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Published in:
Comprehensive Reviews in Food Science and Food Safety
DOI:
10.1111/1541-4337.13124
Publication date:
2023

Citation for published version (APA):

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Download date: 19. Apr. 2024
Organizational unlearning: a risky food safety strategy?

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Short version of title (running head) Organizational unlearning: a risky food safety strategy?

Comprehensive Reviews in Food Science and Food Safety
ABSTRACT: Strategically unlearning specific knowledge, behaviors and practices facilitates product and process innovation, business model evolution, new market opportunities and is essential to meet emergent supply chain and customer requirements. Indeed, addressing societal concerns such as climate change, and net zero means elements of contemporary practice in food supply chains need to be unlearned to ensure new practices are adopted. However, unlearning is a risky process if crucial knowledge is lost, for example if knowledge is situated in the supply base not the organization itself, or there is insufficient organizational food safety knowledge generation, curation and management when new practices/processes are designed and implemented. An exploratory, critical review of management and food safety academic and grey literature is undertaken that aims to consider the cycle of unlearning, learning and relearning in food organizations and supply chains with particular emphasis on organizational innovation, inertia and the impact on food safety management systems and food safety performance. Findings demonstrate it is critical with food safety practices, such as duration date coding or refrigeration practices that organizations ‘unlearn’ in a way that does not increase organizational, food safety or public health risk. This paper contributes to extant literature by highlighting the organizational vulnerabilities that can arise when strategically unlearning to promote sustainability in a food supply context. Mitigating such organizational, food safety and public health risk means organizations must simultaneously drive unlearning, learning and relearning as a dynamic integrated knowledge acquisition and management approach. The research implications are of value to academics, business managers and wider industry.

Keywords: unlearning, food safety, risk, performance, knowledge management, knowledge acquisition,
1. Introduction

Unlearning can be regarded as the overwriting of existing knowledge (Hedberg, 1981); as a process of strategic change (Akgün et al., 2003); a mechanism to underpin new product and service development (Akgün et al., 2007; Cegarra-Navarro et al., 2010) and new ideas (Prahalad & Bettis, 1986). Unlearning has also been described as an activity to discard out of date tacit knowledge (Rebernik & Sirec, 2007); relinquishing ways of doing [practices] at the personal level (Bridges, 1991; Duffy, 2003) or at the organizational level (Hedberg, 1981; Klein, 1989; Hamel & Prahalad, 1994). Unlearning, described also as knowledge extinction, interference, inhibition or suppression (Klammer & Gueldenberg, 2019), is a selective reversible response (Klein, 1989).

Shedding or discarding of pre-existing knowledge, at the individual or organizational level, can be initiated as an intentional process where existing knowledge creates a barrier to new learning or stifles entrepreneurial activity or innovation (Hedberg, 1981; Newstrom, 1983; Becker, 2005) e.g. with new product development that drives the ingredient switch from meat based to plant based foods or global to local food supply. Situations where unlearning is essential is where current practices create inertia (Durst & Zieba, 2020), for example, an inability to decarbonise current organisational processes and activities so an organization may seek to implement management processes to reduce food loss/waste, change packaging instructions (the removal of duration dates), or there is a pressing need to adapt quickly to sudden supply chain shocks (Awan et al., 2021), such as those caused by Brexit, COVID-19 or a product recall incident.

Unlearning and forgetting are umbrella terms used to address different types of organizational knowledge loss (Klammer & Gueldenberg, 2019; Manning et al., 2020). Some argue that intentionality separates the concepts of unlearning and forgetting (Howells &
Scholderer, 2016; Klammer & Gueldenberg, 2019), i.e., some knowledge loss at the individual or corporate level [unlearning] is both conscious, purposeful, voluntary and intentional, whilst with organizational forgetting knowledge loss is involuntary (Globerson, 1987; de Holan & Phillips, 2004; 2011). However, this differentiation is not consistent in the literature (Kluge et al., 2018).

Retention of redundant or obsolete knowledge and associated routines and practices in itself possess risks for business resilience from an economic and environmental perspective (Durst & Zieba, 2020), especially where such knowledge informs practices that are neither sustainable, environmentally sound, or compliant with changing societal and market expectations of food related organizations or their products. Retaining old food safety routines and practices when new knowledge or new ways of ensuring product safety are identified can also lead to a higher than necessary food safety risk. Strategic organizational unlearning takes place in food organizations and wider supply chains within existing system complexity and uncertainty, and in competitive markets where food supply chains need to be dynamic and agile, constantly realigning and reconfiguring to meet customer demand. Unlearning occurs when organizations are seeking to pivot as a result of internal or external market and societal pressures (Hislop et al., 2014). A contemporary example of pivoting in the food safety context is where food organizations are being required by policy and/or the market to address climate change, switch to alternative proteins or reformulate their products, decarbonize to meet net zero, extend shelf-life and/or remove duration coding to reduce food waste. Pivoting, realigning practices and reformulating products means historic practices have to be unlearnt, new knowledge acquired and this needs to be embedded effectively within existing food safety management systems (FSMS). Howells and Scholderer (2016) position that the use of the term
“unlearning” is superficial, and not a recognized term in the scientific field of psychology, a so-called ‘clean slate fallacy.’ Indeed, the processes of learning and unlearning actually occurs simultaneously (Becker, 2005).

The aim of this research is to consider the cycle of unlearning, learning and relearning in food organizations and supply chains with particular emphasis on organizational innovation, inertia and the impact on FSMS and food safety performance. In this critical review, unlearning is positioned as a strategic management process that intentionally sheds existing knowledge or practices in favor of new or modified knowledge and practices to achieve a specific goal. This intentional unlearning process, for example the repositioning of corporate values that realign procurement and operational activities, could occur alongside unintentional loss of knowledge and practices leading to unintended outcomes such as reduced food safety performance.

The methodological approach employed was an exploratory, purposive, snowball review of existing academic and grey literature to frame the conceptual research and gather evidence for the case report (see Kowalska & Manning, 2020 for an explanation of this form of review). The following databases: Science Direct, Google Scholar, Google (to include grey literature) were used to primarily consider current information on food safety, food safety performance, knowledge management, inertia, learning, unlearning and knowledge loss at organizational level. These themes were used as key search terms in a range of combinations. Iterative literature review is grounded by a foundational literature search using a series of iterative searches. In undertaking the searches for a given combination of terms the first 100 items in each search were considered for relevancy and any duplication. All relevant papers were then collected and the titles and abstracts read. The papers were then read in full and screened for relevance and value in
supporting a discursive narrative and argument. Ninety academic sources were used to support
the primary narrative in this paper. Screening of both academic and grey literature has
demonstrated there is limited previous research considering the concept of unlearning in order
to innovate in food supply chains and its impact on food safety performance. The paper is
structured as follows: Section 1 gives an introduction to the paper. Section 2 considers inertia,
organizational order and implications for food safety. Section 3 on strategic unlearning,
organizational resilience, and organizational recovery leads into Section 4 on strategic unlearning
and its relationship to knowledge management. Section 5 positions strategic unlearning and its
association with risk; Section 6 provides a case study example and Section 7 concludes the paper.

2. Inertia, organizational order, and implications for food safety

Inertia is the speed of adjustment of an individual, organization or supply chain relative to the
environment in which it operates and the rate of change or degree of environmental turbulence
in that environment (Hannan & Freeman, 1984). This means that an organization may be deemed
to have inertia in a highly turbulent environment/situation such as a product recall scenario,
because their response is deemed slow or insufficient, whereas previously the organization was
perceived as agile or dynamic in a less turbulent ‘business-as-usual’ situation. In this context,
change within a ‘business-as-usual’ context, what French and Bell (1999) describe as incremental
day to day adaption, or first-order change, is completely different to second order change where
comprehensive, radical, often externally imposed, organizational change is required (Louw &
Martins, 2004) e.g., during or post product recall, a food safety scare or food defence incident.

