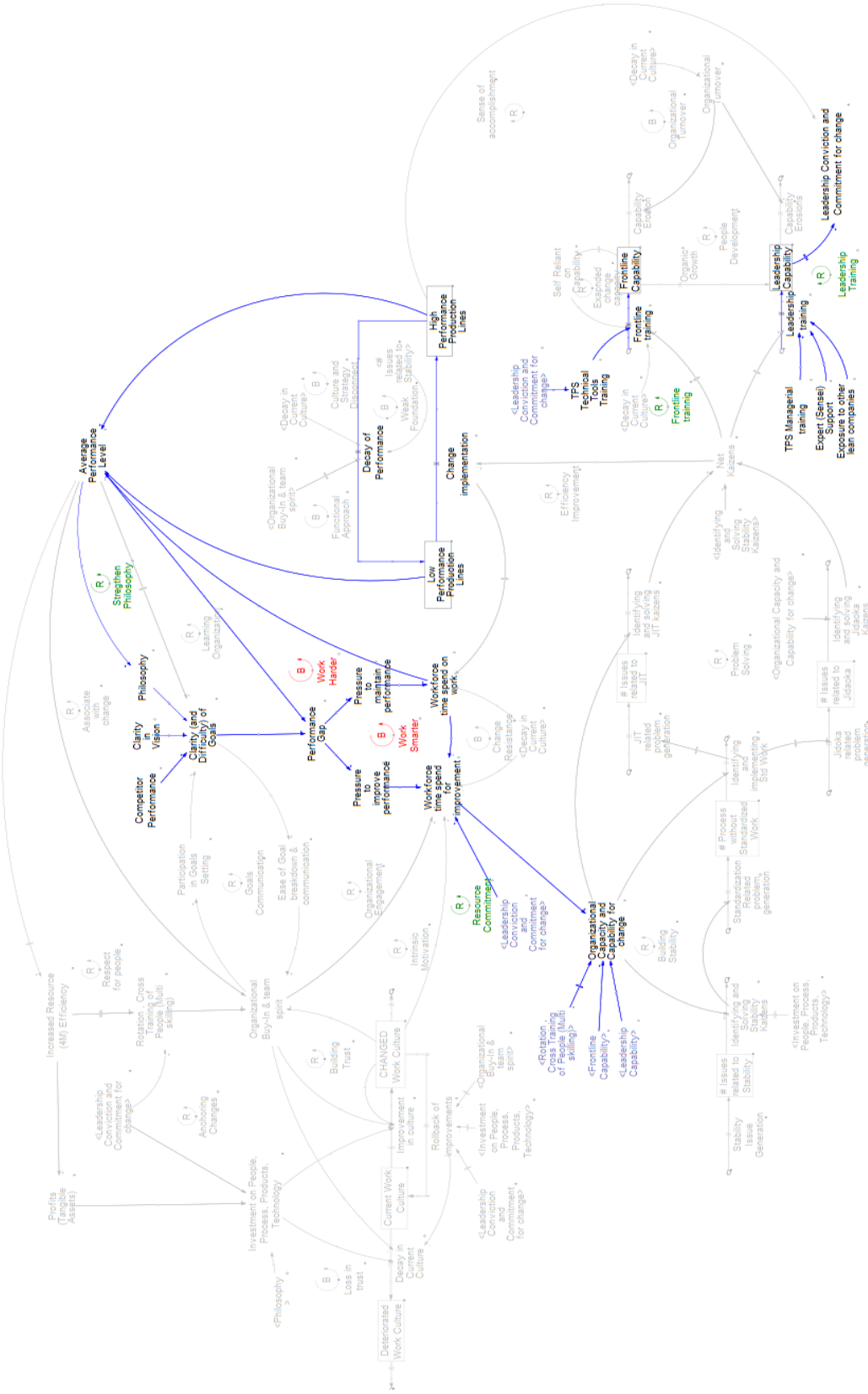

Figure 11 : Module 1: Goals Setting and avoiding capability trap

5.3.2.2 Module 2: Change Implementation

Regarding lean implementation, TSSC and partner companies aim to foster a culture of highly engaged individuals who actively solve problems and drive innovation. According to Toyota's House (Figure 2) and TSSC's perspective, problem-solving involves four steps. It Is important to note that each of these changes is first implemented in a model cell, and then over time repeated over multiple model cells while sustaining the condition in completed model cells. The first step focuses on achieving stability within the model cell. As time progresses, problems are likely to arise due to distinct reasons. Within this module problems are classified into stability-related, standard work-related, jidoka-related, or just-in-time (JIT) related (the meaning of jidoka and just in time can be learned from (Liker, n.d.). The idea of this classification is specific to the implementation of TPS in an organization. At a deeper level, the concept of stability is defined in the hybrid model chapter (Chapter 4).

Standard work pertains to establishing standardized procedures for production related processes, enabling the identification of normal versus abnormal conditions. Identified gaps are considered problems, and corresponding countermeasures are devised. Once stability is established and standardized work is in place, the focus shifts to just-in-time processes, aiming to reduce lead time from order to delivery, and jidoka, which emphasizes built-in quality. Further details about these tools can be found at (TSSC 2022; Liker and Convis 2012; Liker, n.d.).

The cumulative benefits of these improvements, also known as kaizens, can be effectively summarized as “net kaizens,” illustrating the overall positive impact of the implemented changes. However, addressing stability-related problems is only sometimes straightforward and may require additional investments. In the case of Company B, stability issues arose concerning staffing, such as inconsistent and unstable schedules. Such issues hinder the implementation process and take time to resolve, often necessitating higher-level leadership thinking and organizational involvement. Hence, it is sometimes feasible to temporarily skip or delay stability-related problems, particularly for more significant issues, and instead focus on everyday work, JIT, and jidoka-related problems. The sequence in which these problems are tackled becomes less critical in this context. However, suppose stability-related issues persist over the long term. In that case, they can lead to a “decay of performance” and the transition of lines from high-performance to low-performance levels, as depicted by the weak foundation loop. Hence, it is crucial to keep the organization informed about stability-related issues and the ongoing development of countermeasures to address these problems. By doing so, employees will perceive a sense of determination and be motivated to sustain the benefits. If these issues are

not sorted out in long term, then it can lead to loss in trust in organizations. This commitment is typically achieved by incorporating stability problems into the organization's goals, charter, or Hoshin Kanri (refer to the chapter on Hoshin Kanri in (Liker and Convis 2012)).

As problems are solved, it becomes evident that the time spent by the workforce on non-value-added work can be reduced from a lean perspective. This reduction enables the organization to allocate more time to improvements while utilizing the same resources. This time optimization, eliminating non-value-added tasks and generating more time for value-added work, is a fundamental principle of the Toyota Production System (TPS). This entire loop is encompassed within this stage, showcasing the importance of maximizing value-added activities and time utilization.

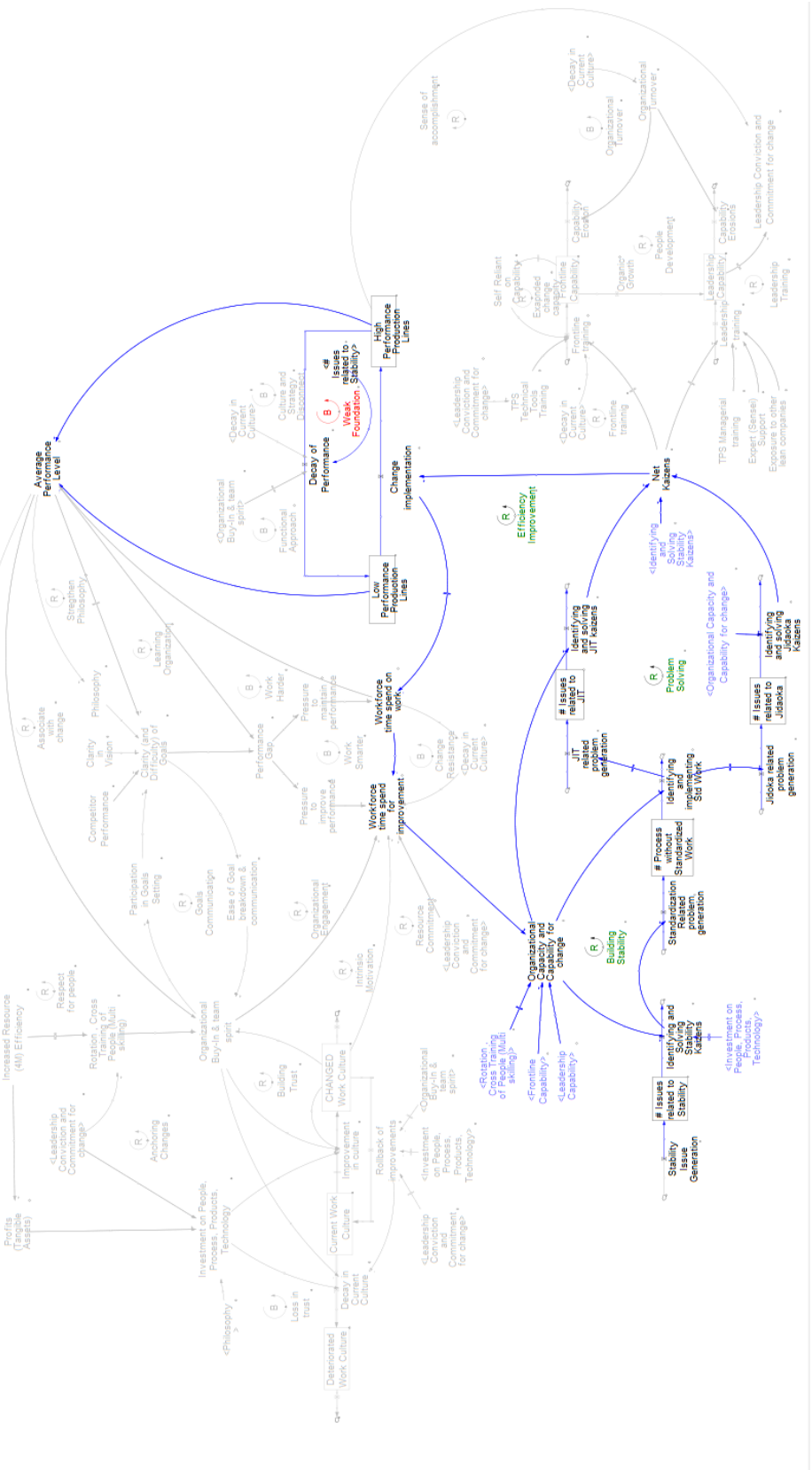

Figure 12 : Module 2: Change Implementation

5.3.2.3 Module 3: People Development

The active involvement of people is crucial for the successful implementation of TPS, as previously explained. This encompasses everyone within the organization, from the frontline workers who closely interact with products and processes to the leadership team, including the CEO, who collaborates with and supports the frontline. Notably, the development of people, specifically their capability to implement and sustain the change, holds prime importance.

In the previous module, we observed that "net kaizens" represents the variable capturing all changes implemented in the organization. This created a reinforcing loop, encouraging increased investment of time and effort into improvement activities. In this module, the focus shifts to understanding how these changes contribute to developing people and leadership.

In Module 1, the initial capability was established through external training and frontline and management personnel exposure to lean philosophy, practices, and methods. This was the foundational capability required to initiate the change process or implement the model cell (refer to the hybrid model for model cell details). The challenges arising in implementing TPS in an organization is unique and thus more hands-on localized approach is required than a generalized training approach. However, relying solely on external training is not sustainable eventually and can be costly. Therefore, it becomes essential for the organization to foster internal training capabilities to facilitate the expansion of change implementation. This emphasis on people development recognizes that implementing change is challenging and involves identifying problems, analysing root causes, implementing countermeasures, and preventing recurrence. The journey of problem-solving is not easy and may span across sections or departments, providing valuable on-the-job training opportunities for those involved in change implementation. Consequently, problem-solving activities contribute to the generation of capability, as depicted by the links from "net kaizens" to "frontline capability" and "leadership capability." Through repeated and diverse problem-solving experiences, learning and capability development are enhanced.

Implementing model cells represents an ongoing process due to continuous learning and the pursuit of true north targets assigned to these cells. As a result, problem-solving within model cells becomes a perpetual endeavour, leading to continuous capability development. However, it is worth acknowledging that as time progresses, the availability of problems decreases, making them more challenging to solve. Thus, the focus gradually shifts toward sustaining the implemented changes, which can present even more significant challenges.

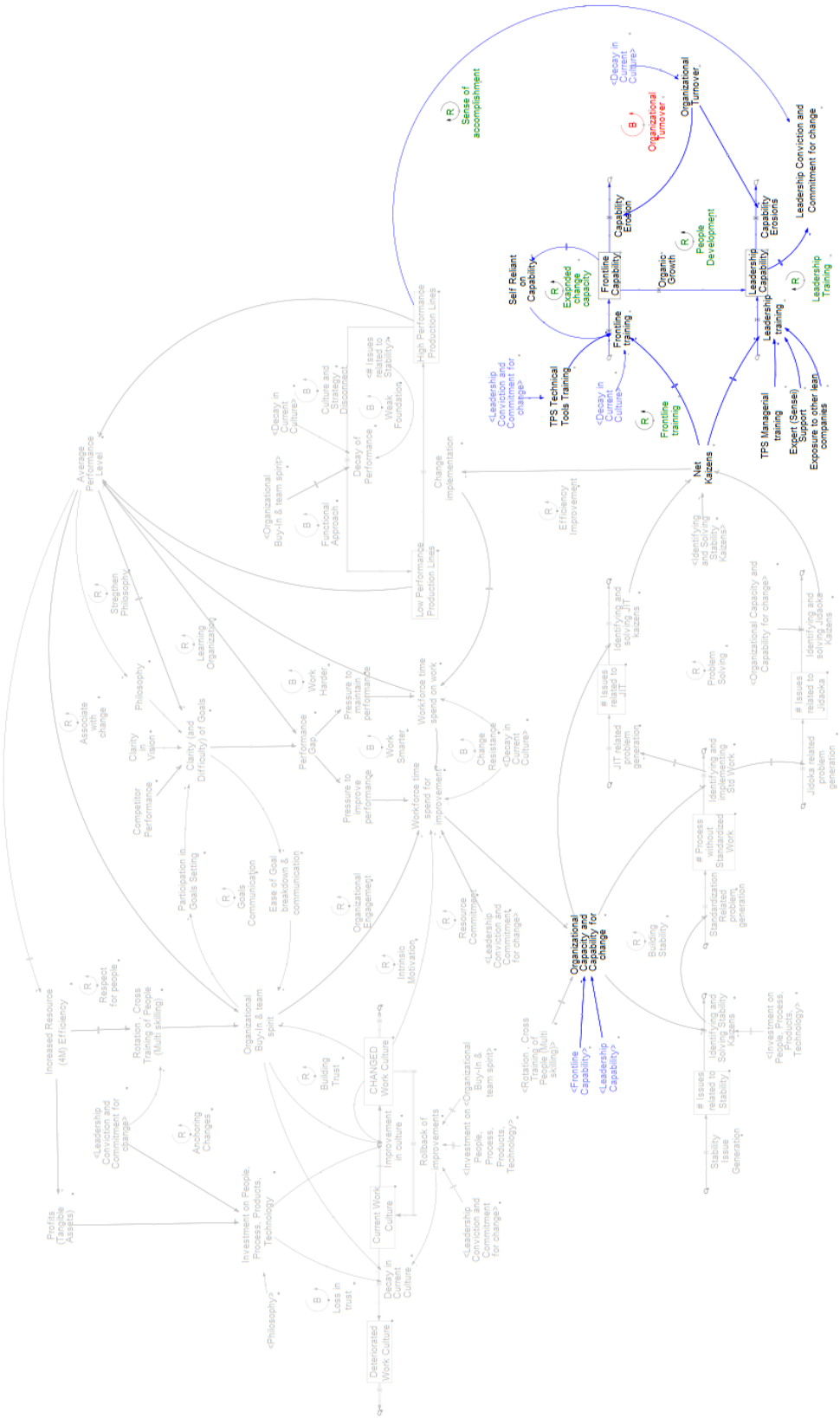

Figure 13 : Module 3: People Development

Over time, numerous organization members receive training, and an internal training team, like a continuous improvement team, can be established to train other members. Model cell implementation often serves as a valuable training ground, allowing untrained individuals to receive training alongside implementation. Furthermore, once a model cell is implemented, personnel can be rotated in and out of the group to ensure broader exposure to change implementation concepts. It is crucial to note that model cell implementation represents an ongoing journey that can be leveraged for internal training, as exemplified by the "expanded change capacity" loop.

A common observation in both companies is the establishment of Continuous Improvement (CI) teams responsible for assisting and training members on the principles and methods of the Toyota Production System (TPS). Over time, separate groups within the HR department took over certain aspects of the training while the CI team continued to handle the remaining portion. The training occurred in classrooms and eventually transitioned to model cells for the final stage. This is a frequent practice in many companies. However, a drawback of this approach is that the training becomes rigid, and any new learnings or updates to the training material become administrative tasks, slowing down the double-loop learning process.

Additionally, the CI team often finds itself detached from the point of implementation due to differences in reporting structure. In both Companies A and B, the CI team reported to the directors in charge of operations. However, as we moved down the hierarchy, managers held differing views on who was responsible for CI or improvements. It was a classic case of whether improvements were treated as projects or part of daily routines. Particularly in Company B, it was observed that improvements were primarily treated as projects, driven by the CI team rather than the operations team. Such variations in ownership often impact motivation and accountability. These variations can also be caused disconnect between hoshin kanri (communication of goals) and performance appraisal system (to align goals and behavioural change). Therefore, it is crucial for organizations to clearly define the accountability and responsibility of both the CI team and the daily operations team.

Another critical aspect is growth. TPS implementation leads to non-value elimination, re-organization to ensure smooth workflow and some people to face loss of power and autonomy. The leadership team should recognize this and have plans to accommodate these individuals as well. Over time as individuals gain more knowledge about change and TPS, they should be encouraged to challenge themselves with larger targets and extend their influence on other areas of the organization, promoting further change implementation. Sustainable change over the long

term also relies on fostering growth within the organization. As frontline members progress through the ranks and assume leadership positions, their exposure to problem-solving activities enables them to comprehend the depth of resolved issues and recognize the benefits over time adding to the leadership capacity and capability. Subsequently, they can drive these changes into the organization's culture, as discussed in Module 5.

Turnover poses a risk to capability erosion over time. However, a strong organizational culture, discussed in Module 5, can help mitigate turnover and its detrimental effects.

As leadership capability increases, driven by the recognition of organizational capability potential, there is a heightened sense of commitment from leadership to expand change efforts. Additionally, the benefits arising from change implementation can reinforce the leadership's commitment to drive more change. Both the frontline and leadership capability build into the "organizational capability and capacity" discussed in module one.

5.3.2.4 Module 4: People Participation

In prior modules, the organization has established the need and urgency for change, provided training to individuals, implemented changes to gain benefits, and leveraged these change implementations to develop people and leaders. One fundamental assumption is that people will participate in change implementation. This assumption is valid but not guaranteed.

