Exploring Learning Organizations through the High Reliability Organization Framework

Jared D. Padgett University of Phoenix and Michael Armanious, MA Technology, U.S.

ABSTRACT

The modern pace of business has changed the way organizations need to function to maintain viability in the rapidly changing marketplace. Healthcare organizations face similar changes in the way they operate, partly because of the recent national healthcare changes and the emergence of electronic health and medical records. Healthcare organizations are also challenged to avoid preventable medical errors, which cost $38 billion annually and negatively affect patients and staff. Organizational knowledge is critical to identify and implement the rapid changes required in these systems. Traditional corporate training is quickly made obsolete, raising training costs to $400 billion. The purpose of this qualitative exploratory multi-case study was to explore characteristics of learning organizations from different industries to identify common themes to enhance the use and disseminate organizational knowledge. Data were collected from 29 participants representing 11 organizations from different industries, including healthcare, investment and small I.T. consulting firms, online learning organizations, global technology companies, and educational T.V. stations. Data were analyzed using the High Reliability Organizations framework. Data were analyzed to explore how organizations may meet the demands for safety, quality, and agility in a fast-moving, ever-changing environment and disseminate this knowledge across their organizations. This framework may be useful as a learning tool for learners engaged in organizational research and as an evaluation method for organizational leaders to improve outcomes. Key themes included the need for continuous learning, open communication, development of a problem-solving culture, and teamwork. The results may enhance awareness of quality issues, development of adaptable core competencies, improve morale, reduce turnover, and empower staff to make timely, informed decisions. This may help reduce costly errors in care, enable agility in the rapid-changing knowledge economy, and enhance frontline leadership to promote a resilient, highly reliable organizational culture.

INTRODUCTION

As the resource-based economy shifts to a knowledge-based economy, organizations need to rely progressively upon knowledge workers rather than physical resources to create agile core competencies.[1] These competencies are necessary to sustain their competitive advantage and enable organizations to stay in business. The resource-based economy depended on deteriorating physical assets, predefined processes, capital equipment, and manual labor. The knowledge-based economy is growing and changing too quickly to rely upon these static sources of core competencies. The current pace of business has changed the way organizations need to function to maintain viability in the rapidly changing marketplace. Healthcare organizations face similar

[1] Farrukh and Waheed, "Learning Organization and Competitive Advantage-An Integrated Approach."

changes in the way they do business, partly because of the recent changes in national healthcare and the emergence of electronic health and medical records. Healthcare organizations are also challenged to find solutions to preventable medical errors, which cost $38 billion annually and negatively affect patients and staff.[2] Organizational knowledge is critical to identify and implement the rapid changes required in these systems.

Traditional organizations are rigid and lack the flexibility needed to adapt to an ever-changing environment. Leaders in traditional organizations make decisions based on past experiences and expect these decisions to be implemented throughout the vertical hierarchy.[3] This vertical hierarchy is unable to flex or adapt in response to emerging problems quickly.[4] A newer, more flexible structure is needed.

Core competencies within the knowledge-based economy are skill-based and need to be agile to allow for constant evolution and unique enough to maintain that organization's competitive advantage.[5] Leaders need to focus on developing agile capabilities such as problem-solving and research capabilities. These capabilities allow knowledge workers to respond to complex challenges or unpredictable events faster than traditional employees.[6] The quick response times enhance decision-making throughout the organization and enable the organization to adapt to the changing environment.

Robertson and Tasso estimated that the United States (U.S.)would need over 35 million more knowledge employees by 2020 to sustain its competitiveness.[7] This number is expected to grow throughout 2020 and beyond. Knowledge workers are employees whose primary skill is to create new knowledge by engaging in continuous learning and sharing that newly gained information with fellow employees.[8] Knowledge workers are the agents of change and evolution within organizations in the knowledge-based economy.[9]

[2] DeBourgh and Prion, "Patient Safety Manifesto."
[3] van Stralen, "High-Reliability Organizations."
[4] van Stralen.
[5] Denning, "How to Make the Whole Organization 'Agile.'"
[6] Denning.
[7] Robertson and Aquino, "Online Education to Improve Workforce Skills."
[8] Pokharel and Ok Choi, "Exploring the Relationships between the Learning Organization and Organizational Performance."
[9] Leon, "The Development of the Future European Knowledge Workers. An Academic Perspective."

Knowledge workers who engage in continuous learning are vital to an organization's survival in this new economy. However, traditional corporate training practices do not teach or encourage their workers to continuously seek knowledge. Traditional corporate training practices do not adequately meet the requirements of the new knowledge-based economy.[10] Traditional corporate training teaches knowledge workers the skills to solve a specific problem but does not provide knowledge workers with the skills needed to interact with or interpret the complex external environment in which their organizations operate.[11] A new approach is needed to integrate learning strategies rather than traditional corporate training to prepare their workforce to learn and grow continuously.[12]

Senge defined a learning organization as an organization that continually expands its intellectual database through its employees to sustain its strategic goals.[13] Learning organizations build a culture of continuous learning, which helps organizations achieve a sustainable competitive advantage in an unpredictable business environment.[14] A learning organization uses both adaptive and generative learning to maintain its environment of continuous learning. To create a learning organization, leaders need to become adaptive, communicative, and flexible to help employees innovatively and creatively adapt to the unpredictability of the business environment.[15] Senge indicated that every employee has the ability to learn continuously, independently, and within teams.[16] Senge also proposed identifying and addressing system causes of events rather than the events themselves to sustain their learning organizations.[17]

The High Reliability Organization (H.R.O.) framework is generally focused on preventing or mitigating the risk of catastrophic failure on a large scale as in nuclear energy, commercial aviation, or wildland firefighting, or on a smaller scale such as one-on-one patient interactions in healthcare. An organization that does not integrate agile core competencies is not typically at risk of causing catastrophic harm, yet the continued existence of the organization is at stake. Evaluating the concept of learning organizations within the H.R.O. framework will

[10] Milligan and Littlejohn, "Why Study on a MOOC?"
[11] Leon, "The Development of the Future European Knowledge Workers. An Academic Perspective."
[12] Brandi and Iannone, "Learning Strategies for Competence Development in Enterprises."
[13] Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization*.
[14] Peters, "A Learning Organization's Syllabus."
[15] Rijal, "Leadership Style and Organizational Culture in Learning Organization."
[16] Senge, *The Fifth Discipline: The Art and Practice of the Learning Organization*.
[17] Senge.

therefore be useful for leaders seeking to initiate change. The purpose of this study was to explore learning organizations through the H.R.O. framework to better enable leaders to initiate and lead changes in their organizations as they adapt to the modern knowledge economy.

HIGH RELIABILITY ORGANIZATIONS

Roberts defined High Reliability Organizations (H.R.O.s) as organizations that conduct operations with minimal error, over an extended time, and consistently make good decisions that result in both high quality and high reliability.[18] The H.R.O. framework has been used to assess and adapt organizations to develop learning cultures that promote safety. The H.R.O. framework is interdisciplinary and has been explored in various environments, including aircraft carriers, nuclear power plants, a power grid, and air traffic control.[19]

Five common characteristics are typically present in reliability-seeking organizations. The characteristics were identified through studying organizational systems in wildland firefighting, military, nuclear energy, commercial aviation, and other industries where catastrophic failure is a possibility. The five characteristics include Preoccupation with Failure, Reluctance to Simplify, Sensitivity to Operations, Commitment to Resilience, and Deference to Expertise.[20] These characteristics have been adapted into principles in organizations from various industries, but the general principles are not industry specific.