Factors that increase inertia are forces resistant to change (Jones, 2000), or associated with
organizational complexity (Hannan & Freeman, 1984). Organizational inertia reduces product
and business model innovation (Huang et al., 2013) directly impedes change, and/or indirectly promotes the status quo (Louw & Martins, 2004). Structural inertia, either internal to the business or external within the wider environment (Hannah & Freeman, 1984), has two main aspects firstly, that the factors that drive resilience and give organizations a survival advantage and this can also make them resistant to change and secondly, that organizational change is often perceived as more risky, disrupts routine, existing competencies, organizational memory and notions of institutional legitimacy (Larsen & Lomi, 1999) promoting resistance (Conit et al., 2021). Table 1 synthesizes factors cited as driving structural inertia in the literature into specific themes, financial, infrastructural, market-orientated, normative, social and technological. These have been linked to a food safety example.

**Take in Table 1**

Unlearning has been identified as a key unlocking strategy to address the inertia of path dependency (Ernste, 2003; Hassink, 2005); where knowledge is identified by organizations that can be unlearnt as it is obsolete, and does not equip organisations for the future, or align with future strategy. Using the work of Rushmer and Davies (2004), Hislop et al., (2014) position two types of unlearning in terms of the depth of unlearning, wiping versus deep unlearning with regards to knowledge, skills and behaviors, and more deeply values, assumptions and beliefs, where a third response, fading is considered as organizational forgetting (see Manning et al., 2021). Unlocking strategies have been considered in management research from the perspective of unlocking of business potential or unlocking of innovation potential. The notion of unlocking technologies (Tura et al., 2019) are considered especially within industry 4.0 (Berg et al., 2021) and digitalization (Loock, 2020). Lock-ins are “blockages” that promote a singular view and
practices, to the exclusion of other alternatives, and as a result sustain, even entrench, the established organizational trajectory (Della Rossa et al., 2020; Feyereisen et al., 2017; Messner et al., 2021, 2022; Conti et al., 2021). In terms of lock-in in existing organizational systems and its influence on food safety and FSMS, Iftekhar and Cui (2021) cite lock-in associated with data management and traceability systems i.e., if the organization has invested considerably into one traceability system, they are less likely to switch to another. Others have considered lock-in as a barrier to reducing food waste, especially technical and investment lock-in (Bajželj et al., 2020; Messner et al., 2021, 2022). Lock-in mechanisms support the maintenance of business-as-usual and restrict adaptation activities (Groen et al., 2022). In technology adoption, for example, in traceability systems, lock-in can include the challenges of non-standardization of data collection within bespoke organizational applications and a lack of interoperability of the technology adopted (Opara-Martins et al., 2016).

Organizational order, encompassing institutional arrangements, processes, work practices, routines and people, lies at the heart of efficient, and strategically resilient, food supply chains (Manning & Soon, 2016). The development and implementation of quality assurance models has been a strategic organizational approach within food supply chains to embed organizational order and compliance with food safety, product quality and labeling, social, environmental and organizational criteria and as a result deliver safe, consistent, affordable food (Manning et al., 2006).

Organizational order is “the structural and cognitive order which affects the pattern of the members of the organizational activities namely the pattern of resource deployment, organizational structure, systems processes and cultures” (Nonaka, 1988, p.57). Consideration of
organizational control structures involves “explicitly or implicitly, general considerations of changing social structures and sources of disorder which threaten their continued existence” (Whitley, 1977, p.169). With regard to food safety, organisational order and control structures involve the design, development and implementation of FSMS and the associated social structures, often referred to as food safety culture. Faced with change and uncertainty in internal or external environments e.g., changes in market requirements or food safety legislation, self-renewal of organizations, or indeed whole supply chains, is essential to ensure viability, resilience and growth. Organizational self-renewal requires the dissolution of existing organizational control structures and the creation of new patterns of order and control (Nonaka, 1988). The creation of new organizational order also influences networks of power and interdependent factors such as institutional arrangements, work and organizational practices, staff and cultural dynamics, relationships and reinforcement processes that exist at the micro (individual), meso (business) and macro level (supply chain) simultaneously (Constantinides & Barrett, 2006; Higashi et al., 2020). Indeed, organizational practices are socially constructed through routines and habits that inform behavior, work plans and practices.

Organisational order and control structures within FSMS over a period of time can experience inertia attached to work routines, leading to them becoming rigid, bounded by past experience and learnings, internally resistant to change; and as a result, reinforce the status quo (Hannan & Freeman, 1984; Huang et al., 2013; Hur et al., 2019). Thus, the capacity of individuals and/or organizations to be agile, and strategically unlearn established knowledge, behaviors or values can either embed inertia or be a strong catalyst and facilitator of change (Hislop et al., 2014). Organizational inertia theory does not position that organizational change never occurs,
rather that the organizational changes that occur reinforce inertia (Hur et al., 2019). Indeed, organizations can have high levels of inertia either in the routines employed, in the defined rules used to transition between routines, or within the organizational memory (Hannan & Freeman, 1984). This is not to imply that existing FSMS that remain constant lack value. Existing food safety organizational order and control structures underpin the continuous delivery of excellent food safety performance, but organizational change needs to be considered as to whether it is enacted to reinforce existing norms and routines rather than to engage with aspects of practice that increase agility and resilience.

Organizational inertia has characteristics of sluggishness (Louw & Martins, 2004); stickiness (Wolf & Bonanno, 2014; Hur et al., 2019); or viscosity where information and innovations fail to flow (Krackhardt, 1997). Hur et al., (2019) state that stickiness can be driven through the impact of previous investment in technology influencing the willingness to implement change or to adapt. Stickiness, as a concept, can be extended to infrastructural aspects too, stickiness occurs where the business does not adopt new ways of doing because they have not sufficiently realised the financial benefit of previous investments. This can prevent the adoption of emergent food safety measures, because the cost benefit analysis promotes “business as usual.”

There are three stated elements to organisational inertia: insight inertia, action inertia and psychological inertia (Godkin & Allcorn, 2008; Huang et al., 2013). Godkin and Allcorn (2008, p.82), capture these three elements in two aspects of organisational inertia, firstly, apathy to change and secondly, lethargy toward taking action leading to organisational resistance and failure, and an “inability to think ahead and anticipate or failing to respond to internal and external demands for adaptation and change.” Hur et al., (2019) additionally identify cognitive
inertia which is linked to culture and norms in work routines, technological inertia which can be
driven, as previously described, by pre-existing investments and also subsequent challenges with
interoperability between the technology used and other potential innovations. Resource
allocation inertia arises from previous decisions on infrastructural investment and political inertia
is driven by the positions taken on a given policy and the influence of senior management
decisions, especially where doing nothing, in terms of enacting change, is the least risky option.
Strategic organizational unlearning, inertia and aspects of lock-in are enacted at the
individual, organizational and supply chain level. Overcoming lock-in through unlocking strategies
that reduce inertia at all socio-technical levels is essential to drive economically, environmentally
and socially sustainable food supply chains and improve food safety performance. Strategic
unlearning, organizational resilience and organizational recovery is now considered as a concept.

3. Strategic organizational unlearning, organizational resilience, and
organizational recovery

3.1 Organizational knowledge and organizational knowledge creation

Shin (2004) differentiates between three kinds of organizational knowledge:

- **Codified Knowledge** – knowledge that is formally codified with appropriate context
  (formal knowledge, symbolic knowledge); a food safety example being the principles of
  hazard analysis critical control point (HACCP) see Codex Alimentarius Commission (CAC,
  2020).

- **Instrumental Knowledge** - knowledge that is created by and resides with the individual
  (tacit knowledge, automatic knowledge); i.e., personal food safety related knowledge
derived from experience or practices undertaken over time which is situational (Manning et al., 2021), and

- **Social knowledge** – knowledge that is created by social links, established ways of doing, and accepted as a shared value (informal knowledge, social knowledge, embedded knowledge). Social knowledge is the collective and co-created body of knowledge that informs social norms (attitudes, intentions and behaviors) that are embedded within food safety culture (Griffith et al., 2010).