Modelling employee participation involves considering factors such as the opportunity to participate in change, awareness of why change is needed, association with change within the organization, the skills required to implement change, and intrinsic motivation to participate. Employee participation is collectively modelled as "organizational buy-in and team spirit," recognizing that the participation of every employee or a critical mass is essential for successful change implementation.

The "learning organization" loop enables the opportunity to participate; where the organization achieves its set targets, the targets are continuously moved upward. These are commonly referred to as true north targets or utopia targets. Initially, these targets may be achievable, but over time, problem-solving may also become tougher as targets become more challenging. However, this target-setting methodology enables people to practice problem-solving and creativity skills continuously. Some ideas generated through this process can lead to more exciting business value-generation ideas. Having a mechanism in place is crucial to capture all these ideas.

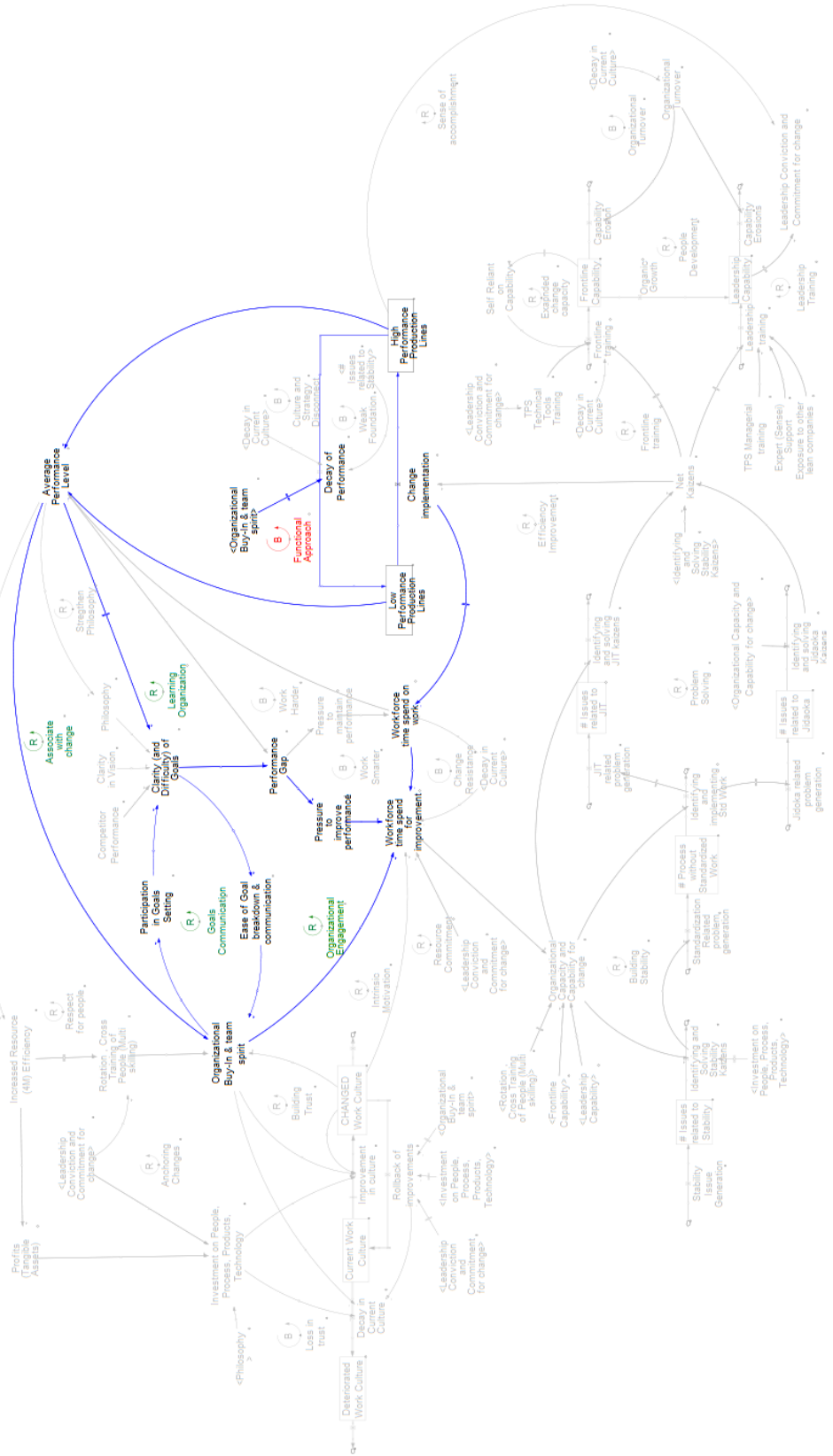

Figure 14 : Module 4: People Participation

Target setting is not easy and should not be left solely to management or leadership decisions. Even at Toyota, higher-level goals are determined by top management. However, these goals are then broken down by country, company, department, and sections and drilled down to the individual level. This communication allows everyone to understand their role and how it contributes to the organizational goals, motivating employees to seek out ideas or solve problems that help the organization achieve those goals. As the organization emphasizes change, employees can recognize the need for change and understand how it is linked to organizational goals and performance. This means that the leadership team or management should listen to employees' feedback on goals.

Since employees work closely with the product or process, their feedback and input should be essential and considered during goal setting. Toyota's hoshin kanri process is an example of effective downward and upward communication from which other organizations can learn. Involving members in target setting helps identify priority areas for the organization to focus on and garners buy-in from employees into the change process. This two-way process benefits both employees and the organization and this loop is represented by the “Goal Communication” loop and represents the awareness aspect of the employee participation to the change.

When a model cell is selected, and changes are implemented, resulting in noticeable improvements in performance KPIs, the model cell becomes a focal point that attracts attention. It engages people from various parts of the organization and encourages their buy-in to the change. During the change process, only some individuals are initially inclined to participate because they may need to be made aware of the effort required or the benefits that can be achieved. However, when the model cell demonstrates tangible results, it can act as a showcase to highlight the benefits and the learning journey it has undergone.

Those involved in the model cell take pride in explaining their contributions and the outcomes they have achieved. This motivates other employees to join and participate willingly in the movement. This phenomenon is facilitated through the "associate with change" loop observed in numerous organizations that contribute to employee participation. As effective communication of goals permeates throughout the organization, individuals outside the core implementation area begin to recognize how they can contribute and collaborate to accelerate the achievement of organizational goals. They may even set higher targets for themselves, surpassing the organization's goals. The model cell team can also involve other departments when they require problem-solving support, further fostering buy-in.

These activities lead to higher “organizational buy-in and team spirit” as individuals become more connected to the change initiative and actively work toward its success.

As the variable "organizational buy-in and team spirit" strengthens, the level of organizational engagement in the change initiative increases. This heightened engagement fosters mutual motivation among team members, encouraging them to invest time and effort into improvement endeavours. The "organizational engagement" loop represents this reinforcing dynamic.

Conversely, the organizational buy-in is weak due to insufficient communication or limited involvement from different teams, among other reasons. In that case, it can impede the progress of the problem-solving journey. This can result in a decline in performance, with high-performing lines regressing to low-performance levels. The underlying concept is that when teams do not receive the necessary support from other teams to successfully address and resolve problems, their motivation to sustain change diminishes. Consequently, they may begin to doubt the efficacy of the change initiative and revert to low-performance conditions. This phenomenon is captured in the "functional approach" balancing loop.

During the interviews conducted in both Companies A and B, it became apparent that the Toyota Production System (TPS) implementation was primarily focused on the manufacturing department. This is a common trend, as many companies view lean (TPS) as a set of tools or methods for improving manufacturing processes and productivity (reference) rather than embracing it as a culture of problem-solving and innovation (reference). Consequently, most of the training and attention is initially directed towards the production-related functions, while other departments may need to be noticed.

However, as issues arise that require cross-departmental countermeasures, the limitations of this approach become evident. This is where organizational buy-in becomes crucial. The extent of organizational buy-in depends on the scope and scale of the desired change. Securing buy-in from across the organization is essential for a companywide implementation of TPS.

The penultimate aspect of employee participation skills is addressed in the people development module. This module focuses on cultivating and enhancing the skills necessary for individuals to contribute to the change initiative effectively. Employees can acquire the competencies required to implement and sustain the desired changes by providing training and development opportunities.

The final element, intrinsic motivation, is discussed in the subsequent module. Intrinsic motivation refers to individuals' internal drive and passion to engage in the change process. The next module explores how to foster and nurture intrinsic motivation among employees, recognizing its significance in maintaining their commitment and enthusiasm throughout the change journey.

5.3.2.5 Module 5: Culture Change

Intrinsic motivation refers to the internal drive and motivation that individuals must engage in an activity rather than being solely motivated by external factors such as financial rewards. It is imperative for employees to be intrinsically motivated, as it fosters a stronger sense of commitment and satisfaction in performing their tasks. This intrinsic motivation is cultivated by establishing a positive and supportive organizational culture, which is the focus of module five.

As the average performance level increases within the organization, there are notable gains in resource efficiency across the 4M dimensions: people, machines, methods, and materials. For instance, as non-value-added activities are eliminated, employees become available for other responsibilities, machines are freed up, and additional space becomes accessible. These examples demonstrate the potential benefits of improving resource efficiency, although the examples are a partial list only.

When freed up within the organization, employees can be utilized for rotation and cross-training in multiple areas. This approach enables employees to develop a broader skill set and capabilities across various domains. It promotes job satisfaction and a sense of connection while providing the organization with a backup of process capabilities in case of urgent needs. Furthermore, utilizing these extra resources can enhance organizational buy-in, as employees see the direct benefits of change implementation on their growth and well-being. The impact of organizational buy-in on change initiatives was discussed in module four. Maintaining a strong "Respect for people" link within the organization is crucial, as some organizations may resort to laying off employees to maximize cost savings. Such actions weaken the "Respect for people" element, undermine organizational buy-in, and hamper change initiatives. The decision to prioritize rotation and cross-training requires leadership commitment to drive the utilization of employees for expansion, training, and overall growth. Leveraging these additional resources can enhance the “organization's overall capability and capacity.”

The profits and other tangible benefits (other than people freed) should be used by the leadership drive to invest on people, process, products, and technology. These investments are directed towards building stability and growth in the organization. The people aspect is to ensure that the

investment convers the basic and advanced needs (this is covered in people related in focus one in section 4.4). Covering these needs may require higher investments than the benefits generated form one model cell, however over time as the benefits accrue there should be leadership commitment to invest into these people needs. Some commitments if it takes longer time, the commitments are captured in the corporate goals or Hoshin Kanri, so that the organization can see commitments from leadership towards investing back into organization.

Simultaneously, allocating profits towards investing in formal and informal business processes is essential when implementing the Toyota Production System (TPS) in organizations. Formal processes encompass various aspects such as single-piece flow, basic safety measures in machines and layout, IT systems for planning support, process standardization for result monitoring, floor management systems, visual systems, and more. These formal processes are crucial in standardizing all business processes within the organization. Formal processes vary across different organizational changes, but it is possible to uphold the underlying spirit consistently.

From company A and B, few formal processes that lacked completeness include establishing a hierarchical structure with team members, team leaders, group leaders, and higher-level managers, each with an appropriate span of control. A performance appraisal system is implemented to assign goals to individuals through the goal communication loop, and managers or leaders review employees' behaviours to ensure alignment with the intended cultural change. The appraisal system is valuable for tracking individual difficulties and providing feedback on the change systems. The appraisal system needs to be fair, rewarding employees with growth opportunities and focusing on results and the processes employed. This weakness indicated whether the strategy of the company was only to see the benefits or to whether an improved culture wanted to be established in the organization.

In addition to formal processes, informal processes also contribute to the successful implementation of TPS. Informal processes encompass pay equity, fostering a diverse and inclusive work environment, knowledge sharing, interpersonal and social dynamics and promoting employee fairness. These informal processes are essential for cultivating a positive organizational culture and ensuring equal opportunities for all employees.

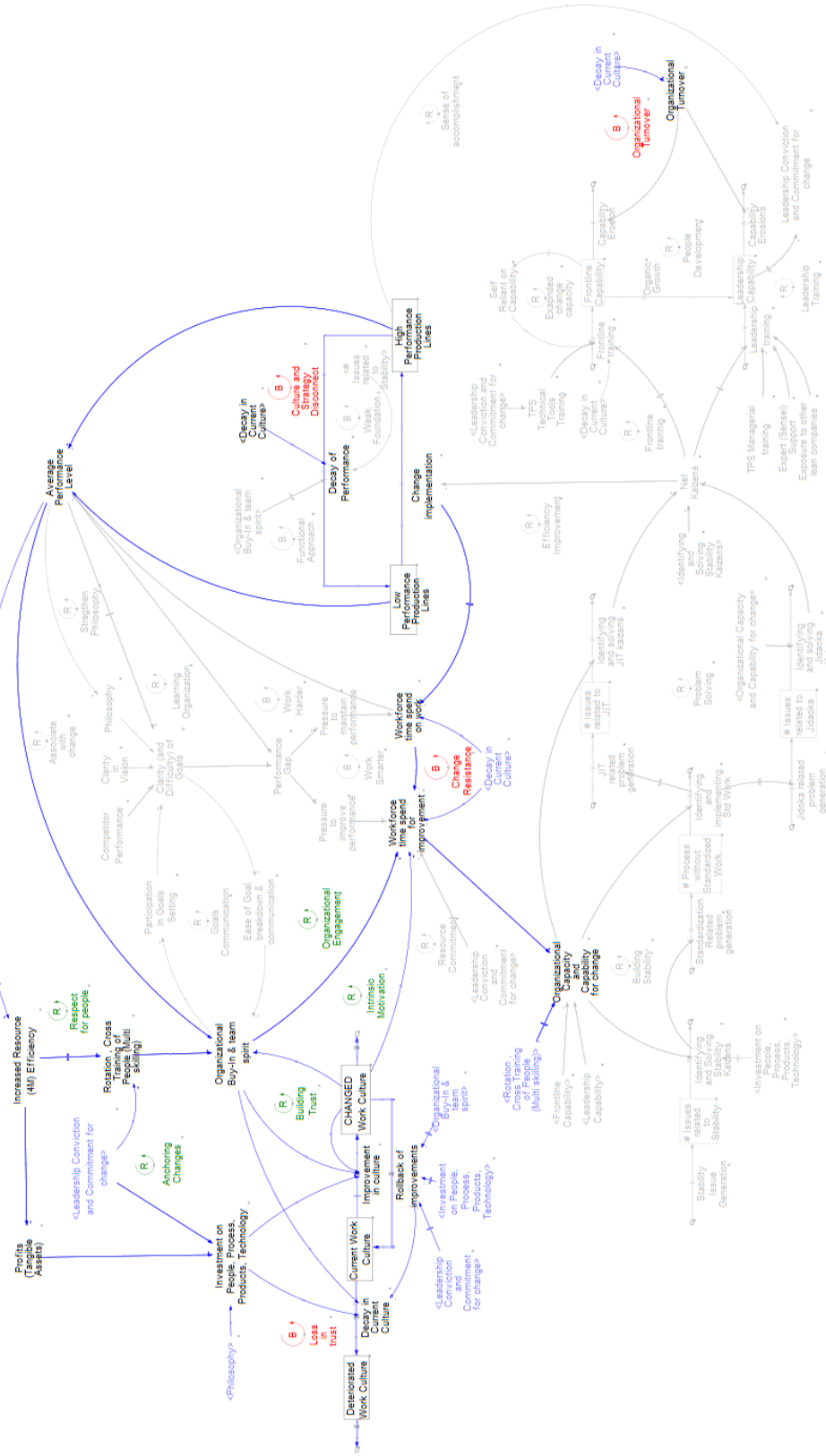

Figure 15 : Module 5: Culture Change

A portion of the savings must be allocated toward product development and technological advancement that aligns to the desired culture. By introducing new products, technologies or expanding existing portfolios through other plants, organizations can generate a broader range of opportunities for employee growth. Leveraging the extra resources allows for expansion and gives employees a sense of security. This increased sense of security fosters a more stable and confident workforce within the organization.

The benefits obtained from implementing change in the organization, supported by consistent leadership, significantly impact the organizational culture. This cultural transformation is called the "Changed work culture," where highly engaged individuals actively participate in problem-solving and innovation to drive performance.

When employees perceive that the organization reinvests the benefits into areas such as people, processes, products, and technology, there is a stronger sense of trust and buy-in (represented by the "Building trust" loop). There is no sequence to the investments, but a balance must be achieved based on the current priorities. Over time, as these patterns repeat, the desired behaviours become embedded in the organization, resulting in a cultural shift from the "Current work culture" to the "Changed work culture." At the individual level, this creates a stronger intrinsic motivation to adapt and embrace the expected changes in behaviour (represented by the "Intrinsic motivation" loop).

On the other hand, if leadership fails to reinvest the benefits into the organization, the culture deteriorates from the "Current work culture" to a "Deteriorated work culture." This decay erodes trust (represented by the "Loss of trust" loop). It leads to resistance to change, where employees may be less inclined to invest time and effort in improvement or even regular work (represented by the "Change resistance" loop).

There is another aspect to cultural decay. Suppose the leadership initially invests heavily in organizational culture but later withdraws support without valid reasons. In that case, it can result in a gradual regression from the "Changed work culture" back to the "Current work culture" through the rollback of improvements. However, this deterioration also pushes the culture to a new low of "Deteriorated work culture." This phenomenon is often referred to as "declaring victory too soon." (Kotter, John P 1995) pulling out before the change inertia sets in.

If employees do not observe improvements in the organizational culture, it will also impact current performance, and the performance may deteriorate back to lower performance levels. The

"Strategy vs. culture disconnect" loop captures this disconnection between strategy (the result) and culture (the process).

The benefits obtained from implementing change in the organization, supported by consistent leadership, significantly impact the organizational culture. This cultural transformation is called the "Changed work culture," where highly engaged individuals actively participate in problem-solving and innovation to drive performance.

When employees perceive that the organization reinvests the benefits into people, processes, products, and technology, there is a stronger sense of trust and buy-in (represented by the "Building trust" loop). At the individual level, this creates a stronger intrinsic motivation for both change participants and non-participants to adapt and embrace the expected changes in behaviour (represented by the "Intrinsic motivation" loop). Over time, as these patterns repeat, the desired behaviours become embedded in the organization, resulting in a cultural shift from the "Current work culture" to the "Changed work culture."

On the other hand, if leadership fails to reinvest the benefits into the organization, the culture deteriorates from the "Current work culture" to a "Deteriorated work culture." This decay erodes trust (represented by the "Loss of trust" loop). It leads to resistance to change, where employees may be less inclined to invest time and effort in improvement or even regular work (represented by the "Change resistance" loop).

The integration of all five modules provides a comprehensive understanding of the challenging and interconnected nature of the change journey. A holistic view of the change process emerges by examining each module's components. This model combined with the hybrid model description gives a deep idea of the change implementation at any organization.