Preoccupation with Failure requires continuous attention to system problems.[21] It also requires avoiding the comfort and complacency that successes may bring.[22] Reluctance to Simplify is the intentional reluctance to apply labels to a situation at the outset of the event.[23] This prevents false interpretations of familiarity. When a situation is perceived as familiar, it is easy to ignore cues that may indicate something else is happening. Sensitivity to Operations describes the awareness of the effect subtle changes have on the system.[24] Reliability-seeking organizations try to maintain awareness of the system so any errors readily stand out and may be

[18] Roberts, "Some Characteristics of One Type of High Reliability Organization."
[19] Casler, "Revisiting NASA as a High Reliability Organization."
[20] Weick and Sutcliffe, *Managing the Unexpected: Sustained Performance in a Complex World*.
[21] Weick and Sutcliffe.
[22] Weick, Sutcliffe, and Obstfeld, "Organizing for High Reliability: Process of Collective Mindfulness."
[23] Weick and Sutcliffe, *Managing the Unexpected: Sustained Performance in a Complex World*.
[24] Weick and Sutcliffe.

quickly addressed before they affect other parts of the system.[25] Commitment to Resilience enables engagement in just-in-time learning. This helps to synthesize past experience with new knowledge to enable continued functionality in case of an emerging failure or other change in conditions.[26] Deference to Expertise involves the ability for system to organize around a problem.[27] The authority to make decisions may migrate up or down the hierarchy so that the person with the most information makes the decision regardless of rank or position.[28]

One way to apply the H.R.O. framework to initiate and sustain an organizational culture change includes developing and maintaining standard processes; implementing checks and redundancy to mitigate potential failure, deferring to individuals with the most information, and developing teams that openly communicate about failure to prevent recurrence of unsafe or avoidable incidents.[29] Another way to apply the H.R.O. principles and initiate a culture change is through Libuser's model of process auditing, reward system, quality degradation, risk awareness and acknowledgment, and command and control elements.[30] Process auditing correlates to implementing checks and redundancy to mitigate potential failure.[31] The reward system is similar to traditional organizational behavior concepts of initiating change through implementing a sustainable reward system based on achievable results. A focus on quality degradation helps address the potential of systems to experience poorer performance over time. The perception of risk involves both the awareness of risk and the activities undertaken to mitigate the risk.[32] The principle of Command and Control is multifaceted and includes migrating decision-making, redundancy, avoiding micromanagement, and formal rules and procedures. Libuser's process was used to initiate the transition of a traditional subacute nursing facility into a reliability-seeking organization, capable of admitting and caring for high-risk, technology-dependent children in a pediatric post-acute facility.

The H.R.O. framework helps conceptualize organizations from a systems perspective.[33]

[25] Weick, Sutcliffe, and Obstfeld, "Organizing for High Reliability: Process of Collective Mindfulness."
[26] Weick and Sutcliffe, *Managing the Unexpected: Sustained Performance in a Complex World*.
[27] Weick and Sutcliffe.
[28] van Stralen et al., "Changing a Pediatric Sub-Acute Facility to Increase Safety and Reliability."
[29] Hartmann et al., "Validation of a Novel Safety Climate Instrument in VHA Nursing Homes."
[30] Libuser, "Organizational Structure and Risk Mitigation."
[31] van Stralen et al., "Changing a Pediatric Sub-Acute Facility to Increase Safety and Reliability."
[32] van Stralen et al.
[33] Grabowski and Roberts, "Risk Mitigation in Virtual Organizations."

Modern organizations are complex systems in which all the parts are interdependent and affect other parts. Changing a seemingly unimportant part of the system can lead to cascading failures, often to disastrous effect.[34] Small changes or errors can cascade throughout the system, leading to catastrophic system failure. Using the H.R.O. framework reinforces behaviors that enable organizations to practice mindful awareness, identify and address system failures in the early stages, and integrate preventative measures to reduce risk or successfully respond to opportunities. Communication and teamwork are key elements in this process.[35] The way organizations learn is also distinct in reliability-seeking organizations. Rather than using just exploitation, which involves making use of what is known, or just exploration, which involves generating new knowledge, reliability-seeking organizations must make use of both types of learning.[36] By combining what is known with what is learned in real time, organizations are better enabled to respond to changing circumstances.

ORGANIZATIONAL LEARNING

Organizational learning is the process of acquiring, disseminating, and sharing knowledge within an organization.[37] Organizational learning processes encourage learning and reflection at the individual, group, organizational and inter-organizational levels.[38] These processes guide knowledge workers' efforts in expanding their bodies of tacit knowledge. An organization that does not actively promote organizational learning may inadvertently introduce significant knowledge gaps that may lead to an incident, enable missed deadlines, or fail to incorporate the desired organizational culture, particularly in small organizations.

Smaller organizations may have additional challenges in increasing institutional knowledge because of differences in scheduled working hours. Night shift workers, including maintenance staff or patient care staff in healthcare organizations, are not always aware of changes implemented by administrators.[39] They may also be overlooked when administrators seek feedback on opportunities, safety issues, or concerns. Each member of the organization can

[34] Grabowski and Roberts.
[35] Padgett et al., "Improving Patient Safety through High Reliability Organizations."
[36] Weick, Sutcliffe, and Obstfeld, "Organizing for High Reliability: Process of Collective Mindfulness."
[37] Argyris and Schon, "Organizational Learning."
[38] Megheirkouni, "Leadership Styles and Organizational Learning in UK For-Profit and Non-Profit Sports Organizations."
[39] Zúñiga et al., "Psychometric Properties of the Swiss Version of the Nursing Home Survey on Patient Safety Culture."

contribute to organizational learning. They should be actively encouraged to do so.

Learning Processes

Single-loop learning is a sequential process focused on detecting and correcting errors according to organizational procedures.[40] Single-loop learning relies upon the status quo and does not include changing system goals. Double-loop learning includes reframing the organization's goals and assumptions.[41] Double-loop learning enables adjustments in response to changing objectives. Triple-loop learning goes further and incorporates strategic thinking to systematically unlearn the status quo and integrate generative and strategic input.[42] Individuals use triple-loop learning to continually add to their understanding of system variables, and incorporate lessons learned to prepare for changing conditions. H.R.O.s use single-loop and double-loop learning processes to enhance resilience and enable a quick response to system changes. H.R.O.s use triple-loop learning to initiate system changes to prevent error and enable responsiveness.

Adaptive Learning

Adaptive learning is enhanced by an organizational or collective mindfulness. Sutcliffe described adaptive learning as a component of resiliency.[43] Incorporating institutional knowledge with adaptive learning can help reduce error by enabling decision makers to make decisions that meet the need, rather than trying to fit in with policies or procedural norms. The H.R.O. framework enables adaptive learning and reliability simultaneously.[44] The lessons learned through this decision-making process add to the organizational body of knowledge and aid in ongoing organizational learning. Adaptive learning enables organizations to respond in real time to adapt and integrate the unknown into their decision-making processes, which enhances resiliency.

Double-Loop Learning

Double-loop learning is a generative learning process in which leaders change organizational structures, strategies, and cultures to address system problems.[45] This helps employees integrate

[40] Argyris, "Teaching Smart People How to Learn."
[41] Nordin, Kork, and Koskela, "Value-Based Healthcare Measurement as a Context for Organizational Learning."
[42] Nordin, Kork, and Koskela.
[43] Sutcliffe, "High Reliability Organizations (HROs)."
[44] Weick, Sutcliffe, and Obstfeld, "Organizing for High Reliability: Process of Collective Mindfulness."
[45] Argyris, "Teaching Smart People How to Learn."

organizational system changes.[46] Double-loop learning is facilitated through openness, continuous learning, teamwork, and ownership.[47] Single-loop learning is integrated into double-loop learning to enable organizations to reactively, and resiliently respond to changing systems. To enhance proactive strategic positioning, organizations use the triple-loop learning process.