The organizational unlearning process creates the space for innovation, new food safety knowledge creation and promotes new food safety practices and processes within the organization. Organizational knowledge creation, more generally, is explained as “the capability of a company as a whole to create new knowledge, disseminate it throughout the organization and embody it in products, services, and systems” (Nonaka & Takeuchi, 1995, p.3). Organizational knowledge creation is a process that captures and adds value to existing data and information in considering the relationships between data and how it transforms to information, and then to knowledge (Ponelis & Fairer-Wessels, 1998). This is a parallel process to strategic organizational unlearning that involves curating, aggregating and utilizing data in a different way.

Yang et al., (2010) determine organizational knowledge creation as being a four-step process, exploration, institutional entrepreneurship, combination and exploitation which are mediated by knowledge creation routines of which organizational unlearning, along with learning and relearning forms a part of the development and honing of the organizational knowledge repository. Thus, organizational learning, relearning and unlearning processes are embedded in...
organizational change strategies that aim to increase strategic resilience where the long-term survival of organizations requires strategic flexibility (Zhao & Wang, 2020); and innovation.

3.2 Organizational resilience

Strategic resilience is “having the capacity to change before the case for change becomes desperately obvious” (Hamel & Valikangas, 2003, p.3) and is dependent on the organization’s ability to learn and unlearn (Tsang & Zahra, 2008). Starbuck (2017) proposes that organizations must first undertake the process of unlearning in order to overcome inertia driven by obsolete knowledge and letting go of information to facilitate strategic foresight and strategic flexibility (Burt & Nair, 2020; Zhao & Wang, 2020). The shedding of obsolete knowledge and information in order to inform strategic foresight and flexibility is a key aspect of organizational resilience, and, in the context of this paper, food safety-related organizational resilience and food-safety related organizational recovery. FSMS resilience is defined here as the ability of the FSMS to survive supply chain shocks or incidents which are associated with increased food safety risks e.g., during the COVID-19 pandemic, sudden loss of key employees operating the FSMS due to illness, or when supply chains were disrupted and spot purchasing of ingredients was inevitable. Djekic et al. (2021) describe the influence of the degree of FSMS maturity and that the greater the maturity of the FSMS the greater the resilience shown.

3.3 Organizational recovery

Food supply chain resilience is also positioned in the literature in terms of the ability to recover and the adaptive capacity to food safety shocks (Mu et al., 2021). Mu et al. suggest food safety recovery can be considered in terms of recovery time or recovery speed between the shock and the FSMS recovery point (back to original position or new equilibrium) and the degree of
recovery or recovery capacity i.e., the ability to return to that original position or steady state with a new equilibrium within the organization itself and the wider supply chain.

Mu et al., (2021, p.5) state: “The recovery capacity can be improved by, for example, quick detection of the food safety hazards (e.g., using sensor technologies for the real-time monitoring, proactive surveillance scheme) and allowing redundancy on the production capacity (e.g. labor, raw materials, equipment) and supply chain network (e.g. alternative supplier, transporter).”

Food safety-related organizational resilience and organizational recovery has been considered in other literature (Kowalska & Manning, 2022; Smith et al., 2022; Manning et al., 2020; 2021; Manning, 2020).

4. Strategic organizational unlearning and knowledge management

4.1 Knowledge management strategies

Knowledge management as a strategy has a positive, yet indirect effect on organizational change (Imran et al., 2016). Knowledge management is not just about knowledge acquisition and measures to prevent knowledge loss, it is a holistic strategy that recognizes that core knowledge within an organisation is dynamic, shed, relearned and continuously supported by new knowledge. Effective knowledge management strategies and the leveraging of knowledge can, if suitably focused, enhance organizational success (Greiner et al., 2007; Imran et al., 2016).

Barney’s (1991) resource-based view of the organization also acknowledges knowledge as a vital resource. However, in a strategic unlearning process, learning, unlearning and relearning need to take place simultaneously (Sharma & Lenka, 2019), and this requires significant organizational resource. Ineffective knowledge management strategies will lead to poor performance, even business failure, and in the context of food safety, a food safety incident. Therefore, from the
senior management board and throughout the organization, there needs to be a constructive reconciliation of valuable and redundant knowledge and this needs to be integral to knowledge management strategies (Sonnenfeld, 2002). Effective dissemination of existing knowledge especially food safety knowledge should be supported by knowledge management strategies that incorporate learning and knowledge acquisition as a core organisational tool to drive innovation and competitive advantage (Purushothaman, 2015). Whilst food safety management is a frequently addressed topic in the food science literature, knowledge management strategies associated with FSMS and food safety performance is considered much more sparsely.

Knowledge and information management systems for microbiological hazards have been considered (McMeekin et al., 2006), but otherwise knowledge management is considered more broadly in terms of supply chain management. This area of research is worthy of more conceptual and empirical food safety related research in the future. Knowledge management processes should be determined by the strategic direction of the organization in that the process(es) employed depend on the organization’s strategic intent and its embedded business model (Greiner et al., 2007; Hansen et al., 1999). Thus, knowledge management processes should consider the policies, procedures and technologies employed (Anthes, 1991); capture, distribute and effectively manage knowledge (Davenport, 1994); and consolidate existing knowledge so it is accessible and evolves with the business as it implements new strategies (Birkett, 1995). At senior management level, there must be a process of building mutual respect and trust, but also the sharing of difficult issues, challenging each other as to the best response and implementing the appropriate actions based on the food safety knowledge available at the
time and to determine which aspects of food safety knowledge are valuable and which have become redundant, or simply no longer useful.

4.2 Knowledge reframing in the intentional unlearning/learning dynamic

Schein (1985, 2004) determined there were three hierarchical levels of actualization of organizational culture and these were adapted by Griffith (2014). Level 1 of the hierarchy, organizational climate, is the outer-most, visible layer of organizational culture that is observed and verified during audits and inspections; Level 2, is the underpinning culture of the organization’s espoused values and attitudes and behaviors that relate to regulatory and market standards compliance, and Level 3, core culture, reflects the invisible and assumed core values of the organization which is informed by social knowledge. Wiping involves behavioral unlearning where the catalyst is external to the individual and relates to a change of process, job role or strategy driven within the organization or wider environment (Rushmer & Davies 2004; Hislop et al., 2014). Wiping, as a form of unlearning operates at level 1 of the Schein’ (1985, 2004) and Griffith’ (2014) models. Deep, cognitive unlearning is concerned with the ‘discarding’ of values, norms, assumptions (Rushmer & Davies 2004; Hislop et al., 2014), i.e., cognitive unlearning positioned at level 2 and 3 of the Schein/Griffith models, that then informs individual and/or organizational behavior change. However, organizational values and norms may not co-align with individual behaviors and norms within the organization or indeed between organization and the wider supply chain. Aspects of knowledge reframing that are of interest for food organizations and the wider supply chain, specifically are overwriting, grafting, interference, inhibition, suppression and extinction (Table 2). Many of the terms in Table 2 are novel in the context of FSMS and food safety culture. Proposed paradigms of types of organizational
unlearning are myriad in the general literature and are synthesized in Table 3 aligned with a food safety management related example.

Take in Tables 2 and 3

The risks and benefits derived from organizational unlearning are specific to a given food safety situation. A strategic trade-off can occur between the risk or benefit associated with organizational unlearning and the risk or benefit of retaining elements of existing organizational memory, and by inference associated practices and culture. Developing an agile organizational unlearning response that establishes a holistic knowledge review process would enhance active knowledge-capture processes, for example, using exit interviews with experienced staff as they leave the organization to capture and constructively reconcile personal and tacit food safety knowledge as to why things are done in their current way, and what practices can be revised, improved or are redundant.