Chapter 7 of the report delves deeper into these insights and initiates discussions highlighting the connections between the system dynamics model and existing literature. A more nuanced understanding of the change journey is obtained by comparing the model to the experiences of other organizations and drawing on relevant research. These discussions provide valuable insights for practitioners and researchers seeking to navigate and explore the complexities of change management.

5.4 Validation of Model

The model was developed using the hybrid methods developed earlier and the literature on failure modes. The model is then re-validated to ensure that the key elements of hybrid methodology focus points is covered in the system dynamics model. Further as a validation step, the model was checked against the interview hypothesis mentioned in section 4.2.1 and 4.2.2.

5.4.1 Model comparison with Hybrid method

In Figure 16, the system dynamics model is mapped and overlapped with the focus points of the hybrid methodology. This visualization allows for direct comparison and assessment of how well the system dynamics model captures the hybrid methods' key elements and focus points.

By examining the overlapping areas in the figure 16, it can be concluded that all the focus points of the hybrid methodology are covered in the system dynamics model. This indicates that the system dynamics model effectively incorporates and represents the essential aspects and dynamics of the change journey as outlined in the hybrid method.

The alignment between the system dynamics model and the focus points of the hybrid model provides confidence in the model's ability to capture the complexity and interconnectedness of the change process. It ensures that the system dynamics model encompasses the critical factors and relationships necessary to understand and analyse organizational change comprehensively. This validation gives additional insights that is discussed in Chapter 7.

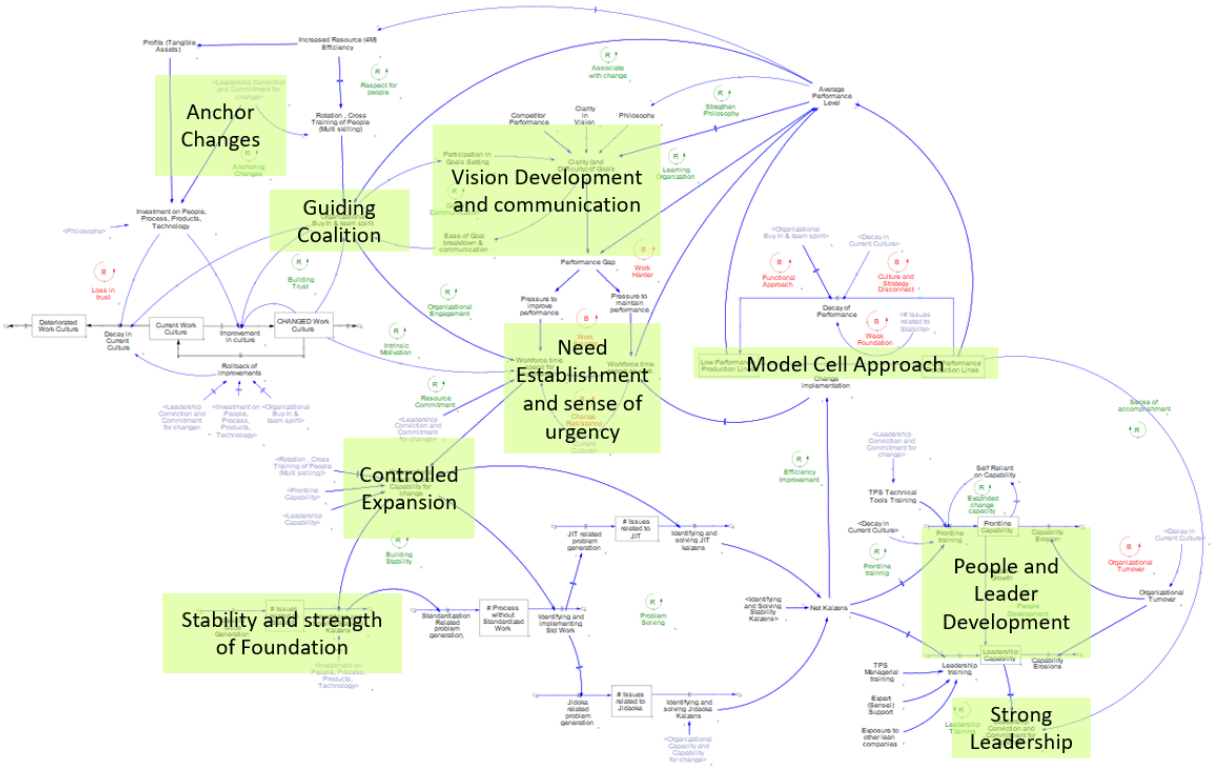

Figure 16 : Hybrid method vs systems dynamics model comparison

5.4.2 Model validation with interview hypothesis

In the next validation step, the failure modes mentioned in Section 2.4 and the interview hypotheses from Section 4.2.1 and 4.2.2 are mapped (Figure 17) onto the system dynamics model. Each hypothesis (HA/B-X) is carefully examined and mapped onto the system dynamics model's relevant components and feedback loops.

By mapping the failure modes and interview hypotheses onto the system dynamics model, we can assess the model's ability to capture the issues and challenges the organization faces during the change process. Each item from the list in section 4.2.1 and 4.2.2 is mapped directly

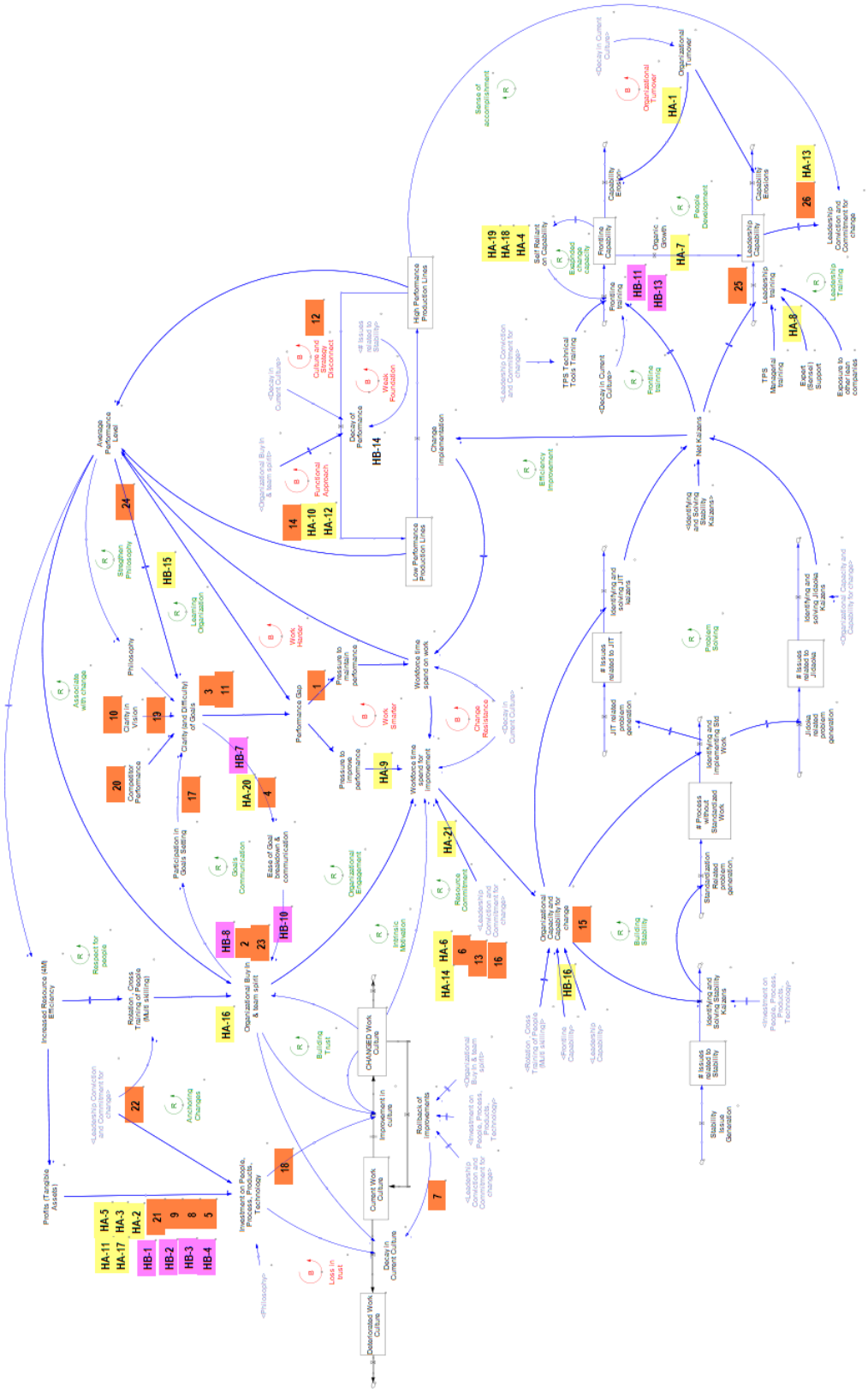

Figure 17 : Mapping of failure modes on system dynamics model

over the link or the variable in the model. The mapping process allows for a direct comparison between the hypothesized scenarios and the dynamics represented in the model.

It is important to note that while mapping hypotheses onto the model provides a form of validation, it does not guarantee the accuracy or completeness of the model. The interviews conducted and the formulated hypotheses may have limitations, such as being based on a limited sample size or not encompassing all details and scenarios. However, the validation process through mapping helps to establish a link between the model and the specific hypotheses, providing an opportunity to evaluate the model's ability to replicate and simulate the hypothesized dynamics.

A significant observation arising from the figure is the presence of numerous links that lack any mapped failure modes or hypotheses. This indicates potential weak points that require protection to ensure the successful implementation of change.

5.4.3 Model validation with interview hypothesis

From earlier section, while it is very evident that the model captures most of the change steps and failure modes, the key aspect that the model emphasises, or highlights is that the loops that connect between different variables/steps and how success and failure of one step affects the other or multiple other steps. This was evident in how each loop explained earlier,

i) Goal setting and avoiding capability trap
ii) Change implementation
iii) People participation in problem solving
iv) People development in problem solving, and
v) Culture change

shared many of the variables of the model together, thus showing inter-relationships between variables and different loops of the model.

Chapter 6: Generalized SD Model for TPS implementation

An industry practitioner who wants to bring TPS change in the organization would find the model in chapter 5 too detailed and challenging to comprehend and use. We aimed to make the model more practical and helpful for the research and the organization we work with. We created a simplified model that had the same spirit as the previous model but lacked the depth (that is covered in a video that explained this model to different audience).

This generalized model for change management is developed from the specific model of TPS, and this model was built upon the capability trap model (Sterman, John D 2015) . Figure 18 displays the generalized model, which is explained in section 6.1.

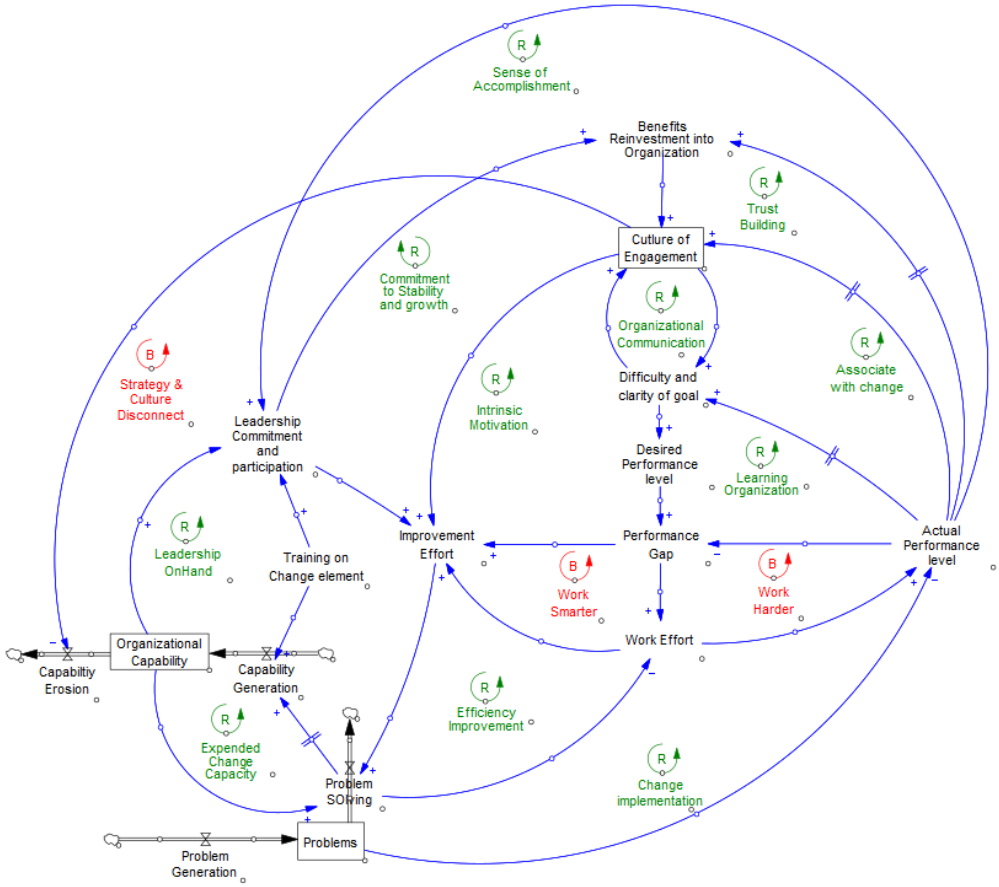

Figure 18 : Generalized Change implementation system dynamics model

6.1 Model Explanation

The explanation of the generalized model follows a similar approach to the development of the specific model, focusing on key exceptions rather than providing a detailed analysis. This ensures that the explanations remain concise while still capturing the essential elements of the model.

6.1.1 Module 1: Goal setting and avoiding capability trap

The critical aspect of the model, as explained in the specific model, is that leadership must commit resources to prevent the capability trap. This involves allowing the workforce to allocate more time for improvement efforts while meeting common work goals. By striking this balance, organizations can avoid getting trapped in a stagnant state and promote continuous improvement. Figure 19 provides the module one of the models.

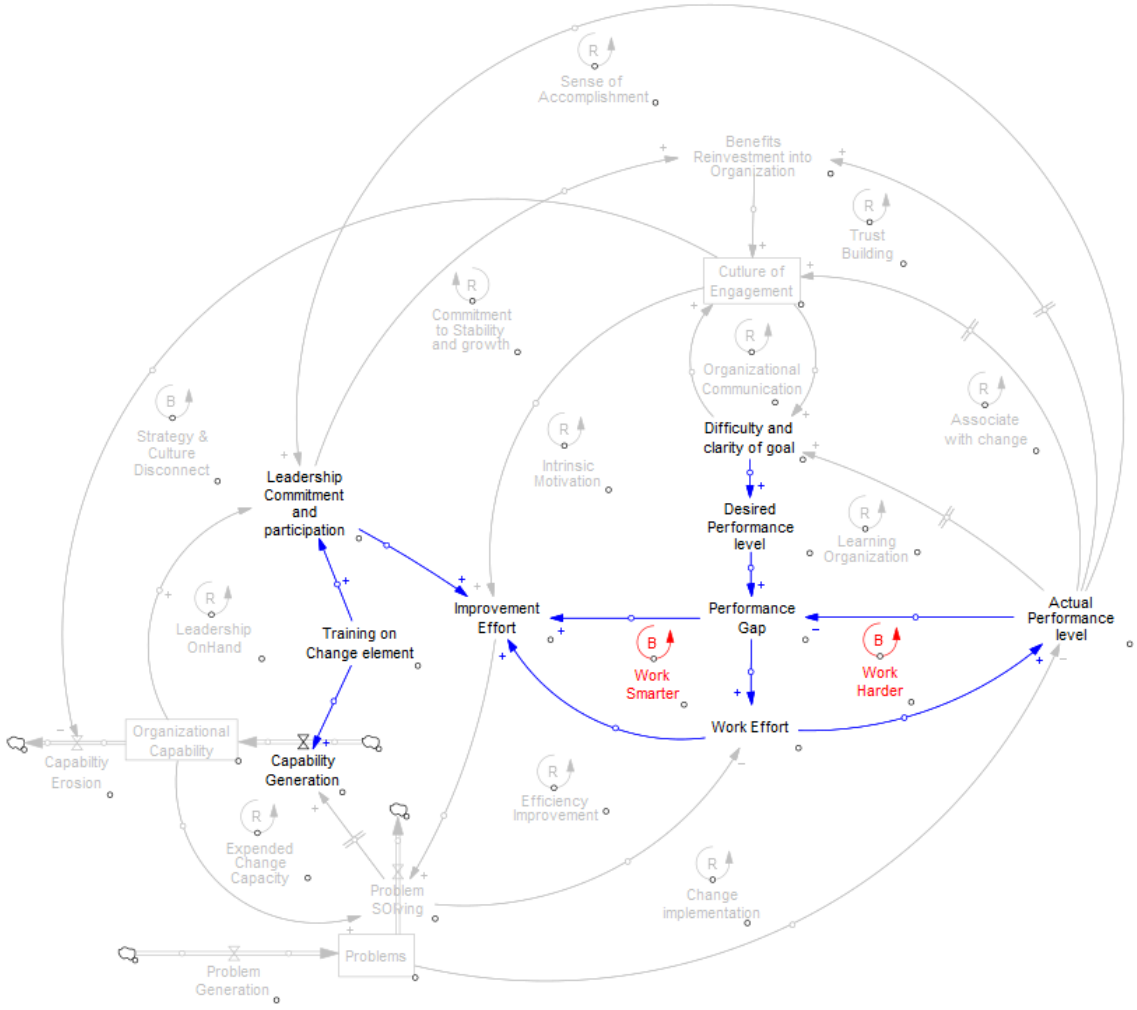

Figure 19 : Module 1: Goal Setting and avoiding capability trap

6.1.2 Module 2: Change implementation

The model (Figure 20) condenses all the problem types outlined in the TPS model into a single problem-solving variable. In a broader context, this variable represents the challenges associated with the organizational changes the company aims to implement. For instance, if the organization focuses on becoming more customer-centric, the problems would be framed from that perspective. By addressing these problems, we should observe tangible improvements in “actual performance level,” such as increased customer ratings or satisfaction levels.