Triple Loop Learning

High Reliability Organizations implement the triple-loop learning principle to enhance organizational mindfulness and sustain a culture of safety and quality. Triple-loop learning is a process of learning how to learn. Organizations use triple-loop learning techniques so their knowledge workforce can effectively understand and respond to unknown problems and situations.[48] Triple-loop learning is a circular process in which teams may discover the causes of errors and modify their culture, structure, behavior, and capabilities to prevent such problems in the future.[49] Unlike the single-loop learning that produces minimal or short-term changes within organization, triple-loop learning helps drive an organizational culture of mindful awareness and proactive problem solving.

The Observe, Orient, Decide, and Act (OODA) Loop was developed by Colonel John Boyd based on his experience as a fighter pilot.[50] H.R.O. leaders encourage the incorporation of the OODA Loop to address system changes in real-time. This process speeds up the time needed to make decisions and enhances decision-making as the system changes. Similarly, Periyakoil found the Plan-Do-Study-Act (PDSA) cycle empowers staff to become change agents and take effective control of the problems in their work setting.[51] These nonlinear approaches to problem-solving help frontline clinicians and direct care staff to enhance the quality improvement process. They are also useful to knowledge workers who are addressing system problems or adapting to changing market conditions.

[46] Argyris and Schon, "Organizational Learning."
[47] Argyris and Schon.
[48] Chris Argyris and Donald A. Schön, *Organizational Learning II: Theory, Method, and Practice*.
[49] Chris Argyris and Donald A. Schön.
[50] Byus, "Observe, Orient, Decide, Act."
[51] Periyakoil, "Taming Wicked Problems in Modern Health Care Systems."

RESEARCH DESIGN

A qualitative exploratory multi-case study design was useful to explore how business leaders cultivate learning organizations that enable development of agile core competencies and respond in real time to changing events. Data from two studies were compared and analyzed to develop a more comprehensive understanding of learning cultures from various industries. The studies consisted of a qualitative exploratory multi-case study (Study A) and a qualitative exploratory single case study (Study B). Interviews, observations, organizational documents, and research notes were used to explore the learning strategies leaders used to develop and maintain an organizational culture of learning where the organization's core competencies are continually updated in response to changing conditions in the knowledge economy. Participants were selected using purposive criterion and snowball sampling.

In Study A, interviews were conducted with 15 participants representing ten organizations.[52] These organizations included investment and small Information Technology consulting firms, online learning organizations, global technology corporations, and educational television stations in the U.S. From these organizations, participant job titles included Angel investor, C.E.O., Executive Director, Head of Engineering and Research, and Manager of Online Education. Document reviews were conducted using archived data from publicly available websites, blogs, annual reports, and commercial databases to supplement the interviews conducted for this study.

In Study B, 14 participants were selected for one-on-one interviews from a healthcare organization in the U.S. transitioning from a traditional organization to a reliability-seeking organization.[53] Participants were frontline nursing and respiratory care staff who experienced an organizational culture change as the organization introduced the H.R.O. framework to improve patient safety. Data from the healthcare organization included observations and internal document reviews, including the Policies and Procedures Manual and prior research posters. Observational data included direct observations of caregivers during their daily routines. Interactions between nursing and respiratory staff were observed during shift changes and group rounds. Observations occurred during 30-minute intermittent periods for one week.

[52] Armanious, "Knowledge Organizations' Learning Strategies to Develop Agile Core Competencies."
[53] Padgett, "Patient Safety Culture and High Reliability Organizations."

Data were coded manually by listing similar themes identified in the interview transcripts, field notes, and document reviews. Key words and concepts were identified through an extensive review of the transcribed interviews and assigned codes. These codes were grouped via frequency analysis to refine the list of themes and group them based on similarities. These themes were stored in Microsoft Excel and were compared to themes from the H.R.O. framework. Participant data from Study A and Study B were distinguished by their respective group. Participants from Study A were grouped per organization and labeled as Participant A1 or PA1 for a single participant or incrementally starting with Participant A1-2 or PA1-2 for multiple participants. Participants from Study B were labeled incrementally as Participant B1 or PB1. These distinctions helped identify which responses related cultural changes in progress and those that related to a successful culture change.

RESULTS

Two primary themes were uncovered through the data analysis. The first theme indicated how leaders responded to outside or external influences. The second theme centered on internal systems and processes and how they relate to external influences.

External Environment

Participants reflected on the frequency and rate of change in a knowledge-centered economy. These changes require knowledge workers to learn continuously to manage new and complex problems. Participants perceived that technological advances caused changes in customer preferences, organizational structure, productivity, and types of employees needed in the organization. PA9, Executive Director of a non-profit education firm, discussed how technology changed his organization's internal environment:

> So workflow based on the technology that exists was now being utilized to organize and make their day more efficient so that they can actually focus on the things, one that they're good at, the things that they love and if they love it, they're going to be good at it and then be able to, you know, spend more time doing what we do need to do as a core competency, which to build our membership, educate, inform, and develop the skillset of our membership.

Participants described how their organizations operate in a mixed environment in which knowledge is a strategic organizational asset, and continuous learning is the most vital process to create new knowledge to survive in a rapidly changing environment. Participants discussed how the uncertainty and complexity of their external environment require them to reevaluate

their internal environment. The array of knowledge and continuous learning influences the organization's internal environment, including leadership styles, learning organization culture, organizational learning processes, knowledge creation, management, and employee relationships and development.

External factors also include physical security. Participants B2 and B6 described these changes, including the addition of security cameras, locking of facility doors at night, increased lighting in the parking lots, and an increase in the number of hours security guards patrolled the facility at night. Improvements in security were perceived positively by the staff, which enhanced employee satisfaction and their desire to continue working for their organization.

Internal Environment

The internal context identified from the data analysis consists of seven interrelated systems that enable reliability and agility: Learning Culture, Leadership, Knowledge Workers, Learning Paths and Training, Open Communication, Knowledge Creation, and Knowledge Management Systems. These interrelated systems enable development of agile and sustainable Learning Organizations.

Learning Culture

Participants indicated a learning organization culture helps organizations continuously evolve and excites knowledge workers' creativity and critical thinking. This learning culture enables and encourages workers to learn continuously. Participant B12 described it as a thinking culture. PA2 fostered a learning culture to prepare employees to act and learn from mistakes to get closer to their desired targets. PA2 added that a learning culture helps employees incorporate the agile concept of "ready, fire, and aim" at their goals. PA3 described a learning organization as "…one that is constantly evolving…" PA3 described his organization as a "listening organization" where team members are continually learning and listening to the external environment to create new knowledge.

P3A-1 described the internal environment as a learning culture where people work in teams. P3A-2 encourages continuous learning, openness, accessibility, and cultural diversity. P3A-3 described the benefits of working within both a learning culture and not-for-profit organization where the focus is on results rather than profits. PA8 and PA9 labeled their organizations as "teaching organizations" capable of teaching what they have learned to others.

PA6 and PA7 perceived a learning organization as a learning culture centered around problem solving and knowledge creation. They emphasized the need for learning organizations to view problems as continuous learning opportunities to analyze their organizations' current core competencies against the external environment. To develop an effective modern corporate learning system, Participants A11-A14 called for leaders to create a learning culture that supports continuous learning.

Leadership

Participants commonly identified a change in their organizations' leadership styles. In the traditional business environment, employees receive instructions from top management. Learning organizations incorporate shared responsibility and self-managing teams. As an investor, PA1 suggested a collaborative leadership style coupled with a feedback process is the best style for managing organizations in a fast-changing environment. Participant B14 described feedback during the culture change: "Oh yeah. They handled by giving suggestion, suggestion for the care. They are open for suggestion." PB14 clarified that managers gave feedback and responded to feedback they received from the staff.