5. Strategic organizational unlearning and its association with food safety risk

5.1 Risk

Risk is a subtle and nuanced concept, while its definition varies with context, risk can be positioned as an uncertain future event that has the potential to cause harm to that [product, person, organization] which is valued (Aven & Renn, 2009). The essence of organizational unlearning can be seen as a matter of risk: consciously putting aside certain knowledge that has been of value from the past as a route to capture the benefits of the opportunities of the future. Risk is an estimate of the probability and severity of the adverse health effects in exposed populations, consequential to hazards in food (FAO, 1997). Durst and Zieba (2020) identify unlearning as a source of knowledge risk and a potential threat to economic sustainability. In
addition, there is an upside or opportunity risk associated with unlearning (see for example Olsson, 2007), where unlearning key knowledge and associated routines and practices to meet emerging customer expectations can provide value. However, strategic organizational unlearning is not simply a rational knowledge ‘shedding’ process, knowledge dynamics theory highlights the influence of emotional and spiritual knowledge within this process especially with regard to downside or threat risk. If accumulated food safety knowledge, and associated practices, are put aside, the organization creates the potential to repeat past mistakes and/or waste the inherent value associated with embedding past experience in current strategic and operational business processes.

5.2 Managing risk

As a first stage of the process of managing the food safety risk associated with strategic organizational unlearning, the organization should assess the level of food safety risk that could arise, for example in changing a product testing strategy, or launching a product with known allergens as ingredients, in comparison to the organization’s risk appetite. This means the organization may strategically accept the level of risk if the level of risk is within the organizations’ risk appetite and seek to address and mitigate the risk by a variety of means, if it is not. Risk appetite in this context is “the willingness to take on [food safety related] risky activities in the pursuit of values” (Aven, 2013, p. 465). Risk appetite and risk acceptance are two different constructs as risk appetite is framed by motivation, incentive and reward compared with downside risk and the decision that is made and risk acceptance is governed by specific acceptance criteria, targets and tolerances (Aven, 2013). Risk acceptance, such as in the deliberations following the development of a FSMS focused on HACCP is based on a sequenced
set of decisions, using a decision tree and/or expert judgment to determine if the hazard is at an acceptable level or not. In the food supply chain, qualitative assessment of food safety risk is influenced by knowledge, and the propensity or willingness of the organization to eliminate, mitigate, outsource or accept risk (Manning & Soon, 2013; Kleboth et al., 2016). If the level of food safety risk is assessed to be too high and cannot be mitigated to an acceptable level; the consequent decision could be either not to unlearn or not to proceed with the activity. For example, the extension of shelf-life for a product to reduce food waste, or the increased food safety risk of reducing preservatives in a product formulation or making a claim that a product is dairy free when there is a risk of potential dairy contamination in the supply chain. Indeed, from a food safety perspective what lies at the heart of demonstrating the implementation of reasonable precautions (beforehand methodization) is to have a reliable food safety risk assessment and control system in place. Then to exercise integrity in that risk assessment and the associated risk management systems that are adopted, and most importantly to be honest about the degree of risk appetite and risk acceptance that either the risk manager(s), the wider risk organization or the supply chain is prepared to accept.

One of the challenges of strategic organizational unlearning where it could affect food safety is that existing and accumulated knowledge within the organizational memory, and the associated practices, can be undervalued. Indeed, it can be difficult to quantify within a risk assessment process, the embedded value of retained historic data and associated practices. This challenge in terms of quantification means that qualitative assessments are undertaken to either maintain the status quo, and potentially associated costs driving uncompetitiveness, or to implement change. The evidence base on which such decisions are made can be strong, or
alternatively may be weakened by the decision not to retain historic data and knowledge due to
the cost of retention, or that the knowledge base is siloed in people, obsolete systems or largely
inaccessible systems (paper records).

It is crucial for an organization to retain certain elements of critical knowledge; in fact, it
presents a business risk if they lose such valuable knowledge. Organizations need to relinquish
knowledge that is no longer relevant or obsolete and gain new knowledge critical to
organizational stability, resilience and growth (Wensley & Navarro, 2015). However, unlearning
to drive socio-technical system level transitions, especially in the food sector where there is a
high degree of environmental turbulence, is not a linear process, as multiple social and technical
factors will co-evolve and shape each other in the process (Silva & Stocker, 2018). This makes
unlearning as a strategic process very complex and potentially risky. Thus, organizational
unlearning cannot be a blanket approach and the upside and downside risks, especially food
safety risks, of an unlearning strategy need to be considered carefully. Different organizations,
even within the same supply chain, will have differing risk appetites and some may be willing to
take on higher risk activities in the pursuit of specific economic, environmental or social values
(Aven, 2013), such as greater economic return or compliance with emergent market
requirements such as greater sustainability, decarbonizing its activities and less environmental
impact. The processes and consequences of unlearning in food safety management are now
considered in a case study context.

6. Processes and consequences of unlearning in food safety
To prevent a food safety incident from occurring during an unlearning, relearning and learning process, effective risk management processes must be in place, and these should include an effective food safety orientated knowledge management strategy and associated food safety performance assessment. Hislop et al., (2014) also differentiate between four aspects of unlearning addressed in the literature: antecedents to unlearning, the process of unlearning, the paradigms of unlearning employed (Table 3) and the consequences of the unlearning approach.

A case study is used to reflect on these four aspects and the complexity for a food organisation of strategically unlearning, learning and sometimes relearning. Organizational unlearning and new knowledge acquisition does not necessarily occur at the same time, or at the same rate for all individuals in the same organization, or indeed the wider food supply chain that supports the organization. This means that organizational unlearning as a process is not homogeneous and can be segmented and fragmented even ineffective if appropriate organizational strategies do not prevent this from occurring. FSMS relate to situational operations and food safety knowledge and management processes that can be within the organization or more widely within their supplier base.

Risk of disruption of processes occurs in a volatile of turbulent environment when the new knowledge implementation/ unlearning/ improvisation interaction become dislocated, because either turbulence is absorbed into operations, there is a failure to operationalize new knowledge or information due to rigidity or inflexibility, or there is a lack of capacity for effective, agile improvisation to occur (Akgün et al., 2003; 2006; 2007). Thus, the antecedents, processes and consequences of unlearning are of importance here (Akgün et al., 2006; Hislop et al., 2014).
Akgün et al., (2006) propose external turbulence (exogenous crisis), team crisis (internal crisis) and team anxiety (team fear and cognitive disturbance) as important antecedents of unlearning where the intended consequence is effective implementation of new knowledge, routines, habits, cognitive frameworks, values, beliefs, assumptions and practices. With the appropriate internal organizational processes (communication tools, feedback processes for example), team crisis and team anxiety can be positive antecedents of success but where these processes fail weak or negative performance can occur. Other antecedents proposed to be of influence include organizational size, labour turnover and maturity of team dynamics, the strength of counter knowledge (knowledge that is counter to the new knowledge/information), and perceptions of procedural justice (Kim & Park, 2021).

6.1 Antecedents to unlearning

Chipotle Mexican Grill Inc, described in this paper as Chipotle, is an organization with a restaurant chain that provides a menu range that includes burritos, burrito bowls, tacos and salads. Chipotle was founded in 1993, in Denver Colorado by Steve Ells (Chipotle Annual Report, 2019), in 1998, McDonalds made an initial investment, and by 2001 was Chipotle’s largest investor seeing business expansion from 16 stores in 1998 to 500 stores by 2005. In 2006, McDonalds fully divested from Chipotle (Daszkowski, 2019), and Chipotle went public in 2007 (Heffernan, 2010). As of December 31st, 2019, they operated 2,580 restaurants throughout the United States of America (USA), 39 international Chipotle restaurants and three non-Chipotle restaurants (Chipotle Annual Report, 2019). Thus, antecedents such as organizational size and staff turnover, and maturity of the FSMS are important here. The 2019 annual report states the restaurants utilize multiple fresh high food safety risk ingredients across their menu. These include chicken,
steak, braised pork, shredded beef, rice, cilantro, cheese, sour cream, lettuce, peppers, salsas and onions. These foods are known to have a history of large-scale food safety outbreaks in the USA, for example: a Listeria outbreak in 1985 associated with Mexican style soft cheese (Flynn, 2011); ground beef in the 1992 Jack in the Box Incident (Marler, 2017); Hepatitis A linked to green onions (Amon et al. 2003); Salmonella linked to jalapeno peppers (CDC, 2008); and an E. coli O157:H7 outbreak linked to a Mexican restaurant in Arizona in 2013 (Andrews, 2013). This demonstrates the food safety risks associated with these ingredients were known at the sector level and this knowledge informs the development of organizational FSMS to ensure food safety.