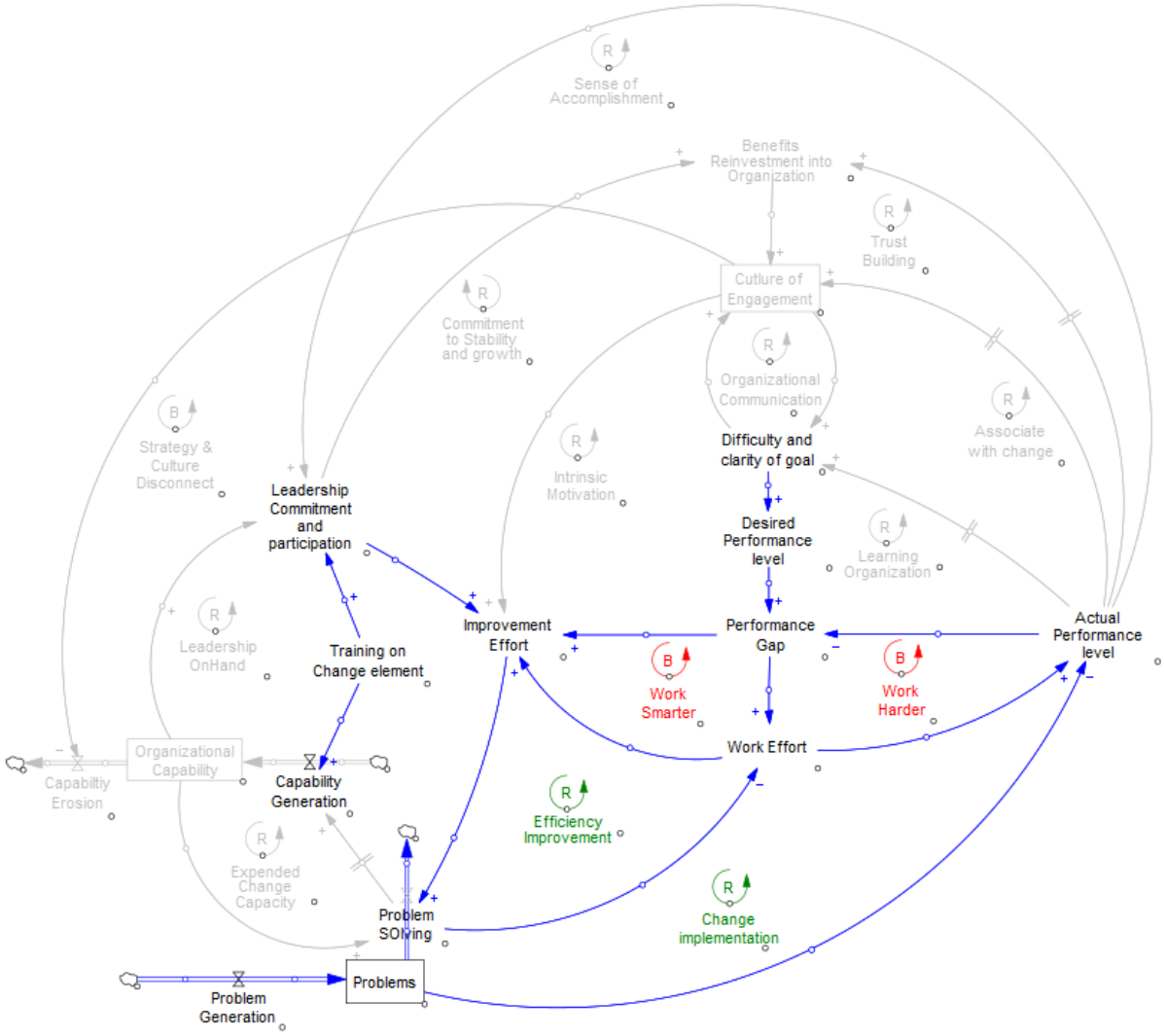

Figure 20 : Module 2: Change Implementation

6.1.3 Module 3: People Development

This module (Figure 21) encompasses the organizational capability development that emerges from ongoing problem-solving activities facilitated by the learning organization's goal-setting aspect. Additionally, leadership capability is cultivated through a hands-on approach to problem-solving in collaboration with other organization members and the “Sense of achievement” that comes from realization of the benefits of the change efforts, which further pushes the improvement effort.

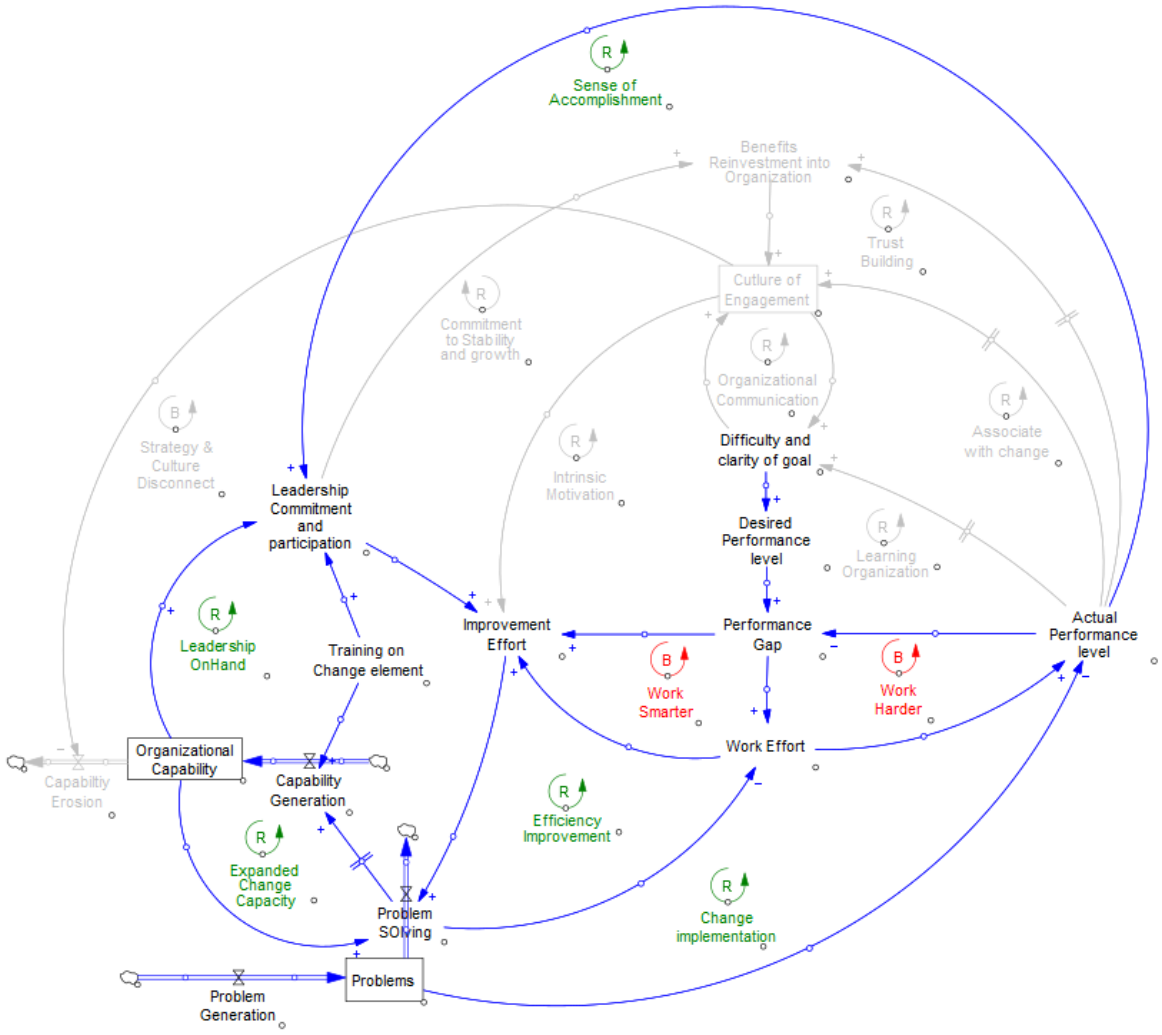

Figure 21 : Module 3: People Development

6.1.4 Module 4: People Participation

Similarly, to the explanation provided in the TPS model, this module (Figure 22) centres around enhancing people's involvement by fostering open communication and cultivating a total organizational culture of engagement and buy-in. In addition, the culture of engagement is enhanced through the “associate with change” loop as people is motivated by positive change happening in the organization. The module examines how this positive culture reinforces the intrinsic motivation required for individuals to participate in the change process actively.

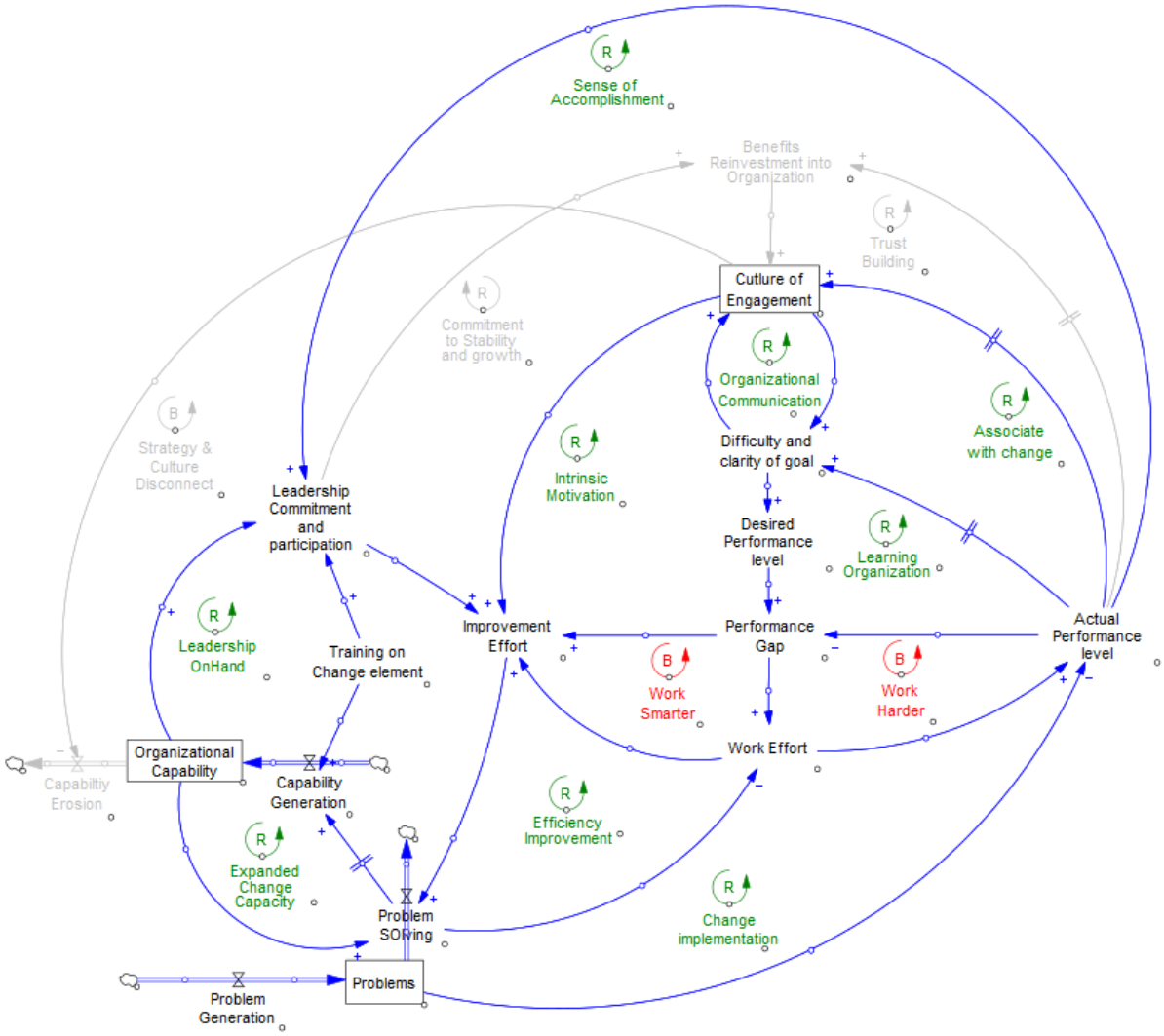

Figure 22 : Module 4 People Participation

6.1.5 Module 5: Culture Change

In the final module (figure 23), we delve into the significance of reinvesting the benefits into the organization to cultivate a more robust culture of engagement. This step holds immense importance as it positively reinforces individuals' efforts and provides incentives for sustaining the desired behavioural changes over an extended period. By reinvesting the benefits, the organization can further nurture and reinforce the culture of engagement, thereby promoting long-term commitment to the desired changes.

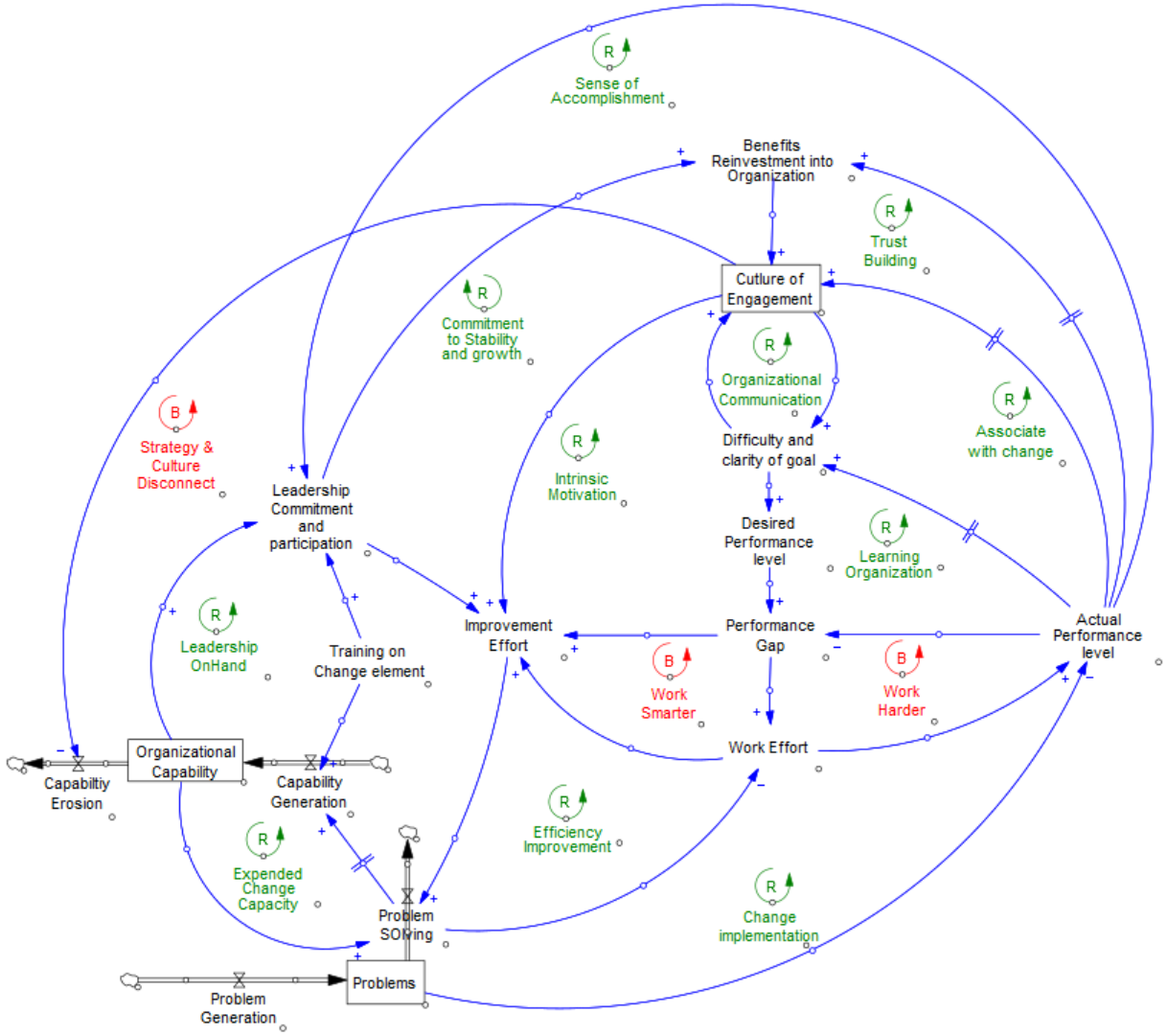

Figure 23 : Module 5 Culture Change

The five modules detailed in section 6.1 is explained in more detail as individual loops in appendix A3. The appendix was the explanation used to explain the model and the loops to the participants of the field experiment (Chapter 7) and our interview participants.

6.2 Model Interpretation

The simplified model depicted in Figure 23 is not limited to the Toyota Production System (TPS) and can be applied to implementing any change within organizations, such as improving collaboration, customer-centricity, agility, diversity, and inclusion, and more. Although many concepts and loops have been borrowed from the TPS model due to its nature and complexity, the underlying spirit of both models remains the same.

In this model, leadership plays a crucial role in driving change by instilling belief and conviction in the organization's ability to change. This belief is a foundation for training employees on the behaviours and capabilities required to address specific problems and improve performance. For instance, if the focus is on customer-centricity, problems are identified based on customer feedback or company-customer interactions. If the focus is on collaboration, problems are identified to bring people together to solve challenges collectively.

As the organization begins to see the positive outcomes resulting from their efforts, such as improved performance, a loop of behaviour sustenance is created. This reinforces the culture of engagement and encourages individuals to continue investing their efforts into the organization's progress. While it may not always be possible to plough back all the benefits into the organization, the open communication and trust established earlier allow leadership to balance different incoming forces to sustain the culture change.

Like the TPS model, this simplified model illustrates the complexity of interconnected variables and the temporal dynamics involved in implementing change. It highlights the importance of addressing various elements of the organization and understanding how they interact to create a lasting culture of change and improvement.

Chapter 7: Field experiment to validate the model (on-going)

The system dynamics model of TPS implementation offers a temporal and interconnected mental framework for change leaders to comprehend the change process. It represents a series of reinforcing and balancing loops, achieved through repeated iterations, facilitating the realization of cultural or behavioural changes within the organization. Although the model appears intuitive, validation from experimental and field data remains a crucial aspect, constituting a key area for future investigation in this study.

The subsequent focus lies in addressing the imminent challenge within the change leadership team of any given company, aiming to answer the question of how to ensure that the change process is on the right track. This area, less researched or focused, is significant due to the existence of numerous change models despite frequent instances of change failures. This underscores the necessity for processes that guarantee the directionality of the change effort, marking the second future area of exploration.

To tackle both these future research domains, we propose a straightforward approach: identifying specific vital signs in the change process. Analogous to warning signs in a car, these indicators would serve as early alerts before the need for major interventions. Moreover, we intend to elucidate methods for measuring these vital signs, empowering leaders and change managers with the ability to assess whether they are steering the change initiative in the right direction.

Step 1: Vital Signs

Rather than monitoring every variable in the model, we have identified five vital signs that change leaders can easily measure within the model (see Figure 24):

i) KPI result (What we want to change)

ii) Shopfloor problem-solving effectiveness

iii) TPS technical capability at the shopfloor by the frontline team

iv) Servant Leadership Effectiveness

v) Culture of Engagement

Step 2: Measure Vital Signs

The subsequent step involves defining what to measure, when to measure, and who will be responsible for the measurements. For each vital sign, we propose a periodic measurement (every four months) to maintain consistency and eliminate subjectivity. The same set of individuals should measure each vital sign in every cycle.

We introduce a novel method for measuring these vital signs. Instead of detailed metrics, we advocate for a classification approach:

Red: Indicates an immediate need for attention.