Participants also discussed open leadership styles. PA2 said his open leadership style is to "…encourage people to get out of their comfort zone, make decisions, risk being wrong, but to acknowledge if you are wrong…that there's a learning opportunity." PB4 also discussed how managers encouraged learning from mistakes, "Well, they address anything that happens, so that way we can learn from the mistakes of others." PA2 added that the open leadership style allows workers to know what is going on all the time.

Participants A3 and A8 said they do not micromanage employees. Participant B12 said that employees feel trusted when they are included in the decision process. PA8 said he gives employees a free hand and "gives them their head back" to manage their own learning and tasks. PA8-1 defined his leadership style as "people-first," where stakeholders' needs drive employees' skills and tasks. PA5 described his role as a coach who provides "air cover" to support knowledge workers and remove obstacles so they can concentrate on creating new knowledge. This is similar to the Scrum Master role in an agile team. PA3 described leading from the front:

> My style of leadership is to recruit top people and the ability to get the team to work together to accomplish great things. I tried to empower my team members, set ambitious goals for us, inspire our people with the grand vision and let them do their job so that

> they can accomplish great things, and uh, uh, this enables them to be autonomous. This enables them to do a set ambitious goals for themselves and accomplish these.

Describing the organizational culture change, PB8 stated it is important for managers to be visible and assist as needed. PB8 added that managers participated in patient care and acted as part of the team. Participant B1 noted that managers were expected to check in with the staff and see if anyone needed help. Most of the participants in Group B felt that managers cared for the residents and the staff. Participant B3 noted that the managers believed what they were teaching, which had a positive effect on the culture change. PB2 said, "they were here, you know, to support us, and wanted us to be safe, and keep the residents safe. So they were here, not just, you know, as a business, but more of a family, you know, looking after each other."

Knowledge Workers

Participants B8, B9, and B12 described how the introduction of the H.R.O. framework empowered them to do the job they were trained to do. Decisions were migrated to the staff, and they were trusted to make the right call based on their knowledge of the current situation and their experience. Participant B12 said that the doctors trusted the staff. Participant B8 said that the staff was empowered by having more access to information and tools. PB8 added that staff was also empowered by providing input to managers regarding patient care or unsafe conditions that needed to be addressed.

Participants recognized the vital role of knowledge workers whose primary assets are knowledge creation and problem-solving skills. PA4 said:

> Okay, so in my mind and in my world, okay, right knowledge employees are those who, when faced with a problem, they will try and figure out a way to solve the problem. So for me knowledge is the definition of knowledge that I work with, right is the ability to think and the ability to break down a problem into its components and solve them right collaboratively leveraging the expertise that's available in a team, if one person can do that person in my definition is a knowledge, and they may not be perfect, and that's exactly where, as a leader, my job comes in.

PA8 and PA9 described knowledge workers as being able to find knowledge to solve problems. PA4 self-identified both as a knowledge and routine worker with a collaborative learning behavior who is always seeking new knowledge. PA6 defined knowledge workers as those who can break down a problem into its smallest components to solve each one separately.

Knowledge workers can enhance collaboration by leveraging their team's expertise. As

critical problem-solvers, PA6 argued knowledge workers could improve organizations' body of knowledge through team learning and knowledge sharing. PB2, a C.N.A., described the teamwork that improved as a result of the culture change along with the safety improvements: "There is a lot more teamwork on the floor, helping one another. Making sure that you know nobody hurt their back or the residents." PB4, an LVN, made a similar comment: "...not only do I make sure that mine are safe, that I make sure that others are safe in different rooms also." When asked if it was the patients were kept safe, PB4 added, "Yes. And staff members." The culture change not only influenced how staff treated their patients but also how they treated coworkers.

Education and Learning Processes

Participants in Group B reported changes in education and training programs after the introduction of the H.R.O. framework. In-services were most commonly discussed. Other subthemes related to education and training were cross-training, preceptor training, access to a knowledge base, continuing education, demonstrations and simulations, and the importance of training to improve safety.

Participant B5 said that in-services were helpful. Participant B4 acknowledged the in-services and added that the safety incentive program also helped improve patient safety. The safety incentive is part of an organizational effort to increase awareness of safety, increase reporting, and reduce the number of repeated errors within the organization. PB1 reported that in-service meetings are provided to the staff in response to incidents to increase organizational awareness and prevent future occurrences. PB5 added that in-services also serve to remind staff about organizational policies.

Participant B5 said the staff needs to learn from mistakes and that the staff needs to know what mistakes to avoid. Offering advice to new staff, PB13 suggested learning as much as possible, and PB14 suggested managing time wisely. PB8 discussed training new employees and said that she emphasizes to new employees that the extensive training will indeed be used on the floor.

Participants B7-B9 reported that doctors and managers participated in training on the facility floor. Participant B10 said that the staff did not always see the reason behind the extensive training, but the reasoning became clearer when an incident occurred. PB10 said that when a

staff member is told about a potentially unsafe behavior that needs to be corrected, it needs to be done without finger pointing or blame. Participant B3 suggested that showing how things can go wrong if the policies are not followed is useful while training new staff.

Participant B1 stated in-service meetings are provided to the staff in response to incidents to increase organizational awareness and prevent future occurrences. Participant B5 added that in-services also serve as a reminder to the staff about organizational policies. In addition to in-services and other formal and informal meetings, participants also described learning paths.

PA10 explained that a learning path is like a training package for a set of skills, consisting of micro steps of learning that can be changed and adapted along the way. A learning path consists of a sequence of courses or activities that allows a knowledge worker to master a subject by accumulating micro skills.

> You don't need to support a whole new database. You could use our technology. But you're using the newer version, so what online allows us to do is educate them on some of the newer tools, and we actually design our courses in the Learning Paths to start with just some awareness training where we'll roll out here is our new document data model and here's how to use it if you already have this back end or here's how to use it if you're a JavaScript person and try to teach them the new model, which I can do starting with a 10-minute module to get them interested because they won't commit even to a one hour course. So. So that's, you know, I, I've got to start with uh 10 minutes, which people have told me is still three minutes too long. Right? So, we, I think that's the big thing that online allows us to do from a business model is get people interested in the technology and teach them enough.

P83, a knowledge worker from an Educational T.V. Station, made similar comments and described how a learning path is used to teach new skills:

> So, we're putting him on knowledge path right now of learning the core competencies of shooting, which we've done. Now we're going on to editing using our guidance that we created a previous loop through the path. And um, then they keep moving forward. So as long as we keep learning, we try to document what we do and create basically a series of breadcrumbs that people can follow to get up to speed. And as we keep moving further, we try to train down and carry the rest of the troops with us. Okay. So, you literally used the concept of learning path for…[name redacted for confidentiality] already in the process of creating a learning path for this new employee where you can envision where do you want them to be, what are the skills the skills going to be in a year from now? Right. So, this actually you're all in the process of doing this as we speak fast as, and we get everyone up to a level.

Participants A10-A14 explained how a learning path gives more structure to organizational learning and allows individual learners to control the time and order of courses.

Learning paths also help ensure that the learner is working towards developing the organization's core competencies. PA10-PA14 discussed how learning paths are designed both by leaders and individual learners to help learners build their knowledge progressively. Additionally, some participants mentioned the need to add learning paths as new components to their learning strategies. PA12, from a global technology consulting company, described the use of learning paths in building employees' skills:

> Uh, so we do provide, we call private portals, so it can sort of pick and choose what courses they want from our catalog. Created what we called their Learning paths or decks that define which courses the employees should take and which order. Uh, and they're going to provide that to their employees, uh, Uh, so the Learning Paths are important for us because we are dealing with companies in different businesses, companies with different goals and what the Learning Paths and all these to actually customize whether their employees are going to learn, how they're going to learn, how they go through this learning process.