6.2 The process of unlearning

2001-2009

In 2001, Chipotle launched their strategic mission of “Food with Integrity” an approach to improve the integrity of sourcing, including finding the best ingredients possible, no prophylactic use of antibiotics and hormones (Gilliard et al., 2017) and more localized products. This corporate strategy changed the procurement policy i.e., a strategic unlearning process took place. Naturally raised pork was first sourced in 2000; naturally raised chicken in 2002; zero trans-fat frying oil in 2004; sour cream and cheese from pasture-fed cattle in 2012 and in 2015 eliminated genetically modified organisms from its food ingredients (Gilliard et al., 2017). However, it is suggested that implementing this strategy meant that existing and new suppliers struggled with the unlearning, relearning and learning aspects of the change (Göçer et al., 2019). Whilst there is a depth of research focused on consumer food safety knowledge and its mediating effect on purchasing intention and purchasing behavior, i.e. business to consumer (B2C), there is less published evidence on either the role of knowledge in business to business (B2B) procurement interaction.
or the association of knowledge management practices and risk in unlearning processes in procurement. This is worthy of further food safety research.

In March/April 2008, more than 20 people who were reported to have eaten at a Chipotle restaurant in La Mesa, California developed Hepatitis A (Taylor, 2015). At the same time, more than 500 people became ill with norovirus potentially linked with eating at a Chipotle location near Kent State University in Kent, Ohio (Marler, 2015). In September 2009, an E. coli outbreak (29 people) that crossed six states (Colorado, Utah, New York, North Carolina, South Dakota, and Wisconsin) was connected via a common link, the consumption of iceberg lettuce in Chipotle’s outlets (Taylor, 2015). A Chipotle lettuce supplier, Church Brothers, LLC, was believed to be the source (Marler, 2015). In 2009, there was also a *Campylobacter jejuni* outbreak linked to a Chipotle restaurant in Minnesota. The outbreak (11 cases) was linked to potentially undercooked chicken and cross-contamination of the lettuce i.e., chicken was the source (MDH, nd) see Table 4.

Take in Table 4

These examples suggest a potentially different food safety risk profile associated with the fresh food format rather than the pre-prepared “fast” format used in many other competing restaurants. The fresh format may require more in-restaurant labour and a higher level of staff training with regards to food safety, what Nonaka and Takeuchi (1998) describe as organisational knowledge creation, which will require unlearning of previous, knowledge, skills and behavior and learning of alternative knowledge and behaviour and potentially improvisation can occur (Akgün et al., 2006).

**2015-2019**
In January 2015, Chipotle withdrew contracts from a pork supplier for not complying with their ‘Food with Integrity’ standards, leading to logistical challenges where one third of their restaurants were not able to offer pork on their menu (Gilliard et al., 2017). By July 2015, Chipotle had switched to a UK supplier who met their procurement standards (Gilliard et al., 2017). The ‘Food with Integrity’ programme meant that Chipotle ingredients could have cost more if they drove lower yields and lower performance in crops and livestock, or if suppliers could not meet their standards within the cost structures they were required to operate to (Gilliard et al., 2017).

The level of supplier knowledge and expertise in addressing food safety issues and inherent food safety risk can shift during an intentional organizational strategy to change the supply base. The loss of supplier knowledge for an organization when a supplier is delisted or replaced is a form of knowledge extinction. A food organization then relies upon the effectiveness of the resultant food safety risk management processes when transitioning the supplier base. Shorter, localised supply chains are not necessarily less risky, they can add complexity and fragmentation and can require increased resources for verification (Torres, 2016). Göçer et al. (2019) describe this as a sustainability-risk-cost relationship as on the one hand implementing more sustainable supply chain standards is a strategic response to reducing reputational risk, but on the other hand the increased costs involved in a highly competitive market are in themselves a risk. Additionally, the procurement of inherently higher food safety risk materials from a constrained supply base can lead to greater food safety risk exposure. Hence, ensuring an appropriate level of risk appetite when strategically repositioning corporate values towards a sustainability strategy e.g., removing duration dates from packaging to reduce food waste, or amending temperature controls or changing packaging to deliver a decarbonisation strategy,
must align with food safety knowledge management processes to ensure that both cognitive and
behavioural unlearning, wiping and deep unlearning are effectively managed (Hislop et al., 2014;
Durst and Zieba, 2020).

Intentionally changing practices at the restaurant level can lead to turbulence, team crisis,
team anxiety, and if combined with staff turnover, and pressure on organizational resources,
reduces food safety-related organizational resilience and food-safety related organizational
recovery. The lack of food-safety related organizational resilience can result from multiple
interconnected and mutually distinct antecedents and processes influencing at individual, team
and organisational level. The capacity of individuals and/or organizations to strategically unlearn
established knowledge, behaviors or values is required to facilitate change (Hislop et al., 2014);
but the unlearning, relearning, learning process requires robustness and rigor within the
associated management practices to prevent food safety incidents from occurring.

In August 2015 in Simi Valley, California there were at least 234 cases of norovirus
allegedly associated with Chipotle restaurants (Zuraw, 2015) see Table 4. The location was
temporarily closed after customers reported the outbreak and health inspectors said that the
facility contained dirty and inoperative equipment, equipment directly connected to the sewer,
and other sanitary and health violations (Taylor, 2015). In August/September 2015, in Minnesota,
a Salmonella Newport outbreak (64 cases) was linked to tomatoes as the source (Zuraw, 2015).
Twenty-two Chipotle locations were allegedly linked to the outbreak and all Chipotle restaurants
in Minnesota replaced the tomatoes of concern with those sourced from a different supplier
(Taylor, 2015). In October 2015, there was a multi-state outbreak of E. coli O26 (52 cases)
potentially linked to Chipotle (Marler, 2015; Zuraw, 2015). At the end of the month, 43 stores
were temporarily closed in Washington and Oregon (Adams, 2016). CDC (2016) states the cases were potentially associated with eating in 17 different restaurant locations in 8 States and 43 restaurants were temporarily closed. Chipotle undertook deep cleaning at all the restaurants connected with the E. coli outbreak, replaced ingredients, changed food preparation procedures, surveyed staff and provided further data to investigators (Taylor, 2015).

On November 10th, Chipotle confirmed that their Pacific Northwest stores would reopen after being sanitised and all food replaced. Less than two weeks later, three new States were included in the E. coli outbreak (Adams, 2016). Microbial testing performed by the company did not yield E. coli (more than 2,500 tests of Chipotle’s food, restaurant surfaces, and equipment all showed no E. coli) see FDA (2016). The FDA report (2016) stated there was increased testing of ingredients, additional safety procedures and audits introduced and deep cleaning and sanitation programmes. In December 2015, seven more E. coli cases were highlighted, and Chipotle launched new food safety protocols for fresh produce before being sent to the restaurants and Chipotle outlined new cooking protocols for their stores (Adams, 2016). In February (8th) all stores were closed for an all-staff food safety training session (McCoy & Lackey, 2016). Throughout 2016, poor in store experience in around half of the restaurants was cited as the main reason for the loss of sales including long waiting times, non-availability of certain ingredients for the burrito products or poor hygiene in the dining area (Halzack, 2016; Czarnecki, 2017).

In July 2017 a Chipotle restaurant in Sterling Virginia was temporarily closed for sanitisation after more than 130 people became sick with norovirus and norovirus like symptoms who were allegedly linked to the restaurant (Edwards & Kekatos, 2017; Jargon, 2017). The same
week photographs were given to the media alleging a mouse infestation in a Chipotle restaurant in Dallas and the share price fell 4.5% (Edwards & Kekatos, 2017). In July 2018, a Clostridium perfringens outbreak in Powell, Ohio led to 647 people self-reporting to hospital linking with visiting a restaurant. A Chipotle statement explained, “Chipotle Field Leadership will be retraining all restaurant employees nationwide beginning next week on food safety and wellness protocols.” (Food Safety News, 2018).