Yellow: Implies the need for some attention and monitoring until a green status is achieved.

Green: Signifies no concerns.

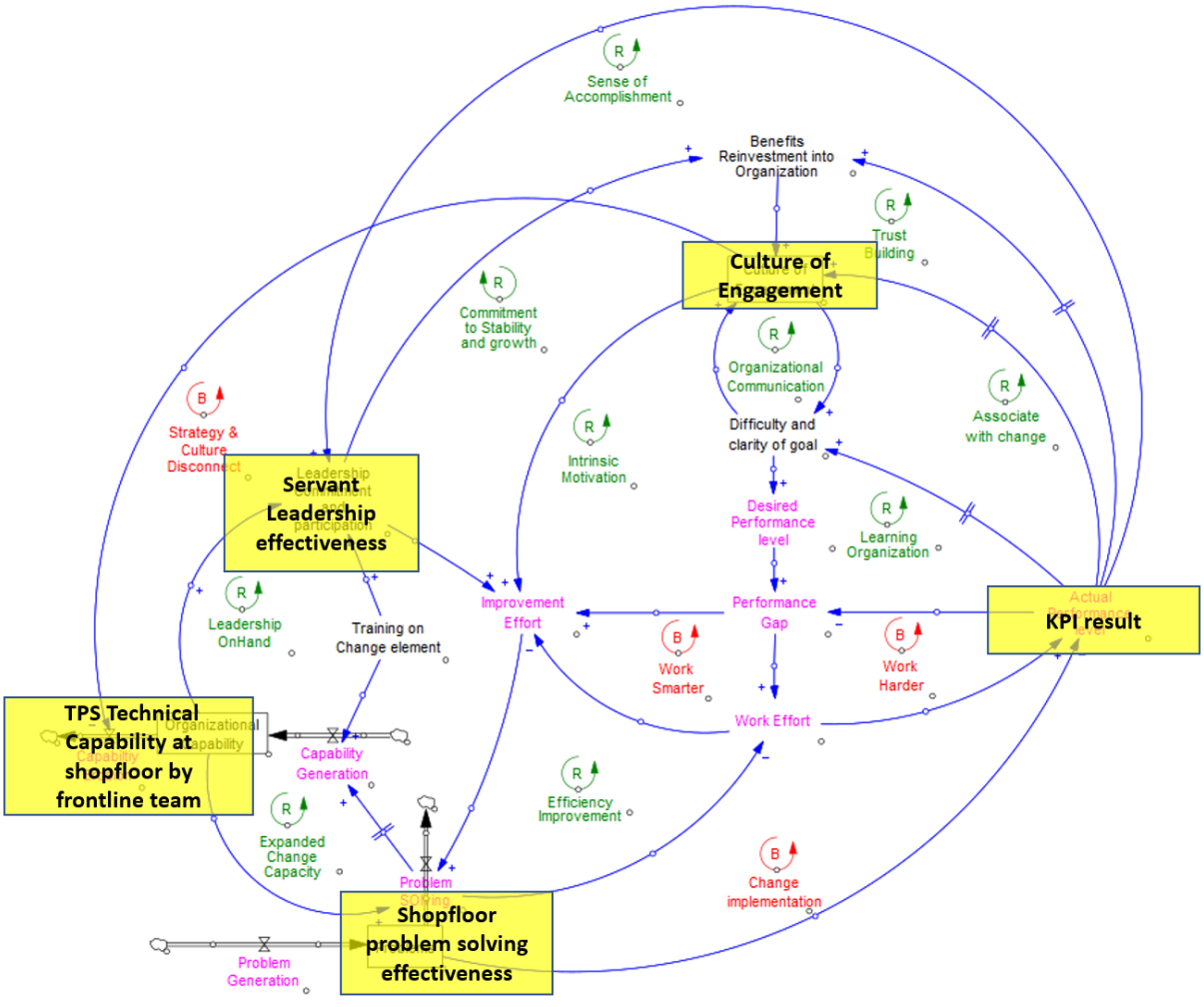

Figure 24 : Key variables identified in system dynamics model to monitor during experiment

Measurement Criteria:

i) KPI result (What we want to change):

This measures the improvement in output expected after implementing the change process. Red indicates not meeting the target, yellow implies not meeting the target but having an action plan, and green indicates reaching the target.

ii) Shopfloor problem-solving effectiveness:

This measures the effectiveness of problem-solving within the organization regarding the KPI result. It considers three aspects:

Quality of problem-solving (linked to depth of problem-solving, root cause analysis, etc.)

Quantity of problems solved

Breadth of the hierarchy involved in problem-solving at the frontline.

The Red/Yellow/Green classification is based on a combination of these three aspects.

iii) TPS technical capability at the shopfloor by the frontline team:

This measures the capability of the frontline team to solve problems using TPS technical tools or practices. Capability is classified into four levels:

Level 1: Learner

Level 2: Can do with support

Level 3: Can do without support

Level 4: Can train.

Progress against a capability development plan is measured for each person and each technical area, indicating the status as red/yellow/green.

iv) Servant Leadership Effectiveness:

Leadership effectiveness is assessed based on the leader's level in the hierarchy and their expected role in supporting TPS implementation. Leaders are measured against four roles: understanding, diagnosing, problem-solving at genba, and TPS self-development. The vital sign is classified as red, yellow, or green based on this assessment.

v) Culture of Engagement:

This vital sign, though challenging to measure due to its subjective nature, focuses on two key aspects:

People feeling happy to come to work

People feeling engaged to help in change

A survey is designed, incorporating questions related to basic and advanced needs or factors (considerations of pay and benefits, schedule, career path, security and safety, meaningfulness of the job, personal growth, recognition, achievement, and a sense of belonging) (Ton, Zeynep 2023), and to measure people's awareness and engagement toward change. These questions are focussed towards first point and the red, yellow, or green status of culture is determined based on these measurements.

Step 3: Visualize status of vital sign in the model

Once all the vital signs are measured, then we can visualize the system dynamics model (Figure 24) with the measured colours of Red/Yellow and Green.

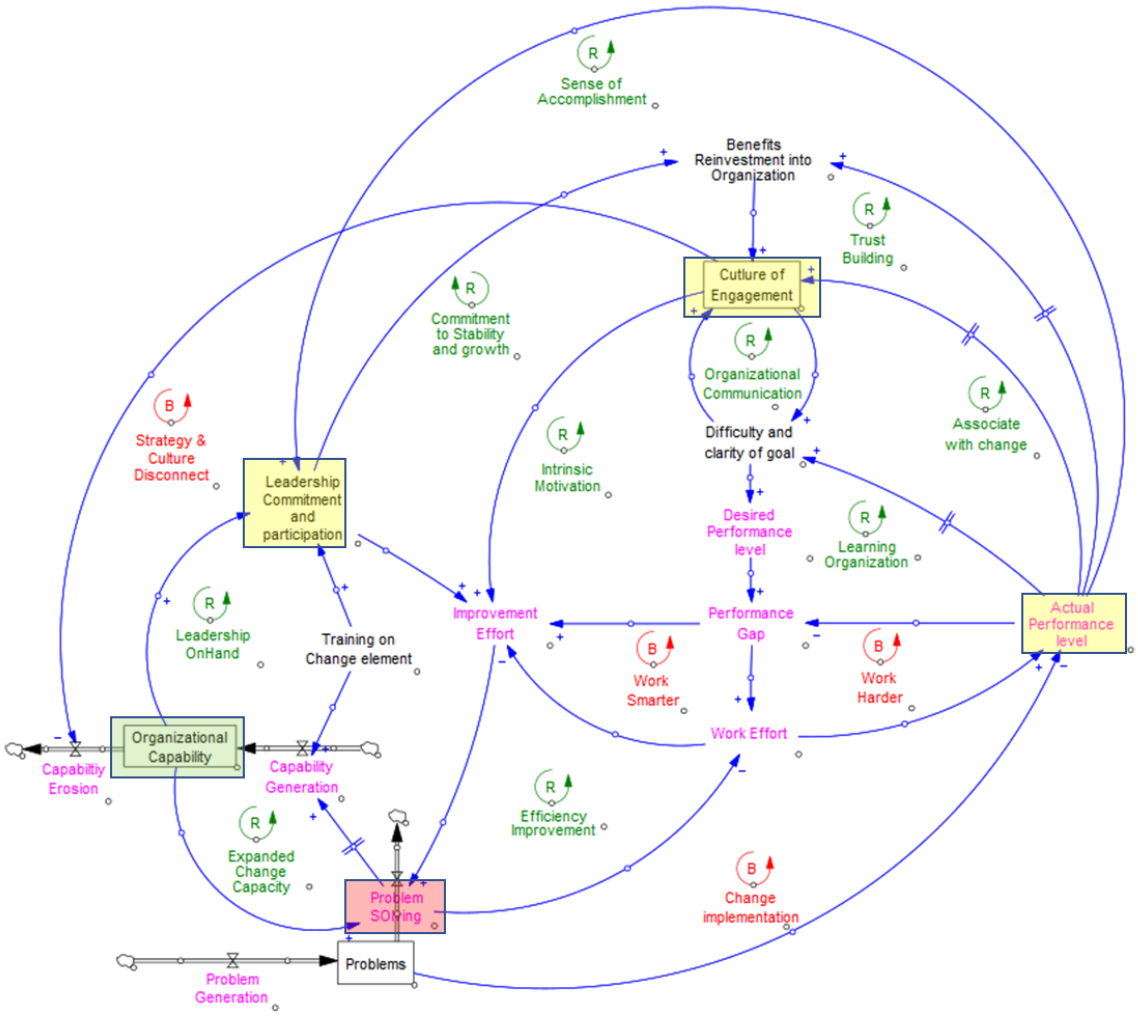

Figure 25 : Model with measured Vital Signs

Step 4: Develop Strategy

In this step, the visual representation of the change status is generated based on the five vital signs. If at least one vital sign is red, attention and efforts should be directed towards that specific area. Continuous improvement and monitoring should persist until all vital signs are green. The underlying system dynamics model, with its reinforcing and balancing loops, can be employed to identify factors influencing the red or yellow variables. Prioritization of focus areas can be determined, considering both the underlying model and the organizational capability to address deficiencies.

Step 5: Update Model (For research team)

Using the model, addressing leading factors should result in positive changes in weak variables (red coloured). This outcome validates the accuracy of the model. If not, it signals the need for potential model updates. The refinement process involves iteratively applying this approach across multiple cycles and different lines or companies, enhancing the model's representativeness and reliability over time. The measurement system can also be improved based on feedback from multiple cycles at different companies.

Current Status and Future Work

At the time of authoring this report, six companies (including two interviewed by us and four TSSC partners) have agreed to participate in testing our model, along with the new measurement method. TSSC and the research team will lead this trial, allowing TSSC to gain in-depth insights into the model's efficacy and enhance their strategies for training new companies in the future. The research team has created two videos providing an overview of the model and its measurement method, shared with all participating companies.

Video 1:
https://drive.google.com/file/d/1_8trfqH8sodydxlcrMyUGfcv14CP4b2v/view?usp=drive_link

Video 2:
https://drive.google.com/file/d/15qk8GJI6_TbUe9dawv7BVPVSqY_efxmZ/view?usp=drive_link

Further work entails mathematical modelling of identified relationships through detailed interviews, experiments, and data collection from multiple companies. This additional effort aims to refine the model's accuracy and applicability in understanding organizational change dynamics. With the growth of LLM, another area of future work involves training an LLM on this report, interview transcripts, and TPS content. This initiative aims to develop a chatbot that can assist change leaders in finding answers on how to improve vital signs, and thus leading change through our model more pragmatic, efficient, and dynamic.

Chapter 8: Insights

The research presented three primary outcomes. **Firstly**, a hybrid change method was developed by integrating insights from four different models. This hybrid methodology aimed to emphasize both breadth and depth key focus points. **Secondly**, the hybrid model was further transformed into a system dynamics-based causal loop diagram. This diagram facilitated examining the relationships between these focus points and the temporal dynamics of change efforts. A comprehensive understanding of organizational change complexity was achieved through the combination of both models. This understanding revealed that organizational change involves:

i) Multiple interconnected focal points,
ii) Temporal dynamics that impact the change effort,
iii) Multiple loops that affect (reinforce and balance) different focal points, and
iv) Key drivers that aid in initiating, implementing, and sustaining change.

Finally, a simple measurement system was developed that allowed to measure the key variables in the model at the model cell in the organization, and then leverage both model loops and specific organizational insights to help develop strategy and action plans to help improve the variables over time, making ensuring that the change is implemented and sustained.

The model was presented and explained to both TSSC and the partner companies, and their insights were gathered and summarized. These insights were combined with the research findings to provide a comprehensive analysis. The following comments highlight the insights derived from the companies and the model, with research insights incorporated into specific points. Unique insights not captured by TSSC, or the companies are listed separately.

8.1 Insights from the model

Insights for Companies

i) **Comprehending complexity and relationships** was a crucial revelation, as it enabled a more comprehensive understanding of change from a systems perspective. This shift in perspective allowed for a holistic examination of the interconnections and interdependencies among various elements. A key aspect to emphasize is the concept of feedback loops, wherein specific actions reinforce or balance the overall change efforts.
ii) **The recognition that reinforcement can operate in both positive and negative directions**. While positive reinforcement can strengthen and enhance change efforts,

excessive negative reinforcement or a lack of positive reinforcement can undermine and worsen the overall outcome. It highlights the significance of providing constructive feedback, recognition, and support to individuals and teams involved in the change process, as this can positively impact their motivation, engagement, and the success of the change initiative.

iii) **Change process has no definitive endpoint**. Instead, it was recognized that change is an ongoing and continuous endeavour. To prevent decay and regression, building and sustaining momentum and inertia throughout the organization is crucial. By actively nurturing and reinforcing the desired changes, organizations can avoid complacency and ensure that progress is maintained over time. This understanding emphasizes the importance of creating a culture that embraces ongoing improvement and adaptation, fostering a sense of continuous change and growth.

iv) **Conventional models tend to oversimplify the change process**, offering an intuitive and easily digestible approach. However, applying system dynamics (SD) models exposed the inherent complexity of organizational change. This realization provided valuable insight into the challenges that would be encountered. Leaders and managers with this understanding can acknowledge that significant effort and time are required to achieve successful change. As a result, they can make informed decisions and allocate the necessary resources and efforts to drive and sustain the desired transformation.

v) The study highlighted the **critical role of leadership** as a cohesive force in controlling and managing organizational change. Rather than solely pushing change onto others, effective leadership entails taking ownership and actively participating in the change process. Leaders are the glue that holds the various stakeholders together, fostering a sense of shared responsibility and collaboration.

Insights for TSSC

i) A significant observation from the study was the **existence of ripple effects** resulting from reinforcing and balancing loops. The concept of these loops became evident and highlighted the importance of considering the entire picture when analysing organizational change. This perspective enables leaders and decision-makers to anticipate and manage the ripple effects effectively, considering the interconnected nature of numerous factors and stakeholders involved in the change process.

ii) One notable implication is that this **understanding of organizational change and systems thinking can be utilized to educate leaders earlier in their roles**. By providing knowledge about what needs to be done and what may be challenging to accomplish, this knowledge becomes a valuable tool for decision-making. It can serve as a checklist or framework for leaders to assess the feasibility and potential success of implementing change initiatives. Equipped with this understanding, leaders can make informed choices about which opportunities to pursue and how to navigate organizational change's complexities and potential obstacles.

iii) A crucial recommendation from the study is the improvement of leadership training programs to incorporate the systems thinking model. By integrating this model into leadership education, leaders can better understand the complexities, interdependencies, and dynamic nature of organizational change. They can develop the skills and mindset necessary to navigate and effectively manage change initiatives within their organizations.

iv) **Need for increased monitoring and collaboration in all areas of change**. This entails a shift towards a more inclusive and cooperative approach. Rather than focussing only on core of TPS, closer collaboration and communication among all steps can help in better resource utilizations. Additionally, a more hands-on approach can help overcome potential roadblocks and ensure the success of TSSC initiatives (This is already there for TPS core but not for change as whole).

Additional research insights

i) **Culture not Productivity:** The model serves as a tool to emphasize that the objective of change efforts should be centred around culture rather than solely focusing on products or process performance. Many companies overlook the cultural aspect of change, which requires more time and effort to implement successfully. This insight is crucial and highlights the significance of cultivating a strong culture as the foundation for sustained change.

The model demonstrates that an impressive performance can contribute to developing a solid culture through reinforcing loops, where positive outcomes and achievements reinforce the desired behaviours and values. However, a strong culture can, in turn, help improve performance by shaping employee behaviour, attitudes, and engagement toward achieving desired outcomes.

Understanding this relationship is critical. The objective is not only to achieve productive performance but also to sustain the cultural change that underlies it. A strong culture acts as a driving force to maintain and enhance performance or even to drive improvements in cases of mediocre performance. This highlights the importance of nurturing a culture that aligns with the desired change and leveraging it as a catalyst for sustained success.

By recognizing the critical role of culture and its impact on performance, organizations can prioritize culture change efforts and invest in building a solid foundation that will support long-term growth and improvement.

ii) **Role of People**: “Toyota Production System as a culture of highly engaged people, solving the problem or innovating to drive performance that is created and sustained by a three-part system of (1) philosophy (2) technical and (3) managerial role” (TSSC 2022). From our research, the system dynamics model visualized the different loops that enabled success of a culture change implementation. It is important to realize that this change is only possible when the people – from frontline to leadership – are actively involved in the process. Thus, role of people in the change in implementing the change and enable the change has to be recognized and prioritized before going deep into change implementation.

iii) **Endless Inter-connectedness:** The model demonstrates its capability to capture the relationships between the various focus points outlined in the hybrid model. Figure 16 illustrates that each focus point is interconnected with every other focus point directly or indirectly through other focal points. These connections create positive reinforcement among the different focus points, whereby the success or progress in one area reinforces and enhances progress in other areas. This complex interdependence can be challenging to comprehend through traditional model representations. The model provides a more comprehensive understanding of the interdependencies and feedback loops that exist between various aspects of the organization. This enables decision-makers to consider the broader implications and potential ripple effects of their actions, facilitating a more effective approach to managing and driving change initiatives.

iv) **Complete yet Incomplete:** The model presented can effectively capture the relationships between various elements of the organization and the efforts identified in the hybrid method. However, it is essential to acknowledge that the model may only partially capture some of the details. Including more intricate details in the model would

increase its complexity. For instance, the variable of leadership commitment, which encompasses the entire spectrum of leadership behaviour discussed in the hybrid method, is a dynamic system influenced by different reinforcing and balancing forces. Each variable in the model could be further expanded into a system dynamics model, capturing all the intricate relationships and dynamics. However, incorporating such detailed interactions would complicate the model. When the system dynamics model is combined with the comprehensive description provided by the hybrid method, it can offer a near-complete explanation of what needs to be done in a change initiative.

v) **Role of stable foundation:** The importance of a solid foundation, as discussed in the lean model, is a critical aspect that impacts the success of organizational change. The model demonstrates that foundation-related problems are not to be overlooked, as they represent one of the most severe failure modes identified in the literature and are supported by the insights obtained from company interviews (as indicated in Figure 17). The model effectively captures the relationship between an organization's foundation (or stability), its culture, and its strategy. These three elements are interconnected, and their relationship can lead to a robust reinforcing effect. A solid foundation, encompassing infrastructure, processes, and organizational structure, provides stability for successful change initiatives. The organizational culture influences how change is embraced and implemented, including values, beliefs, and behaviours. Additionally, the strategy guides the direction and goals of change efforts. By recognizing the interdependence and reinforcing nature of these elements, the model emphasizes the need for a comprehensive approach to change management. Neglecting any of these components can undermine the overall success of change initiatives. Organizations must address foundational issues, align culture with the desired change, and ensure the strategy supports and reinforces the objectives.

vi) **Failure modes are many:** Figure 17 highlights the model's ability to capture various failure modes by mapping them onto the different links within the model. However, it is crucial to recognize that every link in the model holds importance and contributes to the overall effectiveness of the change effort. Even if a particular link has no explicitly mentioned failure modes, it does not diminish its significance.