PA10-PA14 discussed the benefits of learning paths in developing knowledge workers' skills to meet their organizations' objectives:

> So, the learning path allowed us to guide people through a series of courses. So, it's a series of seven courses, and all of these courses together help them meet one goal. Um, so this is a way for us to visually walk people through the sequence of courses.

Open Communication

Participants B1, B5, and B7 described how managers influence communication by conducting daily interdepartmental whiteboard meetings. Managers conduct these meetings at the beginning of shifts. Whiteboards serve as mini in-services if an incident has occurred or to remind staff of certain policies or procedures. Reminders and policy changes were also posted on prominent announcement boards displayed highly visible locations within the facility. PA3 described a similar event called a coffee talk where employees come together and discuss the latest technologies, challenges, customers, and markets in a very cross-functional way and to think of the bigger context. PA2 uses social media to generate and share and receive knowledge. PA9 described creating a bullpen area within his organization to inspire employees to share knowledge or solve problems together. PA9 said the bullpen serves as a safe harbor to encourage employees to speak freely and bounce ideas off each other. PA8 allows employees to use the weekly meeting to discuss issues, including partners, customers, and vendors, which generates new knowledge.

Participant B7 said managers encouraged staff to report problems immediately. PB1 said staff is encouraged to communicate with managers about break times to help keep rooms covered and to ensure staff gets breaks during their shifts. PB5 and PB10 stated that managers are aware of the need to communicate with the staff. Participant B4 felt the increase in communication helped to distribute better information where it is needed. This better information contributes to organizational knowledge and supports a growing knowledge base within the organization. Teamwork is also improved when staff and managers communicate well.

Knowledge Creation

Participants stressed the importance of continuously creating new knowledge to sustain their organizations' competitive advantage. PA6 said:

> Knowledge creation is nothing but the way you look at problems, you look at deliverables, and you find ways to solve those problems. And knowledge is an outcome of the process of you solving problems. So, for me, knowledge is nothing but a collection of problem-solving methods.

PA8 discussed how the weekly meeting allows knowledge sharing and knowledge creation to go hand-in-hand. According to participants, knowledge is created through discussion, continuous learning, collaboration, and interaction. Knowledge was created through open communication, education and training, developing learning paths, and frequently meeting and interacting through bullpens, coffee talks, or whiteboard sessions.

Knowledge Management Systems

Participants discussed how they used different knowledge management systems (K.M.S.s) within their organizations to identify, retrieve, and share knowledge. PA9 explained how his employees use general management systems from different vendors to capture and share knowledge. PA9 described using the corporate email system as a basic knowledge management system to create, analyze, and manage knowledge. They also use other project management systems to organize projects and to learn from past experiences. PA3 discussed the vital role knowledge management plays in his organization:

> I think documentation processes and technologies help. I think using communication channels like Things like Slack or other technologies enable the institutional knowledge where you document, uh, why certain decisions were made, but again, it's a combination of technology and people, uh, that enables us to maintain knowledge in the finance arena.

> There are checklists, and uh, uh, when you maintain checklists for closing processes, and you go through those checklists carefully is really important to document everything now.

PA8 revealed how the document management system allows the organization to capture and permanently store knowledge and then share it with all employees. PA3 and PA9 discussed how they used Things, a personal task manager, and Monday.com, a project management tool, to manage their institutional knowledge. Leaders stressed the importance of electronic document management systems in organizing and disseminating knowledge within their organizations and with stakeholders. Participants also acknowledged the use of a K.M.S. to facilitate employee-employee, employee-vendor, and employee-customer networking to share and transfer knowledge. Participant B12 said that the use of a knowledge base helped to make patients safer. During the culture change, staff would also consult other staff members to make sure no details were missed.

DISCUSSION

Participant responses from Group A and Group B were consistent with the 5 H.R.O. characteristics (or principles) of Preoccupation with Failure, Reluctance to simplify, Sensitivity to Operations, Commitment to Resilience, and Deference to Expertise. The responses from Group A represented current organizational strategies to implement a culture change from the perspectives of both leaders and frontline knowledge workers. The responses from Group B represented a successful culture change from the perspective of frontline healthcare staff. Combining the two sets of responses supported the claims from Group B about what worked during the culture change and demonstrated the benefits of engaging in similar practices in other organizations.

Preoccupation with Failure

Preoccupation with Failure enables identification of system problems.[54] It also requires wariness of past success. Not every situation is known, and not every incident is the same. Failures serve as evaluations of the system's health.[55] Errors that were caught and corrected before an incident occurs are also evaluated to improve organizational learning. Organizations preoccupied with failure are alert to subtle variances in the system that make each situation unique, even if it seems the situation, whether an opportunity or a hazard, has been seen before. All of the themes

[54] Weick and Sutcliffe, *Managing the Unexpected: Sustained Performance in a Complex World*.
[55] Weick, Sutcliffe, and Obstfeld, "Organizing for High Reliability: Process of Collective Mindfulness."

represented an organizational culture focused on error, rapidly changing environments and the agile response to changes. Knowledge is consistently documented, and educational programs and learning paths were developed to ensure information was available when and where it is needed.

Reluctance to Simplify

Reluctance to Simplify is an intentional and mindful decision not to apply labels to a familiar situation and look for the unknown variables.[56] To ensure employees maintain mindfulness, organizations may introduce system checks, seek diverse opinions through meetings, introduce intentionally adversarial system analyses, adapt hiring processes, and frequently refresh employee skills.[57] The themes, Learning Culture, Knowledge Workers, Education, and Learning Processes, and Knowledge creation related to Reluctance to Simplify. Knowledge workers solve problems using existing information, create new knowledge, and share this knowledge in response to unknown events. They recognize that the environment changes frequently and actively work to identify what is happening and determine how they should respond.

Sensitivity to Operations

Sensitivity to Operations describes the ability to detect the real-time changes in the interdependent systems in response to what is being done.[58] The themes Learning Culture, Leadership, Knowledge Workers, Education and Learning Processes, Open Communication, and Knowledge Creation related to Sensitivity to Operations. Participant responses indicated that knowledge workers are responsive to changes as they happen and that managers enable staff to make decisions that address these changes. They are mindful of past successes and are prepared to gain new knowledge as needed to respond to a rapidly changing environment.

Commitment to Resilience

Traditional organizations may try to avoid error altogether by taking preventative measures, while others try to position themselves to quickly respond and mitigate the potential fallout.[59] Commitment to Resilience is about incorporating both preventative and resilient solutions to maintain system functions amidst rapidly changing conditions. The themes Leadership,

[56] Weick and Sutcliffe, *Managing the Unexpected: Sustained Performance in a Complex World*.
[57] Weick, Sutcliffe, and Obstfeld, "Organizing for High Reliability: Process of Collective Mindfulness."
[58] Weick and Sutcliffe, *Managing the Unexpected: Sustained Performance in a Complex World*.
[59] Weick, Sutcliffe, and Obstfeld, "Organizing for High Reliability: Process of Collective Mindfulness."

Knowledge Workers, Education, and Learning Processes, Knowledge Creation, and Knowledge Management Systems relate to Commitment to Resilience. Participants indicated that they work to respond quickly to changes and initiate agile responses as conditions change. Learning paths support these functions and may be implemented in real time to help assess and resolve problems or changes as they emerge.