The Chipotle Annual Report (2019) states:

“Several highly publicized food safety incidents in our restaurants and our Food With Integrity business principles may make us more susceptible than our competitors to significant adverse consequences arising from food safety incidents....we may be at a higher risk for food safety incidents than some competitors due to our greater use of fresh, unprocessed produce and meats, our reliance on employees cooking with traditional methods rather than automation, and our avoidance of frozen ingredients. The risk of illnesses associated with our food also may increase due to the growth of our delivery or catering businesses, in which our food is transported and/ or served in transportation conditions that we cannot control. All of these factors could have an adverse impact on our ability to attract and retain guests, which could in turn have a material adverse effect on our growth and profitability.”

6.3 The paradigms of unlearning reflected in the case study

The case study demonstrates that organizational unlearning as a process of relinquishing ways of doing at the personal and organizational level in terms of personal and organizational cognitive processes and behaviors can create risk. Unlearning as a process of strategic change (Akgün et al., 2003); and to underpin new product and service development (Akgün et al., 2007; Cegarra-
Navarro et al., (2010) and to innovate with new ideas (Prahalad & Bettis, 1986) requires new practices within day-to-day operations. Akgün et al., (2007) consider this dynamic as a dual unlearning-improvisation interaction especially where planned activities or process fail to deliver when internal and/or external environments are highly turbulent or uncertain. Chipotle adopted a business strategy with greater upside benefits in terms of delivering to the sustainability agenda, but with potentially greater downside risk due to the standards set and, potentially their 2019 Annual Report suggests, greater vulnerability associated with the ability to manage inherent food safety risk with the ingredients sourced and in the food safety practices adopted.

6.4 Consequences of the unlearning process

The creation of new organizational order, as in this case study, deeply influences institutional arrangements, work and organizational practices, staff and cultural dynamics, relationships, recovery and resilience processes that exist at the micro (individual), meso (business) and macro level (supply chain) simultaneously (Constantinides & Barrett, 2006; Higashi et al., 2020). Ketchen et al., (2014) consider ‘overkill’ as reflecting food safety incidents and recall approaches where there is a resource gap in knowledge during the recall and a wish to swiftly drive organizational recovery so, for example, product recalls include a wider range of products than if organizational systems had been able to clearly identify the breadth of a problem. De Holan and Phillips (2004) argue that organizations can overlearn from bad experiences (e.g. product failure, food safety incident and/or product recalls) and as a result retaining those practices can lead to organizations, and the individuals that work within them, becoming too cautious, risk averse, and less competitive once an incident has occurred. This can ultimately create organizational dysfunction, reallocation of much needed resources to testing and
sampling and a weak competitive position in the marketplace. In this context, unneeded stocks of knowledge within the organizational memory e.g., adoption of protocols that requires additional product sampling and testing, resources, routines or practices long after a product recall has occurred and can lead to unnecessary expense and use of management time that is diverted from other activities (De Holan & Phillips, 2004). Furthermore, such an approach can make a food business uncompetitive compared with a competitor that has a less rigorous and costly, but still effective FSMS. Bureaucracy overload and over specification in FSMS can be costly and reduce competitiveness, and lead to opportunity costs because activities are ineffective, duplicated, over-proceduralization or over-specification (Størkersen et al., 2020), what Rae et al., (2018) describe as safety clutter.

According to Rae et al., (2018, p. 194) safety clutter is described as “the accumulation of safety procedures, documents, roles and activities that are performed in the name of [food] safety, but do not contribute to the safety of operations.” Safety clutter arises because systems are often developed with a view to auditability rather than practicability and often driven by management insecurity and concern over liability (Størkersen et al., 2020). Thus, it is easier to add or expand existing food safety practices and activities and more difficult to address the additional opportunity costs (Rae et al., 2018) due to structural inertia, or little organizational incentive or drive to undertake a strategic organizational unlearning process.

The strategic unlearning approach to provide “Food with Integrity” especially using of fresh, unprocessed produce, potentially produced a higher corporate food safety risk profile which if not adequately mitigated could lead to food safety incidents (Annual Report, 2019). The approach was a conscious putting aside of previous knowledge and relinquishing ways of doing
to capture a new customer value proposition. A switch to local sourcing of ingredients (35% of supply by 2010) and the growth agenda of the business in terms of increasing restaurant outlets led to added administrative and food ingredient costs and a different logistical process when switching from one multi-national corporate supplier to multiple local farms (Tice, 2010). In 2020 Chipotle agreed to pay a $25 million federal fine to resolve criminal charges related to the 2015-2018 Chipotle associated food safety outbreaks. The level of fine was set in part, because of the cost already incurred with improving its food safety program (Food Safety News, 2020).

7. Concluding thoughts

To innovate and take advantage of new markets and to meet emergent supply chain and customer requirements, food businesses may need to strategically unlearn existing practices and knowledge that is stifling progress, and at the same time learn, and relearn (Sharma & Lenka, 2019). Shedding knowledge and associated practices in a food business, such as the drive to embed environmental sustainability, must be undertaken in a way that does not reduce resilience and recovery capabilities, increase food safety risk or lead to a food safety incident. However, the process of organizational unlearning, if not adequately managed, can lead to knowledge extinction, knowledge interference or knowledge suppression (Table 2) and the loss of performance in terms of FSMS (Bouton, 2002). The additional costs of developing communication structures to share and disseminate new knowledge during an organizational unlearning process also needs to be recognized and addressed, otherwise the existing body of knowledge may be inhibited, and overwriting may occur (Hedberg, 1981), without the food safety risks of concern being fully considered and mitigated.
Organizational unlearning can have positive effects on organisational flexibility, and organisational capability especially in driving incremental and radical innovation (Wang et al., 2013). Allowing new ways of thinking, and new behaviors means an innovative, dynamic business logic can emerge (Prahalad & Bettis, 1986), more widely across the organization and in terms of developing more dynamic FSMS. Thus, organizational unlearning can be viewed as a metaphor for a selective response, a process, or event that can be permanent or temporary, and can be strategically reversed if the old organizational knowledge that has been relinquished in a given situation is then perceived to have greater organizational value when situations change (Klein 1989, Becker, 2005) i.e. there can be a process of organizational relearning. The unlearning, learning (new knowledge acquisition) and relearning processes can occur in tandem, but not necessarily in collaboration or at the same speed, this too can increase food safety risk(s).

The pivoting process of organizations within their wider supply chains and the interconnected processes of unlearning, relearning and learning is considered in this work with particular emphasis on strategic organizational unlearning, organizational order (FSMS), organizational resilience and organizational recovery and how to co-currently effectively manage the food safety risk associated with such dynamics. Food safety related organizational resilience needs to be enacted pre-change, during the change and post change to prevent a food safety incident from occurring and in the event of non-conformance, food-related organizational recovery needs to be agile, adaptive and effective. Unlearning is an important strategic process that is key to building organizational resilience and a precondition to learning as unlearning facilitates the adoption of new knowledge by the organisation (Morais-Storz & Nguyen, 2017; Starbuck, 2017). Therefore, organizations require the capabilities to both learn, and unlearn
(Bonchek, 2016), even learn, unlearn and relearn (Sharma & Lenka, 2019) and this generates a process of double-loop learning and facilitates strategic foresight and relearning (Burt & Nair, 2020; Zhao & Wang, 2020). Becker (2005) states that in many cases new learning does not simply replace the old, instead both old and new knowledge are retained in the organisational memory, and it could be argued here, counter knowledge too. This suggests that the body of food safety knowledge within an organization is dynamically created, curated and managed and organizations need to effectively monitor such knowledge and verify its efficacy in informing practices and processes to consistently delivering safe food.