For instance, let us consider the link between high performance and leadership commitment, which may not have failure modes explicitly associated with it in the model. Nevertheless, it remains a critical link. If leaders or the organization do not perceive the benefits of the change effort, their commitment and motivation can

diminish over time. To ensure sustained commitment, it becomes essential to define key performance indicators (KPIs) or tangible and visible goals. Setting smaller, achievable goals throughout the journey can help maintain momentum and reinforce the value of the change effort.

Another example within the context of lean is the link between change and reducing non-value-added activities. Leaders may allocate additional resources to improvement efforts if this link fails without reaping the desired benefits. The underutilization of resources can hinder the realization of change benefits and lead to inefficiencies. It is, therefore, essential to carefully analyse and optimize this link to ensure that change efforts effectively eliminate non-value-added activities and maximize resource utilization.

By examining the model in detail, it is possible to identify the strength and significance of each link, even if the failure modes are not explicitly specified.

Limitations to the model:

The model is fully focussed on the change aspect and makes assumption that everything else about the organization is perfect or stable. However, this is not a valid assumption as in most cases there are other problems can exist. These can be considered as shocks to the model. Some shocks are:

Financial shocks: If a company is facing financial challenges before embarking on the change journey, it is crucial for leadership to respond appropriately to secure necessary funds to sustain the business while implementing cultural changes. Changing behaviours within an organization is not an easy task, as explained in the model, and it requires a significant investment of time, which is often tied to financial resources.

During the change journey, financial situations may arise due to business conditions or unforeseen expenses, which could potentially impact the pace of investments in the change process. However, it is essential for leadership to ensure that both the change initiatives and the financial conditions are addressed simultaneously. Halting the change process midway can lead to decay or regression, while neglecting investments in culture can cause delays in the overall transformation. It is important to maintain a balanced approach.

Although financial constraints may pose challenges, the model emphasizes that it is not the end of the journey. Keeping employees informed and engaged is vital to sustaining the model. Additionally, the model demonstrates that there are multiple forces at play that can help maintain

its integrity. When one aspect falters, leveraging other forces and relationships can help rebalance and reprioritize the efforts for a certain period.

To effectively navigate financial and change-related challenges, leadership must recognize the interrelationships within the model and utilize those relationships to rebalance and reprioritize as needed.

Business shocks: Shocks within a business environment can be attributed to internal and external factors. External factors include shifts in products or technologies, changes in competition performance, fluctuations in consumer demand, and various political, geographical, or health-related risks. Internal factors encompass changes in leadership or management, alterations in ownership structure, modifications in products and technologies, and other relevant internal dynamics. These shocks are external to the model itself.

However, these shocks can affect the model's functioning when they impact the organization. As mentioned earlier, the model demonstrates the presence of multiple forces and interrelationships that contribute to its overall resilience. In the face of external shocks, leadership can tap into these forces and leverage the model's dynamics to adapt, recalibrate, and reorient the change efforts accordingly.

8.2 Recommendations for TSSC

The insights mentioned earlier provide some aspects of the recommendations, and the below two points conveys the most important recommendations for TSSC to fulfil their mission.

i) **Hand Hold Partners:** Based on Figure 9, the TSSC is not effectively supporting the companies through the change model outlined in the system dynamics or hybrid model. TSSC's primary objective is to ensure that the companies they partner with remain fully engaged until the completion of implementing and sustaining TPS within their organizations. Instead of focusing solely on specific aspects of the change or exclusively on the core elements related to TPS, TSSC should recognize the inherent difficulty and complexity of implementing change as conveyed in the model. To ensure optimal and efficient utilization of resources, TSSC should engage more closely with every aspect of the change process while delving deeper into specific aspects of TPS's technical tools. This comprehensive approach, encompassing both breadth and depth, would provide TSSC with a more unambiguous indication of progress and facilitate more direct reflection.

ii) **Leadership Training:** TSSC can utilize the model to train leadership on the complexity of the change process and gain buy-in from key stakeholders such as the CEO and middle management at an early stage. This would ensure they are well informed about the effort required to undergo the change and understand the necessary resource, time, and financial commitments. By obtaining buy-in early on, TSSC can establish a stronger foundation for successful implementation.

Moreover, the model can serve as a screening tool for organizations considering TPS transformation. Many companies desire the results of TPS but may need to pay more attention to the challenges associated with the process. TPS is not an easy undertaking. By assessing the commitment levels of an organization prior to initiating the change, TSSC can determine the feasibility and suitability of implementing TPS within that specific context. This enables TSSC and the organization to define the best course of action based on their readiness and willingness to commit to the required efforts.

8.3 Recommendations for Organizations

Like TSSC, the insights provided by the model serve as a valuable source of recommendations for driving change within the organization. Here are a few key recommendations:

i) **Frontload Model Training for Leadership and Change Management Team**: With the availability of a comprehensive model that explains the interdependencies of the change process, the organization can leverage this model to provide thorough training to its leadership and change management teams. By familiarizing them with the model, the organization can equip these key stakeholders with a deeper understanding of the journey they are about to embark on. The model highlights the numerous moving parts involved in the change process, and by introducing them upfront through the model, the organization can facilitate early detection and resolution of potential challenges. This also enables the team to anticipate and prepare for unforeseen obstacles that may arise during the change process, leading to better problem-solving and decision-making capabilities.

ii) **Think Circular, Not Sequentially**: The model allows the organization to shift its thinking from a linear, sequential approach to a more holistic, systems-based perspective. Rather than viewing the change process as a series of isolated events or snapshots, the organization can recognize the interconnectedness and interdependencies among various elements over time. Understanding the potential

ripple effects and implications of changes in one area allows the organization to focus on the next steps to ensure a smooth and successful transformation.

Additionally, the model provides insights into alternative forces or aspects the organization can work on when facing multiple constraints. Considering these alternate pathways or approaches, the organization can navigate complex challenges and identify new possibilities for driving change. Embracing a systemic mindset enables the organization better to analyse the dynamic interactions and relationships within the system, leading to more effective decision-making and problem-solving throughout the change process.

iii) **Build a Solid Foundation**: Figure 17 highlights a critical insight that both organizations were missing in their change efforts – the importance of reinvesting in foundational aspects, particularly people and processes. This imbalance resulted in a lack of progress or delays in implementation speed.

To address this issue, the organization should strive for a balanced approach and prioritize developing and enhancing its people and processes alongside product and technology advancements. The model emphasizes the significance of a solid foundation, as explained in both the hybrid and system dynamics models. By communicating the importance of foundation-building throughout the organization, stakeholders can recognize the need to invest in people's capabilities, fostering a culture of continuous learning and development. Simultaneously, optimizing and streamlining processes ensures efficiency, agility, and adaptability to support successful change implementation.

8.4 Insights from the measurement system – On going work

At the time of authoring this report, six companies (including two interviewed by us and four TSSC partners) have agreed to participate in our model validation including the measurement system. The insights and reflections of this method will be published later in a journal article.

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A: Appendix

A1: System Dynamics Model of TPS implementation

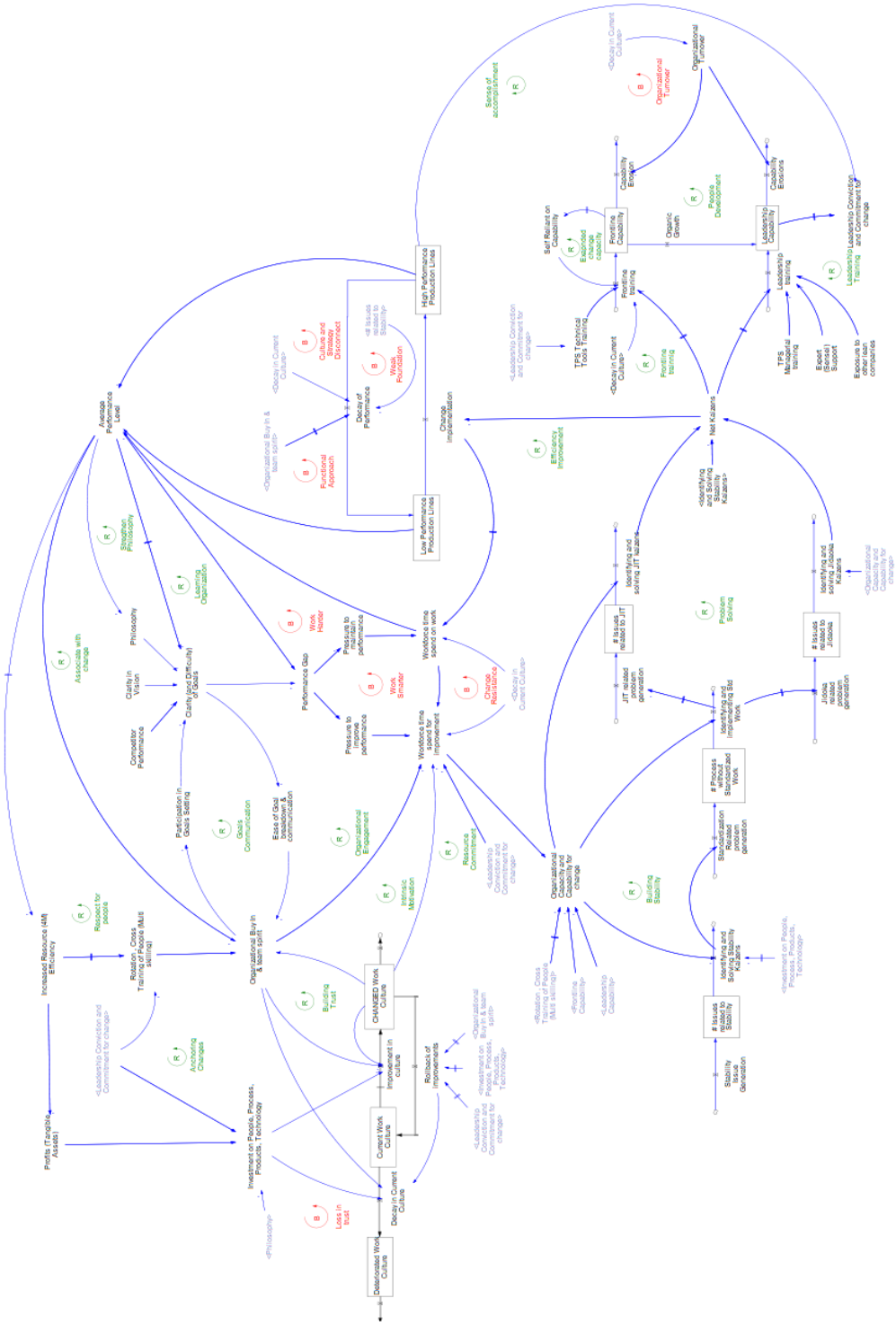

Figure 26 : Detailed SD Model for TPS implementation

A2: System Dynamics Model for General Change implementation

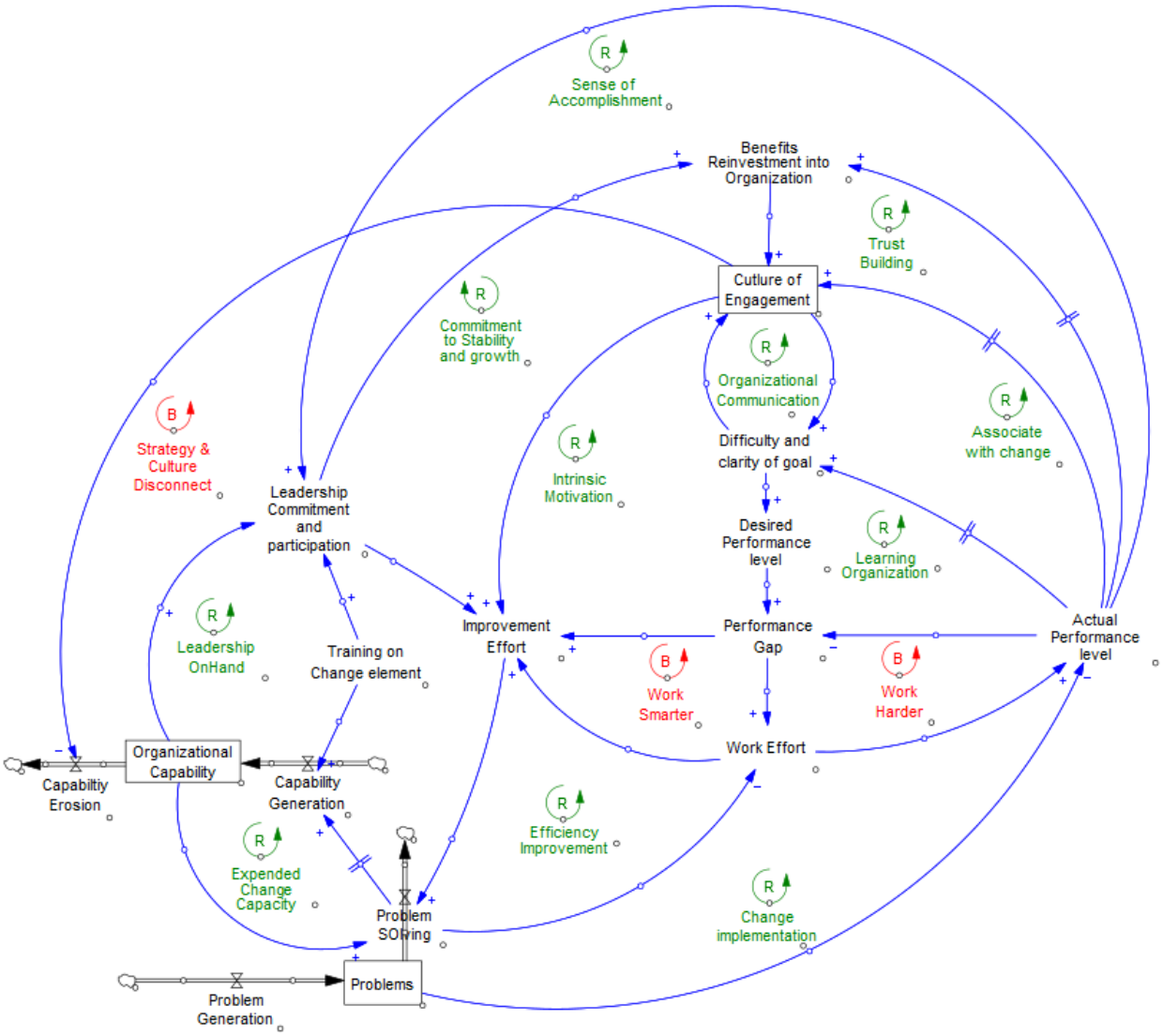

Figure 27 : General SD Model for Change

A3: Individual Loops explained to partnering companies in research

Our research identified ten loops that are a breakup of the modules explained in section 6.1. The loops are explained in detail below. Each loop starts from the variable marked with a star (*).

A3.1 Work Harder loop

As the “performance gap” increases (the gap between the current performance level and the target level), there is pressure on the employees to put in more “work effort,” which is equivalent to spending more time on doing the existing way of work. As more effort is put into work, there is an increase in the “actual performance level,” which leads to lowering the gap (indicated by the yellow arrow). This leads to a balancing loop called the “work harder” loop. This is not a sustainable way of work as the existing way of work may be sub-optimal, and without problem-solving, putting more work effort means working overtime, break times, and pressurizing employees to meet the targets somehow.

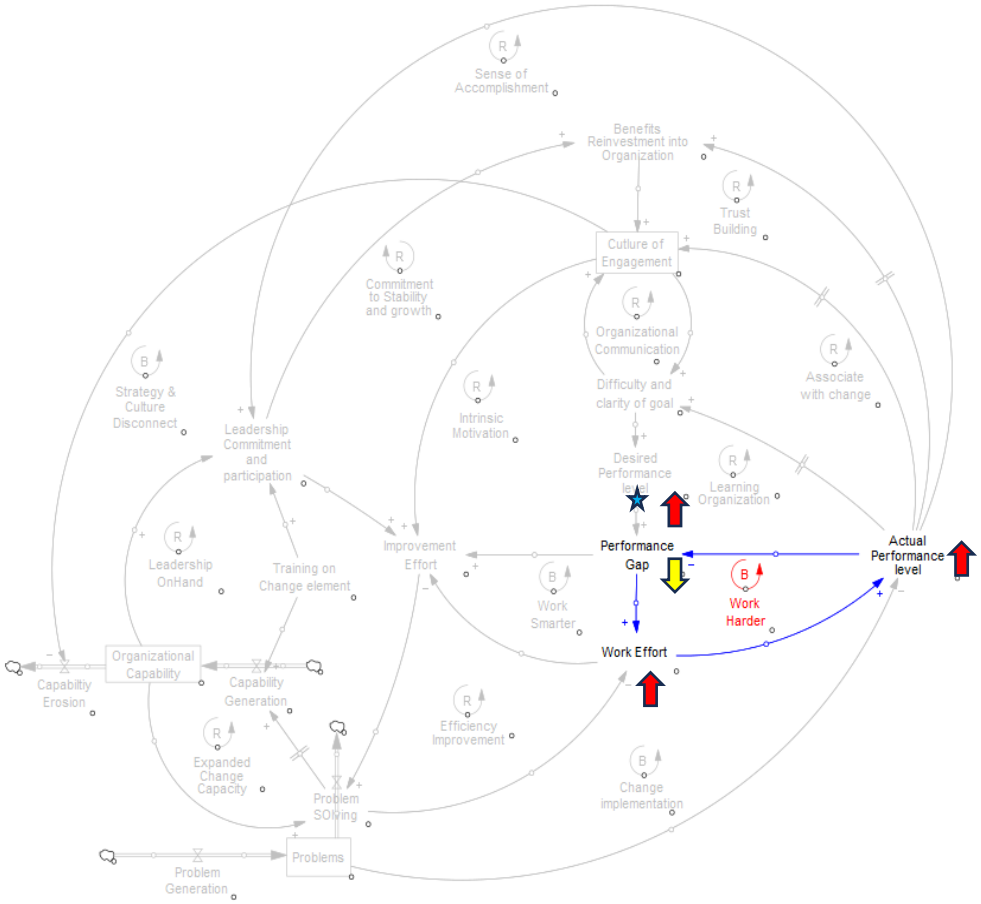

Figure 28 : Work Harder Loop

A3.2 Work Smarter loop

As the “performance gap” increases (the gap between the current performance level and the target level), employees spend time on “improvement effort,” which is time carved out of the working hours of employees to spend time on problem-solving. It is important to note that the company and leadership should allow employees to have this “improvement effort” time. As this effort increases, more “problem solving” happens, and the “number of problems” reduces in the organization. As this problem is reduced, the “actual performance level” increases, thus lowering the “performance gap” (yellow arrow). Repeated applications of this cycle lead to continuous improvement cycles aimed toward improving organizational performance.