Deference to Expertise

Migrating decisions to a broader group of decision makers enable access to a wider group of solutions.[60] The themes of Leadership, Knowledge Workers, Open Communication, Knowledge Creation, and Knowledge Management Systems related to Deference to Expertise. Allowing experienced individuals to make critical decisions from the bottom-up is a feature of a reliability-seeking organization.[61] Decision migration includes a situation where a firefighter recognizes an abnormal condition and has the authority and expectation of making this condition known so the team can make appropriate adjustments.[62] An experienced caregiver might also recognize a deteriorating medical condition and initiate measures to address the condition.[63] Senior organizational leaders receive and act upon any alerts in a reliability-seeking organization and expect subordinates to readily present needed information and make decisions based on this information in the moment.

Negative Feedback System Model

We developed a model to represent the relationship between the H.R.O. framework and the development of an organizational learning culture. The model depicts a negative feedback system (See Figure 1). A direct relationship (+) indicates that when X increases, Y also increases. An inverse relationship (-) indicates that when X increases, Y decreases. The factors that make up a learning organization are depicted, and their relationship to other variables within the system is presented.

[60] Weick, Sutcliffe, and Obstfeld.
[61] Mauelshagen et al., "Respect for Experience and Organisational Ability to Operate in Complex and Safety Critical Environments."
[62] Mauelshagen et al.
[63] van Stralen, "High-Reliability Organizations."

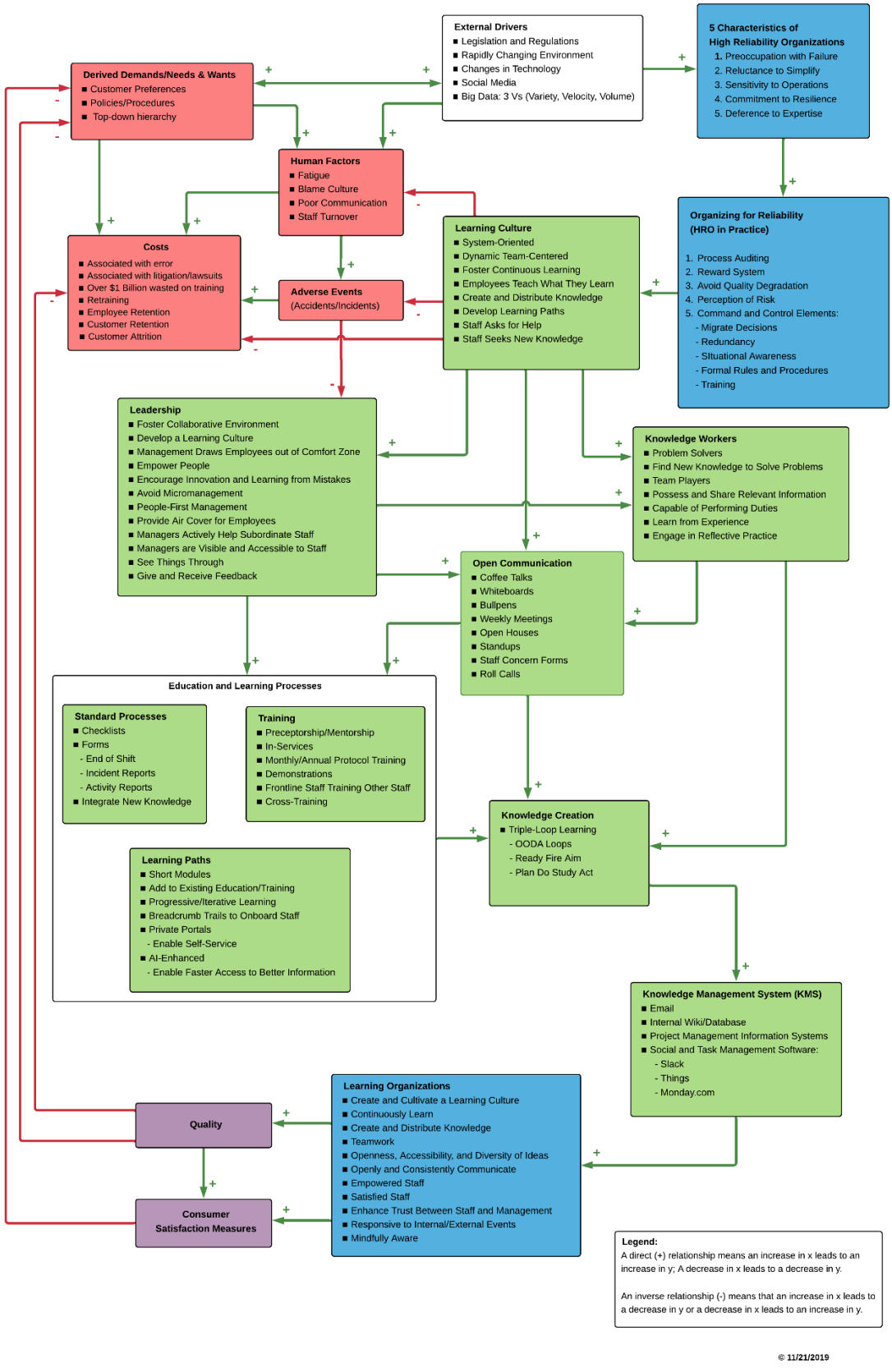

Figure 1 The High Reliability Organizations Framework for Learning Organizations: A Negative Feedback System

External Drivers

The first variable is External Drivers. These drivers represent outside influences on an organization. Examples include legislation and regulations, the rapidly changing business environment, changes in technology, social media influence, and "big data," representing variety, velocity, and volume. These external drivers are directly related (+) to Derived Demands, Needs, and Wants, and Human Factor Errors. The external drivers also serve as the impetus for introducing the H.R.O. framework to the system.

Derived Demands, Needs, & Wants

Derived Demands, Needs, and Wants represent customer and stakeholder responses to External Drivers, and in turn, influence the External Drivers. Examples include internal policies and procedures, customer preferences, and traditional top-down hierarchies. These Derived Demands, Needs, and Wants frequently lead to Human Factor Errors and are directly related (+) to increased Costs.

Human Factors

Human Factor Errors are attributable to fatigue, blame culture, poor communication, silos, and employee turnover. These errors are directly related (+) to Adverse Events. Adverse Events may include supply chain errors, marketing failures, failures to update core competencies, or workplace injury, and in healthcare may include patient harm. These events are directly related (+) to increased Costs related to turnover, litigation, and regulatory scrutiny. Costs are also influenced by traditional training programs that are obsolete even as employees are trained, culminating in an estimated $400 billion in waste.[64] Other Costs include retraining, customer retention strategies, and revenue lost to customer attrition. External Drivers, Derived Demands, Needs and Wants, Human Factor Errors, Adverse Events, and Costs are mitigated through the H.R.O. framework.

H.R.O. Framework

The H.R.O. framework includes the five principles based on the characteristics: Preoccupation with Failure, Reluctance to Simplify, Sensitivity to Operations, Commitment to Resilience, and Deference to Expertise. When applied within an organization, one successful strategy has been

[64] Ben-Hur, Jaworski, and Gray, "Aligning Corporate Learning with Strategy."

to incorporate Process Auditing, a Reward System, Avoid Quality Degradation, Perception of Risk, and the Command and Control Elements of migrating decision-making, building in redundancy, avoiding micromanagement, and adopting and adapting formal rules and procedures. These principles and strategies are integrated throughout the system, but for the purpose of the model, they are listed as the starting point for introducing an organizational learning culture.

Learning Culture

Learning Culture is directly related (+) to Leadership, Knowledge Workers, and Open Communication. Learning Culture is inversely related (-) to Human Factors, Adverse Events, and Costs. The organizational learning culture is system oriented, team oriented, and fosters continuous learning. Leaders develop learning paths, and employees teach what they learn to other employees or external organizations. Knowledge is created and distributed throughout the organization, as staff continually seek new knowledge and are encouraged to ask for help. This culture enables a different organizational structure regarding the relationships between Leadership and Knowledge Workers and the organizational commitment to Open Communication. These variables are developed by the culture, and they each serve to reinforce the culture further.