Knowledge may sit in specific repositories, some of these may be individuals within organizations or that sit outside the core business. In reconfiguring procurement policy across a supply chain, essential food safety knowledge, and effective knowledge management systems, may be lost that resides with suppliers and contractors when they are substituted e.g., in a change from a global to local procurement strategy. In a data rich environment such as food supply chains, knowledge is more than data and information. Indeed, knowledge management failures are said to be due to “an over-emphasis on technologies and insufficient acknowledgment of the “humanness” of knowledge” (Beesley & Cooper, 2008, p.49). The humanness of knowledge is a crucial factor in the unlearning/learning/relearning dynamic at the individual and the organizational level, and factors such as procedural justice, absenteeism, perceptions of fairness will mediate how that knowledge is enacted and shared (Manning, 2020).

Investing in knowledge management strategies requires organizations to consider their food safety-related organizational resilience and how it is affected by unlearning, learning and relearning processes, within the organization and across the wider supply chain. Furthermore,
organizations need to consider whether knowledge retention strategies that are currently employed may actually promote inertia, stifle innovation and hinder improvements in food safety performance i.e., they can act as both a barrier to and an enabler of innovation and organizational improvement, most specifically within the FSMS. As the food sector collectively, and as individual organizations, consider post-COVID, net zero and climate change resilience and recovery strategies it is crucial unlearning strategies are positioned appropriately and effectively. Drivers to improve the sustainability of food production and wider food supply will mean that unlearning of existing practice will take place concurrently at multiple levels of the food supply chain and in multiple interactions. Whilst strategic organizational unlearning can afford the opportunity to take advantage of innovation, new markets and providing new features for food products, strategic organizational unlearning is a risky process if crucial food safety knowledge is lost, or there is insufficient food safety knowledge applied when new practices or processes are implemented. Therefore, unlearning as a process cannot occur in isolation. Mitigating such food safety risk means organisations must simultaneously be driving unlearning, learning and relearning processes in a dynamic integrated approach.

There are implications for the food industry from this paper in terms of the food safety knowledge management processes that frame innovation and alternative strategies to meet societal demands e.g., addressing food waste, reduction of single use packaging, decarbonising supply chains, reducing reliance on fossil fuels etc. Future research should consider other examples of strategic unlearning, learning and relearning as a co-aligned process and how food safety risk management strategies can be implemented to deliver successful outcomes as well as
give rise to more sustainable, resource efficient and societally acceptable ways of producing and
supplying food.

Funding

None

Author Contributions

Conceptualization, ALL.; methodology, L.M.; formal analysis, ALL.; investigation, W.M.; and
L.M.; writing—original draft preparation, W.M.; and L.M.; writing—review and editing, ALL. All
authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

None to declare
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https://doi.org/10.1037/edu0000385


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Higashi, S. Y., de Queiroz Caleman, S. M., de Aguiar, L. K., & Manning, L. (2020). What causes organizations to fail? A review of literature to inform future food sector (management)


Table 1: Factors that drive structural inertia (Adapted from Hannah & Freeman, 1984; Stål, 2015; Conti et al., 2021)

<table>
<thead>
<tr>
<th>Theme</th>
<th>Factors of influence</th>
<th>Food safety example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>Historic investment in plant, equipment, personnel.</td>
<td>Investment in old processing equipment e.g. pasteurizers that prevents investment in new equipment. Lack of finance to invest in new refrigeration systems that can reduce food safety risk and reduce the energy requirements of the system.</td>
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<tr>
<td></td>
<td>Exchange relations with external actors that will lead to financial penalties/cost if altered or cease. Industry cost structures embed inertia. Lack of funds to invest in change/innovation.</td>
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<tr>
<td>Infrastructural</td>
<td>Infrastructural rigidity.</td>
<td>Existing infrastructure does not allow for new innovation e.g. production line too cramped to position an in-line metal detector.</td>
</tr>
<tr>
<td>Market-orientated</td>
<td>Lack of market incentives to overcome inertia. Vested interest in the status quo.</td>
<td>Market is not focused on food safety risk reduction over and above compliance so there is no incentive to invest in additional food safety controls e.g. designated production lines for allergen control.</td>
</tr>
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<td></td>
<td>Market barriers that prevent access and exit from different activities.</td>
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</tr>
<tr>
<td>Normative</td>
<td>Influence of precedents (routines, habits, practices) on current standards, practices and processes. Threat to legitimacy from structural change. Existing assumptions embed inertia. Vested interest in the status quo. Regulatory barriers prevent access and exit from different activities.</td>
<td>Existing practices and norms prevent change to alternative thinking or ways of doing e.g. new allergen control procedures.</td>
</tr>
<tr>
<td>Social</td>
<td>Dynamics of political coalitions/loss of institutional support.</td>
<td>Existing food safety culture within the organization will influence the implementation of the food safety management system. Embedding of hierarchical structure and inability to effect ground up change to food safety management systems may lead to inertia.</td>
</tr>
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<td></td>
<td>Exchange relations with external actors that embed existing networks and social practice. Weak knowledge management, transfer, exchange. Vested interest in the status quo. Misaligned institutional settings, policies and incentives. Attitudes/culture drives an aversion to change.</td>
<td></td>
</tr>
<tr>
<td>Technological</td>
<td>Lack of appropriate technology to support change/innovation.</td>
<td>FSMS are based on historic systems and processes. New products/processes may not be adopted because there is a lack of appropriate technology e.g. new packaging design, or switching from paper to digital data collection.</td>
</tr>
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<td></td>
<td>Technological persistence.</td>
<td></td>
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<td></td>
<td>Dominant research agendas, narratives and priorities.</td>
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</table>
### Table 2. Aspects of knowledge reframing in the intentional unlearning/learning dynamic