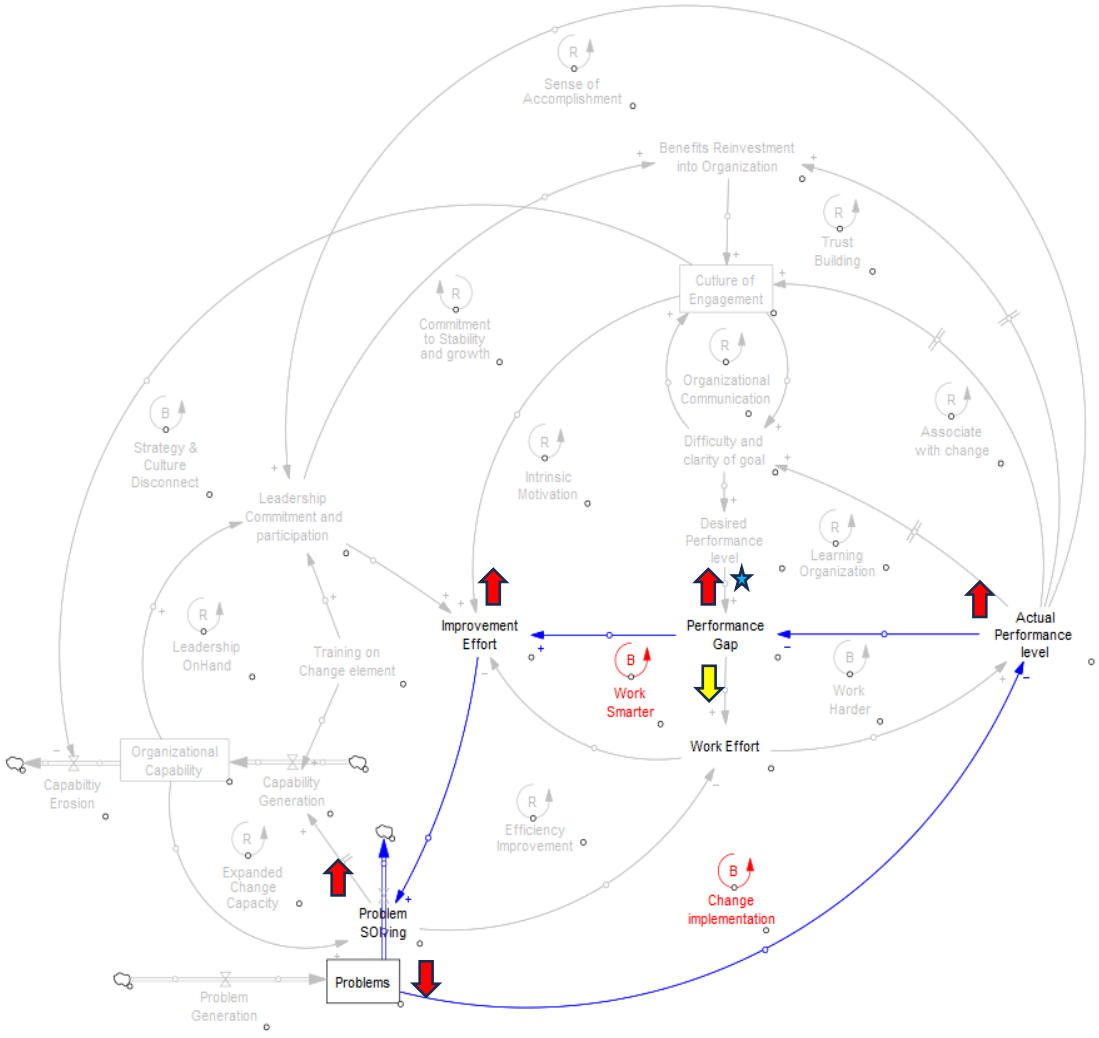

Figure 29 : Work Smarter Loop

A3.3 Non-Value Elimination

As the “improvement effort” increases, the “problem-solving” increases, which, according to the Toyota production system (TPS), reduces waste in the process. Thus, as the wastes in the value chain are reduced, the “work effort” reduces (to do the regular job). This reduction in “work effort” leads to more time available for “improvement efforts,” which can actually help in the A3.2 loop.

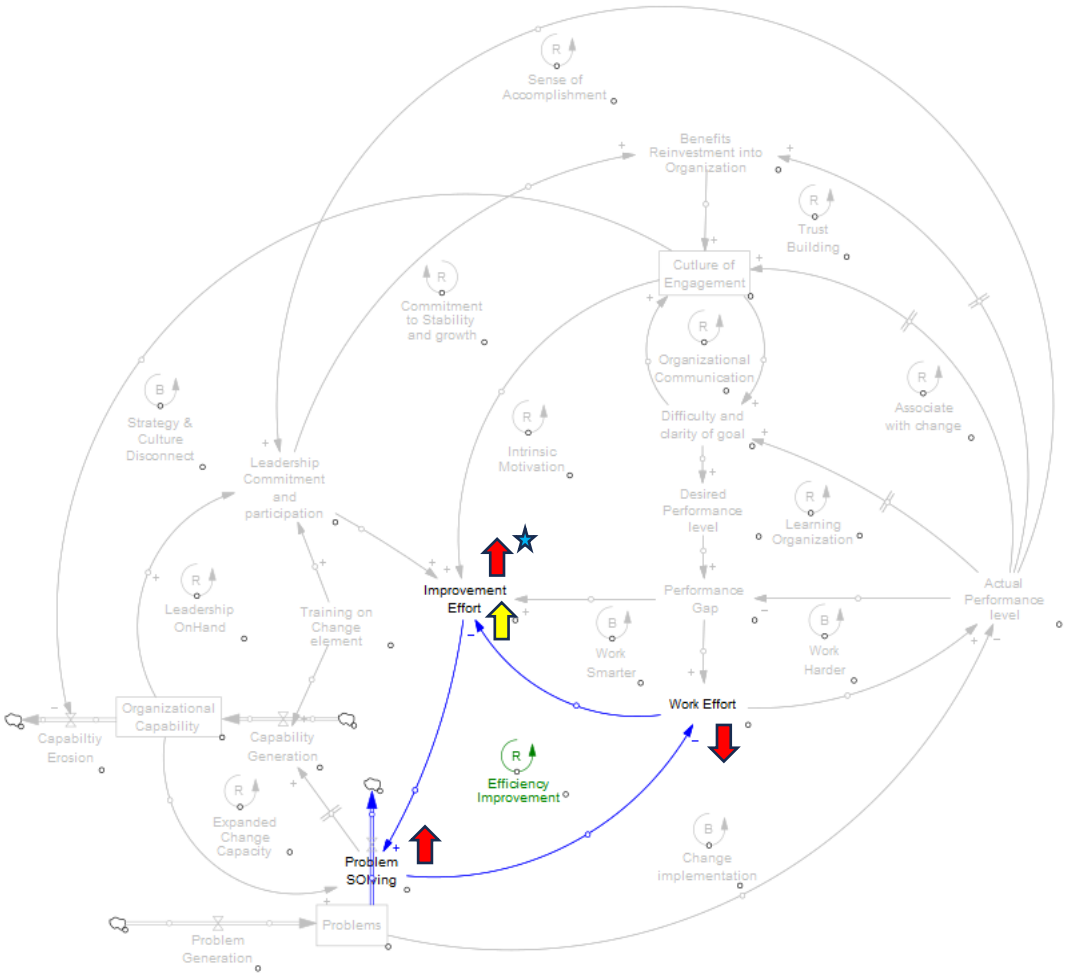

Figure 30 : Non-value elimination

A3.4 Building Frontline Motivation

As more effort is put into the “improvement effort,” the “problem-solving” increases, and the “number of problems” in the organization reduces. This improves the “actual performance level” and benefits for the organization. These benefits include cost reduction, efficiency improvements, reduced space and resources, etc. As people see these benefits, these employees see this as being associated with positive change, and this builds this intrinsic motivation within them to make more effort to improve. It is important to note that intrinsic motivation is more important than any extrinsic or financial motivation. However, loop A3.X adds more to building this strain's motivation.

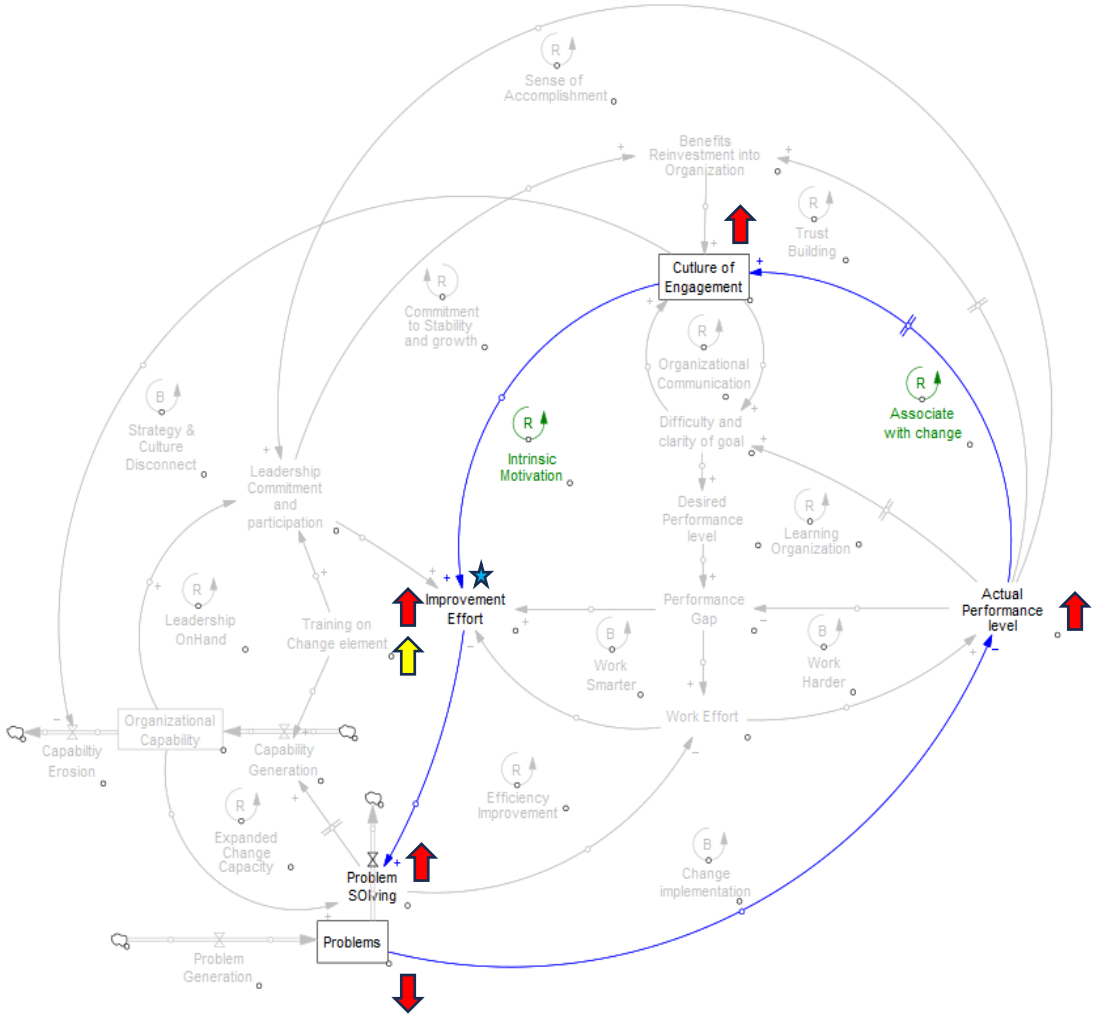

Figure 31 : Building frontline motivation

A3.5 Build leadership motivation through a sense of accomplishment

As “leadership commitment and participation” increase toward lean initiatives, front-line employees are motivated to invest time in “improvement efforts.” This effort increases “problem-solving” and reduces the “number of problems” in the organization, leading to an increase in the “actual performance level.” This increase in “performance” provides a sense of accomplishment to the leadership, thus motivating the leadership to be more “committed and participate” in the change initiatives.

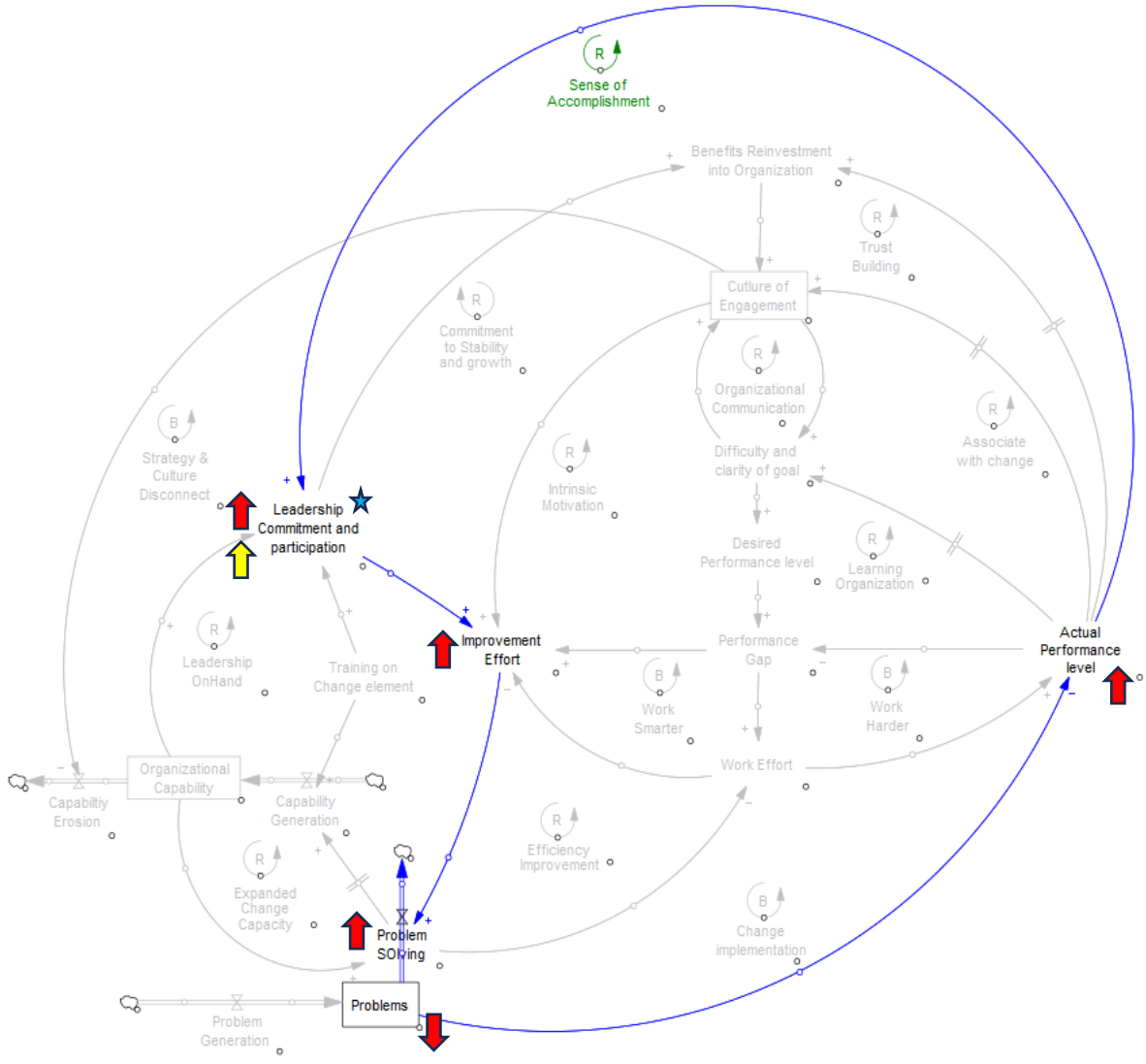

Figure 32 : Leadership sense of accomplishment

A3.6 Learning organization

To support the previous loops, the organization must have enough problems to work on, and problems in TPS or in most changes are defined as the "gap" between the "desired performance level" and the "actual performance level." As the "gap" remains positive, there is always a positive source of problems to solve and thus provides input for both the employees and leadership to participate in problem-solving. The key loop here is that as people put more "effort into improvement," there is more "problem-solving" and, thus, an improvement in the "actual performance level." As the "actual performance level" increases, the leadership must leverage the journey to keep improving the "difficulty of the goal," not to pressure the team but to provide more opportunities for both the frontline and the leadership team to learn and improve their capabilities.