Leadership

Leadership is directly related (+) to Knowledge Workers, Open Communication, and Education and Learning Processes. Culture change starts with leadership. In a learning organization, leaders foster a collaborative environment, initiate and develop a learning culture, empower employees to make decisions, and draw employees out of their comfort zones, so they engage in innovation and learn from their mistakes. Leaders engage in people-first leadership, avoid micromanagement, and provide air cover for employees to further reinforce their ability to innovate. Managers actively help their subordinates and are present and visible to help reinforce the culture and lead by example when managing change. Leaders see things through, provide feedback, and are open and responsive to employee feedback. In this way, they encourage and develop knowledge workers responsible for generating organizational knowledge and making mindful decisions that benefit the organization.

Knowledge Workers

The Knowledge Workers theme directly relates (+) to Open Communication and Knowledge Creation. Knowledge workers are problem solvers who frequently seek new information in order to solve problems. They are knowledgeable and disseminate this knowledge so that others may learn. Knowledge workers are well-trained, knowledgeable in their fields, and capable of performing their duties and making appropriate real-time decisions based on real-time events. Knowledge workers also learn from experience and engage in reflective practice. Leaders and knowledge workers are committed to open communication.

Open Communication

Open Communication is directly related (+) to Knowledge Creation and Education and Learning Processes. Open communication is a consistent and continuous sharing of information throughout the organization. Communication may be casual when staff is going about their day, or it can be structured through micro-meetings, traditional meetings, or in-services. These micro-meetings are presented differently in various organizations. They may be called whiteboards, bullpens, roll calls, or coffee talks. Larger meetings can be called open houses. Agile scrum teams engage in a daily standup. Staff may also communicate directly or anonymously through the use of suggestion boxes, staff concern forms, or other written communication. Weekly meetings help ensure that everyone knows the organization's priorities and are another way to share new knowledge. In addition to open communication, leaders also make available training and learning paths, and they develop standard processes to ensure that information is recorded and distributed.

Education and Learning Processes

Participant responses introduced various processes organizations use to enhance the flow of information and implement relevant training. Three subthemes of Standard Processes, Training, and Learning Paths were identified and combined into a primary theme for Education and Learning Processes. These processes can be used to enhance other subprocesses. The Education and Learning Processes theme is directly related (+) to Knowledge Creation.

Standard Processes

Standard processes include checklists that ensure procedures are followed without missing any steps or ensuring quality measures have been addressed. Forms can be used to ensure and encourage proper communication among staff. These forms may include end-of-shift forms,

incident reports, or activity reports so that information flows between shifts and all pertinent information is available.

Training

Training in a learning organization is more efficient than in traditional organizations, and the information is more frequently updated. Training can be personalized in the form of preceptorships or mentorships, where frontline staff trains other staff. Training can also include in-services, demonstrations, or scheduled periodic protocol training.

Cross training is valuable for learning organizations. Cross training does not require expertise in someone else's job but having a general understanding of other roles helps reduce congestion when decisions migrate to those with the most information. In healthcare, nurses and respiratory staff may be cross trained to be aware of otherwise unknown variables affecting a patient. Other organizations similarly benefit by knowing enough about other jobs that they know whom to ask for help when a problem arises. Another critical aspect of training is the development of learning paths.

Learning Paths

Learning paths can take multiple forms and serve a variety of purposes. They can be used as a breadcrumb trail to guide new employees to the information they require to do their jobs. Learning paths are ideally short modules that are easily digested so that learning can be integrated into daily activities in real time as needed. Learning paths are common in legal and medical fields, where licensed staff must earn continuing education credits. Similarly, certain certifications require continuing education. Learning organizations can integrate this type of progressive, iterative learning paths that directly relate to organizational needs. The integration of Standard Processes, Training, and Learning Paths directly relate (+) to knowledge creation.

Knowledge Creation

Knowledge is created through the conversion of tacit knowledge into explicit knowledge. The triple-loop learning process is supported through implementation and support of learning paths, employee engagement in trainings and institutional education processes, and through the frequent and consistent flow of information throughout the organization via open communication channels. Various system processes contribute to the triple-loop learning process. First is Boyd's OODA Loop, where knowledge workers Observe, Orient, Decide, and Act based on real-time

information. The Plan-Do-Study-Act and Ready Fire Aim processes are similarly used to enhance organizational learning capabilities and enable agile responses to events. Creating knowledge is not enough. It must also be disseminated and readily accessible within the organization. Knowledge Creation is directly related (+) to the development of a Knowledge Management System (K.M.S.).

Knowledge Management Systems

The Knowledge Management System theme is directly related (+) to Learning Organizations. A KMS can take a variety of forms. Organizations commonly use internal wikis or databases for this purpose. A KMS can be as simple as the organization's internal email system or internal social networking tools. These tools may include Slack, Things, or Monday.com, for example. A more formal K.M.S. could include Project Management Information System software. A K.M.S. aims to enable knowledge workers to access the information needed to make informed decisions. It also serves to document lessons learned in response to engagement with new processes, procedures, or incidents.

Learning Organizations

The Learning Organizations theme is comprised of all the preceding themes in the model. The theme is directly related (+) to Consumer Satisfaction Measures and Quality. The learning culture introduced by organizational leaders is supported through the availability and use of a K.M.S. Knowledge workers can engage in continuous learning and document what they learn. This enables other knowledge workers to learn from prior experience and can enable better decision making once new variables are identified. Contributing to the K.M.S. helps create a sense of cohesion and teamwork. Knowledge workers benefit from openness, accessibility, and diversity. They openly communicate with their teams and other stakeholders or knowledge workers to solve problems, innovate, and create solutions. Empowering the staff to make decisions aids in improving employee satisfaction and enhances trust between managers and employees. The learning culture promotes mindful awareness of internal and external factors that affect viability of products, anticipation of customer or regulatory requirements, and awareness of potential safety risks that may be quickly addressed.

Consumer Satisfaction and Quality

Quality is inversely related (-) to costs and Derived Demands, Needs, and Wants. Consumer Satisfaction Measures are inversely related (-) to Derived Demands, Needs, and Wants. As quality improves and consumer satisfaction increases, costs relating to consumer attrition, top-down hierarchies, employee turnover, and outdated training are reduced. Addressing Derived Demands, Needs, and Wants is useful for reducing external influences of legislation and regulation and adverse social media reports.

CONCLUSION

The study results indicate that a learning organization's development is beneficial for adapting to the new knowledge-based economy. Learning organizations are supported by an organization's leadership, a learning culture, knowledge workers, open communication, organizational learning processes, training and learning paths, knowledge creation, and knowledge distribution. Organizations may use the H.R.O. framework to develop a new culture oriented toward safety, reliability, and resilience. The framework is useful to develop agile responses to changes in both the internal and external environment. Providing access to organizational learning enables knowledge workers and leaders to make decisions based on real-time information to address the unique components of problems or opportunities. Knowledge workers reported improved perceptions of organizational leaders and colleagues as they collaborate to develop innovative responses to environmental changes. This collaboration leads to reduced costs related to turnover, outdated training mechanisms, litigation from human error, and customer attrition. This also enables organizations to focus on addressing the rapidly changing external environment and develop agile core competencies in response.

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REFERENCES

Argyris, C., and D. A. Schon. "Organizational Learning: A Theory of Action Perspective, 1978." *Journal of Applied Behavioral Science* 15 (December 10, 1979): 542–48.

Argyris, Chris. "Teaching Smart People How to Learn" 4, no. 2 (n.d.): 12.