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
<th>Food safety example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge extinction</td>
<td>The deliberate destruction of knowledge because it is no longer relevant or needed. The loss of learned performance (Bouton, 2002); extinction, a form of retroactive interference involves new learning that is stored along with the old (Bouton, 2002); the type of learning that occurs with context-dependent learning rather than “unlearning” (Abramowitz, 2013).</td>
<td>Knowledge that is lost when a particular range of food products is no longer produced.</td>
</tr>
<tr>
<td>Knowledge grafting</td>
<td>Organizational learning to increase the store of organizational knowledge by acquiring and grafting on new members of staff who possess knowledge not previously available within the organization (Huber, 1991)</td>
<td>Knowledge introduced to the organization when new staff, contractors or consultants are employed/engaged.</td>
</tr>
<tr>
<td>Knowledge inhibition</td>
<td>Inhibitors of knowledge sharing include power politics, concern over the need to retain competitive advantage, lack of shared context between individuals from different backgrounds and organizational or industry sectors, the cost of sharing may be prohibitive, and the structures developed to share and disseminate knowledge are insufficient (Ipe, 2004)</td>
<td>The power and politics within an organization or an industry can inhibit new knowledge and ways of addressing food safety and the sharing of knowledge between organizations.</td>
</tr>
<tr>
<td>Knowledge interference</td>
<td>Interference occurs when embedded misconceptions held within the organizational memory are reactivated (Butterfuss &amp; Kendeou, 2020). Refutation supports knowledge revision (unlearning) by identifying misconception(s) and correcting them either through implicit communication or explicit direction (Weingartner &amp; Masnick, 2019). If incorrect knowledge that is held within the organizational memory is not revised, it can interfere with new knowledge acquisition (Kendeou et al., 2014); and it cannot be erased from collective memory and can be resistant to change (Lassonde et al., 2016).</td>
<td>Knowledge interference may occur where root cause analysis has not been effectively undertaken in the event of a food safety incident. Surface resolution analysis may have identified factors of influence that were not the actual cause but contributing factors and as a result the collective memory reinforces the incorrect reason for the food safety failure. For example, failure to clean effectively may be cited as the cause of an incident, but if the root cause is the design of the equipment then no matter how many times cleaning is cited – the design of the equipment could cause an incident to reoccur.</td>
</tr>
<tr>
<td>Knowledge management</td>
<td>The panoply of procedures and techniques used to get the most from a firm’s knowledge assets (Teece, 2000, p. 35).</td>
<td>Knowledge management should be an essential aspect of maintaining an effective FSMS.</td>
</tr>
<tr>
<td>Knowledge overwriting</td>
<td>New knowledge is introduced to replace old knowledge which is no longer seen to be of value (Hedberg, 1981)</td>
<td>New analytical techniques may be introduced which make the old techniques, and associated limits of detection obsolete.</td>
</tr>
<tr>
<td>Knowledge suppression</td>
<td>Knowledge suppression is the inability to convert tacit knowledge to explicit knowledge (Teece, 2000). Abstraction describes the way the detail embedded in knowledge is suppressed until it is needed (Davidova et al., 2014). Abstraction influences whether knowledge is deeply or</td>
<td>Knowledge within the organization, for example, tacit knowledge on equipment operations that is not formalized may be inhibited if there are power dynamics that focus on the accepted formal knowledge. For example, a work instruction may not</td>
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<tr>
<td>Learning</td>
<td>Capturing new knowledge can occur simultaneously with the rejection of embedded or existing knowledge leading to a dynamic knowledge stock for a given organization i.e. unlearning and learning are not necessarily discrete activities.</td>
<td>An active food safety training programme can embed learning, unlearning and relearning strategies.</td>
</tr>
<tr>
<td>shallowly embedded in the organizational memory (Ponelis &amp; Fairer-Wessels, 1998). Deeply embedded knowledge can be a barrier to change.</td>
<td>contain all knowledge within the organisation associated with a given process.</td>
<td></td>
</tr>
<tr>
<td>Unlearning narrative</td>
<td>Description</td>
<td>Food safety management related example</td>
</tr>
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<tr>
<td>Unlearning as a process of relinquishing ways of doing at the personal level.</td>
<td>Relinquishing at the individual level the old modus operandi and replacing with new ideas, actions or behaviors.</td>
<td>Switching from paper based to digital systems for recording by the operator in line with changes in operational procedures e.g., operators are required to verify temperature information and include the check on a digital app. rather than on a paper document.</td>
</tr>
<tr>
<td>Unlearning as a process of relinquishing ways of doing at the organizational level.</td>
<td>Relinquishing previous methods, approaches and modus operandi at the organizational level to accommodate changing environments and contexts and replacing with new ideas, actions or behaviors.</td>
<td>Implementing a new traceability system or procurement system within the organization. An example is the paper based supplier approval process is replaced with a digital system.</td>
</tr>
<tr>
<td>Unlearning as a process of overwriting.</td>
<td>New knowledge replaces old knowledge.</td>
<td>Implementing new knowledge into the organizational memory for example with regard to emerging pathogens or emerging antimicrobial resistance with specific pathogens. An example is where the HACCP plan needs to be reviewed and updated in the event of a new pathogen emerging which could affect the organisation and its food products. This means that the HACCP plan will replace existing plans.</td>
</tr>
<tr>
<td>Unlearning as a selective reversible response.</td>
<td>Old knowledge is not erased just maintained for situations where it is considered the new knowledge does not apply.</td>
<td>Information relating to suppliers that are currently delisted is kept within knowledge management systems so that it can be accessed if required in the future. This could relate to historic microbiological sampling data for raw materials which can be kept on file and used to assess new suppliers.</td>
</tr>
<tr>
<td>Unlearning as a process to make room for new ideas</td>
<td>Unlearning is simply the process by which firms eliminate old logics and behaviors and make room for new ones.</td>
<td>When new technology or new cleaning regimes are adopted this requires changes to pre-requisite programs requiring elimination of old behaviors and adoption of new practices, habits and learning. A new system for hand washing could be introduced which replaces the old system.</td>
</tr>
<tr>
<td>Unlearning as a process to underpin new product and service development</td>
<td>Unlearning as a process can drive new developments and improvisation</td>
<td>Adoption of new knowledge, technology in practices as new products are developed and included within day to day production. Products could be reformulated and the new rodut may meet additional societal requirements, e.g. lower sugar content, but as a result this could increase food safety risk.</td>
</tr>
<tr>
<td>Unlearning as an activity to discard out of date tacit knowledge.</td>
<td>Unlearning eliminates and discards outdated tacit knowledge and promotes organizational innovation</td>
<td>Introducing new innovations and ways of doing as part of the organizational system requiring old tacit knowledge to be unlearnt and new knowledge adopted. Tacit knowledge may need to change as new processes or processes are introduced e.g. change from people undertaking food safety checks to automated food safety monitoring.</td>
</tr>
</tbody>
</table>
Unlearning as a process of change

Unlearning is the changing the organizational beliefs, norms, values, procedures, behavioral routines, and physical artifacts.

Intentional strategic process to change food safety culture and food safety climate. An example would be the recognition of the impact of food safety culture on food safety performance and implementing a strategy to improve food safety behaviours.

Akgün et al., (2003),

Unlearning is a metaphorical term that is not accepted in the psychology literature

Unlearning is not a valid term instead terms such as amnesia, extinction, inhibition, interference, learning, memory decay, negative transfer, and suppression should be used.

Examples include the decay of value in knowledge overtime as it becomes obsolete, or organizational amnesia occurs due to the structuring and potential siloing of organizational memory.

An example would be that food safety information is held in a specific location (single computer that is not networked) where if it is not kept up to date and can be obsolete.

Howells & Scholderer (2016); Manning et al., (2021)

<table>
<thead>
<tr>
<th>Year</th>
<th>Incident</th>
<th>Location</th>
<th>Impact</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>Hepatitis A outbreak</td>
<td>La Mesa, California</td>
<td>20 cases</td>
<td>(Taylor, 2015)</td>
</tr>
<tr>
<td>2008</td>
<td>Norovirus outbreak</td>
<td>Kent, Ohio</td>
<td>&gt;500 cases</td>
<td>(Taylor, 2015)</td>
</tr>
<tr>
<td>2009</td>
<td>E. coli outbreak across linked to consumption of iceberg lettuce.</td>
<td>Six US States</td>
<td>29 cases</td>
<td>(Taylor, 2015)</td>
</tr>
<tr>
<td>2009</td>
<td><em>Campylobacter jejuni</em> outbreak linked to potentially undercooking chicken and cross-contamination.</td>
<td>Minnesota</td>
<td>11 cases</td>
<td>(MDH, nd)</td>
</tr>
<tr>
<td>2015</td>
<td>E. coli outbreak</td>
<td>Includes Washington and Oregon</td>
<td>37 cases</td>
<td>(Daszkowski, 2019).</td>
</tr>
<tr>
<td>2015</td>
<td><em>Salmonella</em> outbreak with tomatoes being the likely source.</td>
<td>Minnesota</td>
<td>64 cases; 9 hospitalised</td>
<td>(Taylor, 2015; Zuraw, 2015) (Gilliard et al. 2017).</td>
</tr>
<tr>
<td>2015</td>
<td>E. coli outbreak</td>
<td>Seattle and Portland</td>
<td>24 cases</td>
<td>(Taylor, 2015)</td>
</tr>
<tr>
<td>2015</td>
<td>E. coli O26</td>
<td>Nine US States</td>
<td>55 cases; 21 hospitalised</td>
<td>(CDC, 2016)</td>
</tr>
<tr>
<td>2015</td>
<td>Norovirus outbreak</td>
<td>Boston</td>
<td>&gt;136 cases</td>
<td>(Zuraw, 2015)</td>
</tr>
<tr>
<td>2016</td>
<td>Norovirus outbreak</td>
<td>Billerica, Massachusetts</td>
<td>-</td>
<td>(Beach, 2016).</td>
</tr>
<tr>
<td>2017</td>
<td>Norovirus outbreak</td>
<td>Virginia</td>
<td>&gt;130 cases</td>
<td>(Edwards &amp; Kekatos, 2017)</td>
</tr>
<tr>
<td>2018</td>
<td>Clostridium perfringens outbreak</td>
<td>Powell, Ohio</td>
<td>647 cases</td>
<td>(Food Safety News, 2018; Bosco, 2019)</td>
</tr>
</tbody>
</table>