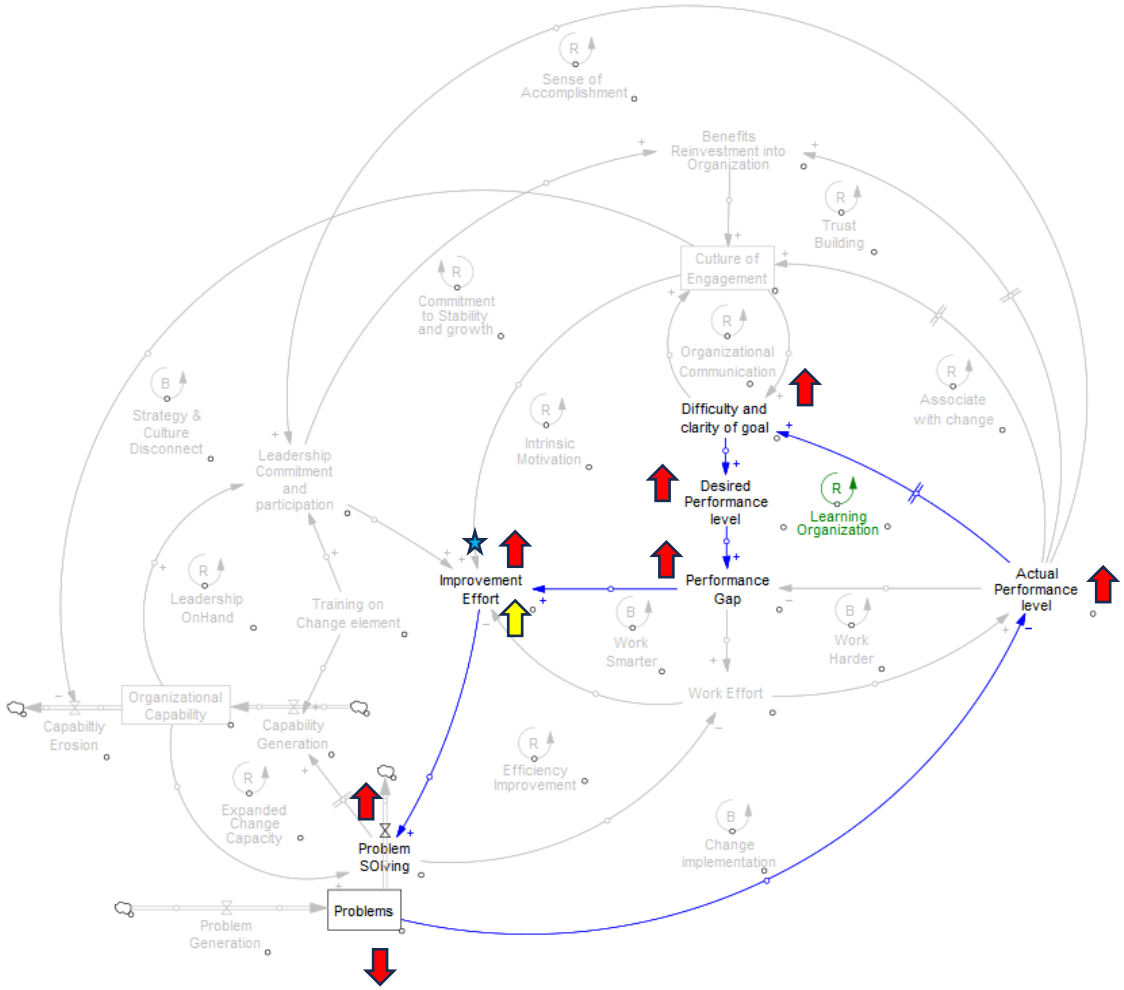

Figure 33 : Learning Organizations

A3.7 Building Leadership Capability

One of the key loops is building leadership capability, and in this loop, we define how such capabilities should improve. As leaders put more "commitment and participation" into the initiatives, there is an increase in "improvement efforts" (A3.5), which leads to more "problem-solving." As more problems are solved, there is more "capability generation" for leadership, and this provides an opportunity to train more leaders with exposure to such capabilities and, combined with loop A3.6, allows new leaders to practice TPS (which is one of the requirements for TPS). As more leaders are exposed to and trained in TPS, there can be increased motivation to promote more "improvement efforts" (problem-solving) across the organization. From a pragmatic perspective, the model cell should be a training ground to rotate leaders to allow for more leaders to be experienced in TPS.

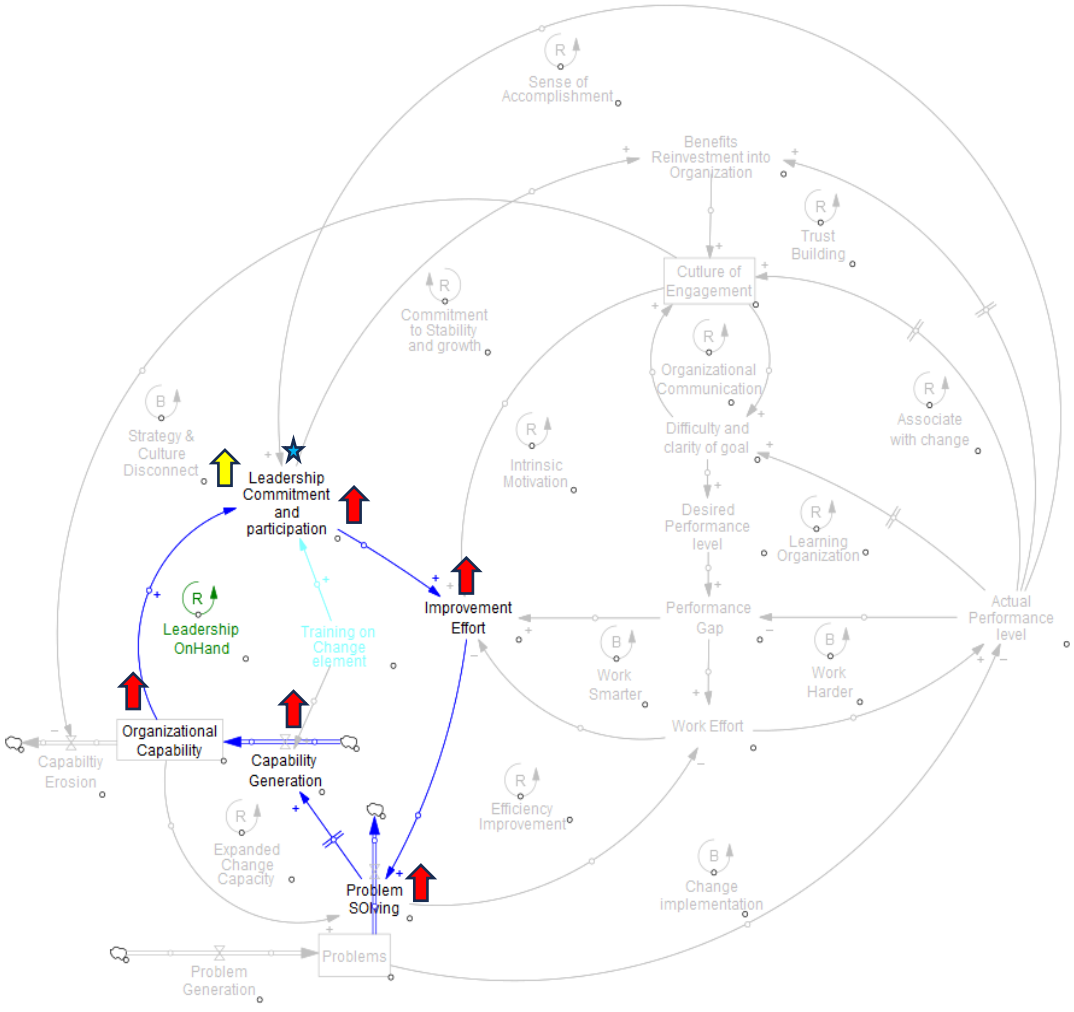

Figure 34 : Building Leadership capability

A3.8 Expanding Frontline Capability

Similar to A3.7, which talks about building leadership capability, this loop focuses on building frontline capabilities (The role of frontline and leadership is explained in Chapters 3 and 4). Similar to leadership capability development, more “problem-solving” leads to more “capabilities” on the frontline to identify and solve problems. As more and more employees are exposed to different types of problems and “solve” these problems, the capability can be expanded across the organization. This supports most of the previous loops.

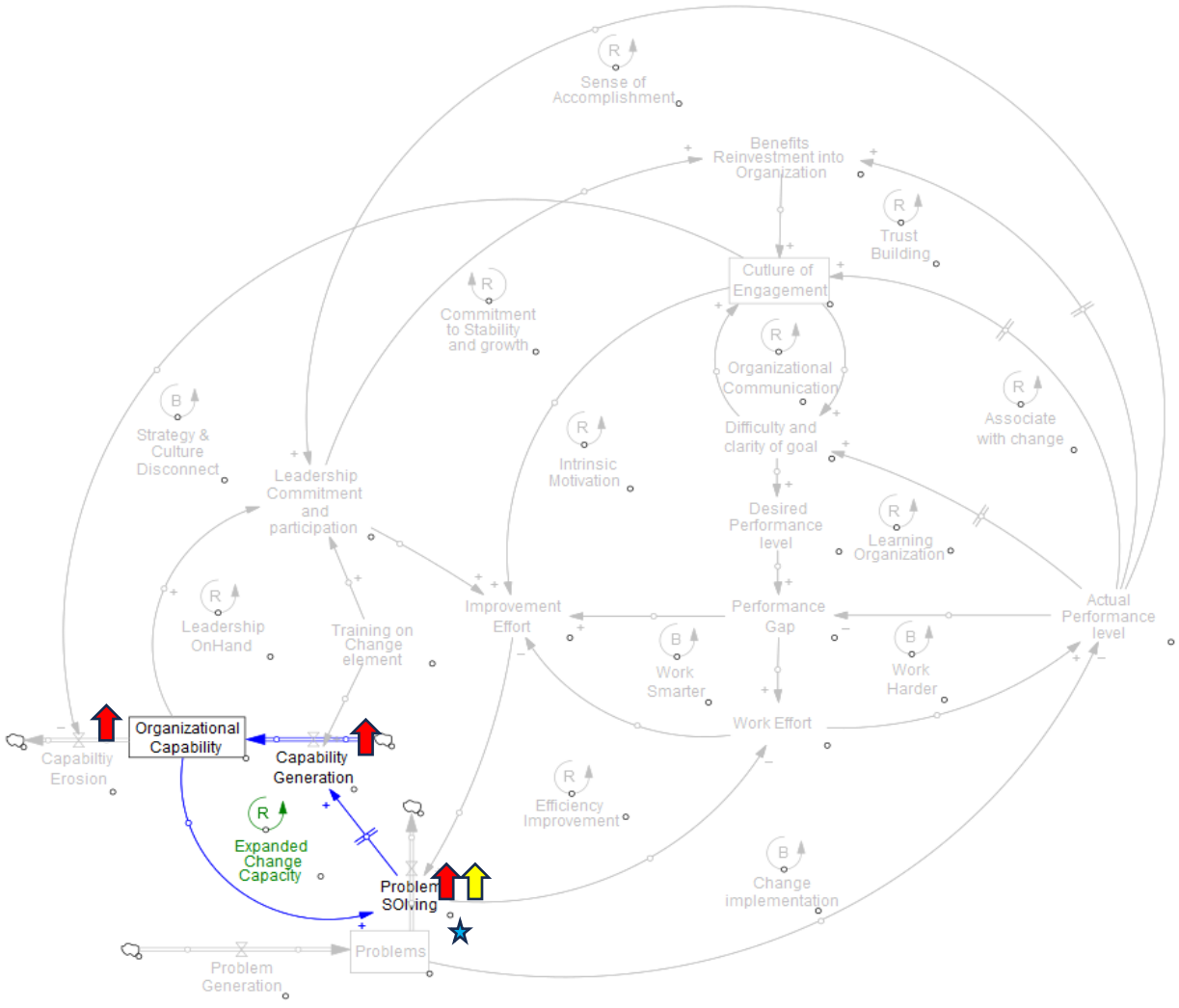

Figure 35 : Expanding frontline capability

A3.9 Building trust in the organization

This is one of the key loops to building a culture of TPS, which deals with the soft side of things in the organization. As employees put more effort into problem-solving, there are fewer problems, and the actual performance level increases. As the organization realizes the benefits (cost reduction, more efficiency, fewer resources, etc.), the organization must re-invest these benefits back into the organization (into better products, better processes (technical, formal, and informal), and people development). As the employees see that their improvement efforts yield benefits for them, that creates a positively reinforced behaviour, motivating the employees to repeat their improvement efforts, thus creating a culture in the organization. This leads to trust building. It is important to note that this loop is not a one-time thing, but a repeated application of the loop brings the cultural aspect into the organization.

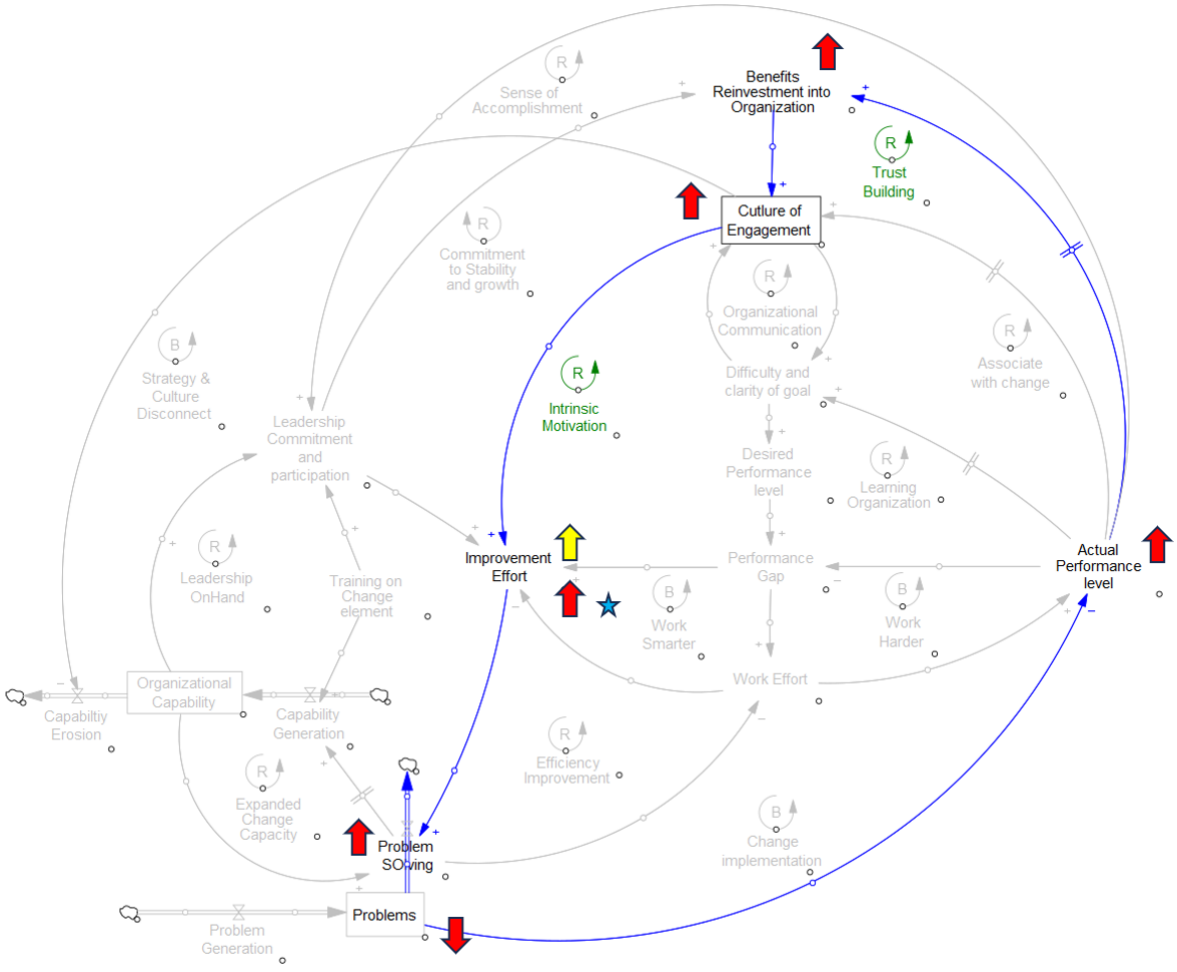

Figure 36 : Trust building

A3.10 Having strategy and culture disconnect

One of the key failure modes of good culture formation is the disconnect between strategy and culture. Strategy is loosely defined as what an organization wants (expects) to do, and culture is what the organization actually does. This loop shows that if the organization does not “re-invest back the benefits” into the organization (which is the strategy) even after making employees go through the “improvement efforts” and getting the “benefits”, this leads to a loss of trust in the organization. Thus, as this trust fades, there are more challenges to creating a strong culture in an organization.

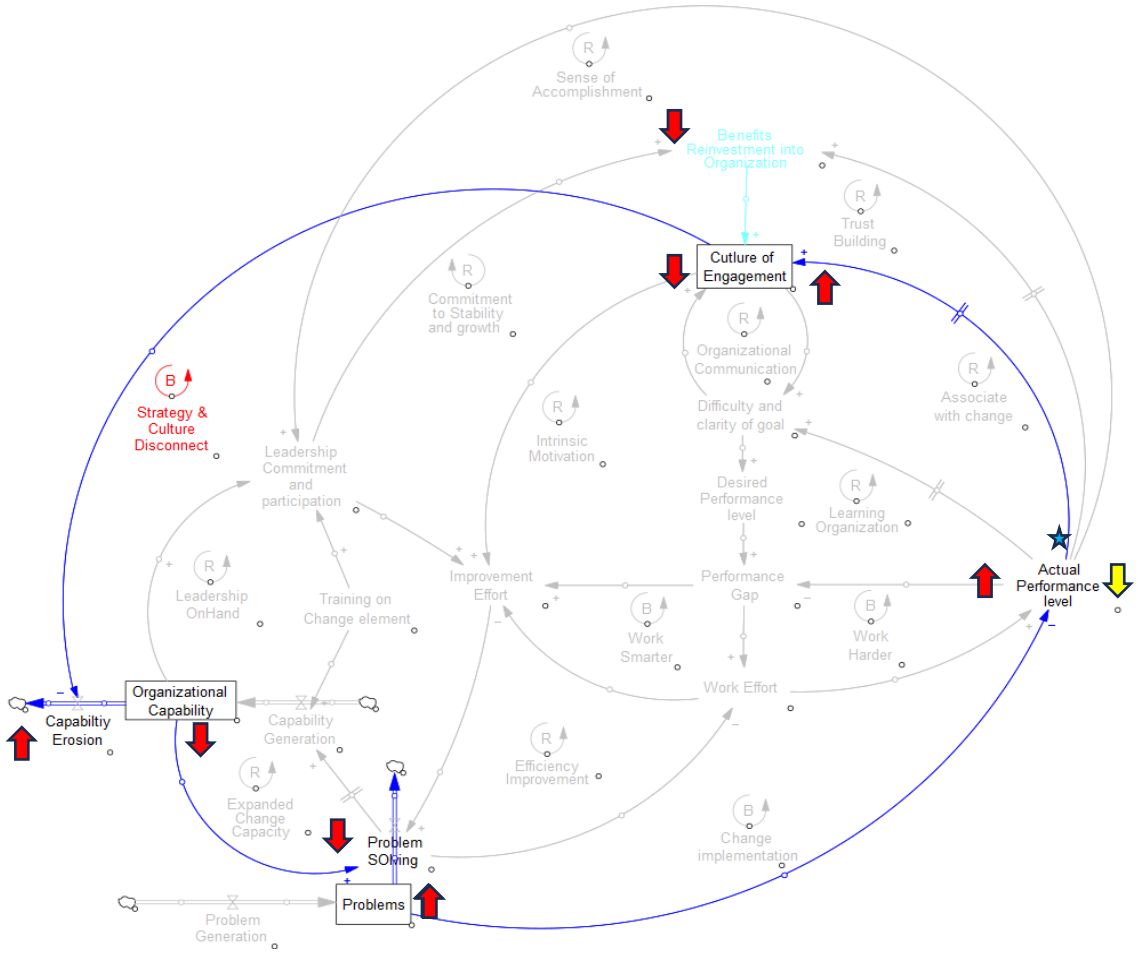

Figure 37 : Strategy vs culture disconnect