Armanious, Michael. "Knowledge Organizations' Learning Strategies to Develop Agile Core Competencies: A Qualitative Exploratory Case Study." D.B.A., University of Phoenix, 2019. https://search.proquest.com/docview/2309528951?accountid=35812.

Ben-Hur, Shlomo, Bernard Jaworski, and David Gray. "Aligning Corporate Learning with Strategy." *M.I.T. Sloan Management Review; Cambridge* 57, no. 1 (Fall 2015): 53–59.

Brandi, Ulrik, and Rosa Lisa Iannone. "Learning Strategies for Competence Development in Enterprises." *Industrial and Commercial Training* 49, no. 1 (January 1, 2017): 1–5. https://doi.org/10.1108/ICT-08-2016-0052.

Byus, Kent. "Observe, Orient, Decide, Act: A Subjectivist Model of Entrepreneurial Decision Making." *Journal of Managerial Issues* 30, no. 3 (Fall 2018): 349–302.

Casler, James G. "Revisiting NASA as a High Reliability Organization." *Public Organization Review* 13 (2013): 1–16. https://doi.org/10.1007/s11115-012-0216-5.

Chris Argyris, and Donald A. Schön. *Organizational Learning II: Theory, Method, and Practice*. Reading, MA: Addison-Wesley Publishing, 1996.

DeBourgh, Gregory A., and Susan K. Prion. "Patient Safety Manifesto: A Professional Imperative for Prelicensure Nursing Education." *Journal of Professional Nursing* 28, no. 2 (2012): 110–18. https://doi.org/10.1016/j.profnurs.2011.05.001.

Denning, Stephen. "How to Make the Whole Organization 'Agile.'" *Strategy & Leadership* 44, no. 4 (January 1, 2016): 10–17. https://doi.org/10.1108/SL-06-2016-0043.

Farrukh, Muhammad, and Abdul Waheed. "Learning Organization and Competitive Advantage-An Integrated Approach." *Journal of Asian Business Strategy; Karachi* 5, no. 4 (2015): 73–79.

Grabowski, Martha, and Karlene H. Roberts. "Risk Mitigation in Virtual Organizations." *Organization Science* 10, no. 6 (December 1, 1999): 704–21. https://doi.org/10.1287/orsc.10.6.704.

Hartmann, Christine W., Mark Meterko, Shibei Zhao, Jennifer A. Palmer, and Dan Berlowitz. "Validation of a Novel Safety Climate Instrument in V.H.A. Nursing Homes." *Medical Care Research and Review* 70, no. 4 (August 1, 2013): 400–417. https://doi.org/10.1177/1077558712474349.

Leon, Ramona-Diana. "The Development of the Future European Knowledge Workers. An Academic Perspective." *Management Dynamics in the Knowledge Economy; Bucharest* 4, no. 3 (2016): 339–56.

Libuser, Carolyn Beeler. "Organizational Structure and Risk Mitigation." Ph.D., University of California, Los Angeles, 1994. http://search.proquest.com.contentproxy.phoenix.edu/docview/304083303/abstract/8B8AD9BE722D4F4DPQ/1.

Mauelshagen, Craig, David Denyer, Martin Carter, and Simon Pollard. "Respect for Experience and Organisational Ability to Operate in Complex and Safety Critical Environments." *Journal of Risk Research* 0, no. 0 (2013): 1–21. https://doi.org/10.1080/13669877.2012.761273.

Megheirkouni, Majd. "Leadership Styles and Organizational Learning in U.K. For-Profit and Non-Profit Sports Organizations." *International Journal of Organizational Analysis* 25, no. 4 (January 1, 2017): 596–612. https://doi.org/10.1108/IJOA-07-2016-1042.

Milligan, Colin, and Allison Littlejohn. "Why Study on a MOOC? The Motives of Students and Professionals." *International Review of Research in Open and Distributed Learning* 18, no. 2 (April 1, 2017): 92–102.

Nordin, Patrik, Anna-Aurora Kork, and Inka Koskela. "Value-Based Healthcare Measurement as a Context for Organizational Learning: Adding a Strategic Edge to Assess Health Outcome?" *Leadership in Health Services* 30, no. 2 (March 23, 2017): 159–70. https://doi.org/10.1108/LHS-10-2016-0053.

Padgett, Jared D. "Patient Safety Culture and High Reliability Organizations." D.B.A., Walden University, 2014. https://search.proquest.com/pqdtglobal/docview/1557705479/abstract/81EFB5C69B974294PQ/2.

Padgett, Jared, Kenneth Gossett, Roger Mayer, Wen-Wen Chien, and Freda Turner. "Improving Patient Safety through High Reliability Organizations." *The Qualitative Report* 22, no. 2 (February 5, 2017): 410–25. https://nsuworks.nova.edu/tqr/vol22/iss2/4/

Periyakoil, Vyjeyanthi S. "Taming Wicked Problems in Modern Health Care Systems." *Journal of Palliative Medicine* 10, no. 3 (June 2007): 658–59.

Peters, John. "A Learning Organization's Syllabus." *The Learning Organization* 3, no. 1 (January 1, 1996): 4–10. https://doi.org/10.1108/09696479610106754.

Pokharel, Mohan P., and Sang Ok Choi. "Exploring the Relationships between the Learning Organization and Organizational Performance." *Management Research Review* 38, no. 2 (January 1, 2015): 126–48. https://doi.org/10.1108/MRR-02-2013-0033.

Rijal, Sapna. "Leadership Style and Organizational Culture in Learning Organization: A Comparative Study." *International Journal of Management & Information Systems (IJMIS)* 14, no. 5 (November 2, 2010). https://doi.org/10.19030/ijmis.v14i5.19.

Roberts, Karlene H. "Some Characteristics of One Type of High Reliability Organization." *Organization Science* 1, no. 2 (1990): 160.

Robertson, Robert W., and Carlos Tasso E. Aquino. "Online Education to Improve Workforce Skills: The Experience in the United States." *I-Manager's Journal of Educational Technology; Nagercoil* 13, no. 2 (September 2016): 1–6.

Senge, Peter M. The Fifth Discipline: The Art and Practice of the Learning Organization. New York, NY: Doubleday/Currency, 1990.

Sutcliffe, Kathleen M. "High Reliability Organizations (H.R.O.s)." *Best Practice & Research Clinical Anaesthesiology* 25, no. 2 (June 2011): 133–44. https://doi.org/10.1016/j.bpa.2011.03.001.

van Stralen, Daved. "High-Reliability Organizations: Changing the Culture of Care in Two Medical Units." *Design Issues* 24, no. 1 (2008): 78.

van Stralen, Daved W., Racquel M. Calderon, Jeff F. Lewis, and Karlene H. Roberts. "Changing a Pediatric Sub-Acute Facility to Increase Safety and Reliability." In *Patient Safety and Health Care Management*, edited by Grant T. Savage and Eric W. Ford, 7:259–82. Advances in Health Care Management. Emerald Group Publishing Limited, 2008. https://doi.org/10.1016/S1474-8231(08)07012-2.

Weick, Karl E, and Kathleen M. Sutcliffe. *Managing the Unexpected: Sustained Performance in a Complex World*. 3rd ed. Hoboken, NJ: Wiley, 2015.

Weick, Karl, Kathleen Sutcliffe, and David Obstfeld. "Organizing for High Reliability: Process of Collective Mindfulness." *Research in Organizational Behavior* 1 (1999). http://politicsir.cass.anu.edu.au/staff/hart/pubs/46%20t%20Hart.pdf#page=37.

Zúñiga, Franziska, David Schwappach, Sabina De Geest, and René Schwendimann. "Psychometric Properties of the Swiss Version of the Nursing Home Survey on Patient Safety Culture." *Safety Science* 55 (2013): 88–118. https://doi.org/10.1016/j.ssci.2012.12.010.