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The Adoption and Implementation of Kaiser Permanente's Guideline for Purchasing Chemicals: An In-depth Case Study

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THE ADOPTION AND IMPLEMENTATION OF KAISER PERMANENTE'S GUIDELINE FOR PURCHASING CHEMICALS: AN IN-DEPTH CASE STUDY

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University of California San Francisco, 2010

This study uses organizational change, diffusion of innovation, and strategic management theories to explore the adoption and implementation of an innovative process for purchasing chemicals and chemical-containing products at Kaiser Permanente (KP), the largest not-for-profit health system in the United States. Case study methodology and content analysis were used to design and analyze this study. Interviews were conducted with key decision makers at KP headquarters in Oakland, California and with informants from nongovernmental organizations that partnered with KP in purchasing chemicals purchasing efforts. In addition to interviews (n = 19), private and public documents (n = 22) were examined and analyzed to triangulate the data. This exploratory study carefully documents the complex factors that influenced an innovation in the purchase of chemicals and chemical-containing products by an industry leader widely recognized for its environmental stewardship initiatives. This study highlights specific organizational successes at KP in driving the design and manufacture of environmentally preferable product alternatives. However, it also characterizes the substantial contextual and regulatory barriers that KP confronted as it tried to establish a more sustainable base of operations. These barriers included: (a) difficulty acquiring product information; (b) difficulty reducing chemicals and chemicals of concern in the supply chain due to various factors, such as lack of

available alternatives; (c) limited organizational resources to pursue or verify product information or create new products; (d) difficulty addressing the large and complex range of products that enter KP's supply chain; and (e) difficulty surmounting barriers posed by existing regulations governing chemicals.

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CHAPTER 1

THE STUDY PROBLEM

The health care sector consumes substantial quantities of materials and products that contain synthetic industrial chemicals. Although largely unintended and typically not well-understood, purchasing practices in the health care sector can negatively contribute to human and environmental health outcomes due to (a) considerable resource and material consumption that involves hazardous chemical processes and ingredients; (b) patient, occupational, and environmental exposures to hazardous chemicals in the health care environment; and (c) significant contribution to waste streams once chemicals and chemical products leave health care organizations (HCOs). Although the number of HCOs that are currently examining their environmental performance in terms of purchasing practices is limited, Messelbeck and Sutherland (2000) contend that such efforts may signal wider institutional awareness and interest in the impact of products in the health care supply chain.

Significance of Study

According to the American Chemistry Council (2003), the health care industry is the leading purchaser of synthetic industrial chemicals in the United States ($106.1 billion in 2002). Theoretically, this purchasing capacity could enable the health care sector to either mitigate or exacerbate the magnitude of negative environmental and human health effects linked to health care sector purchasing practices by influencing product design decisions. The health care purchasing dollar is considerable. In 2006, health care expenditures for medical structures and equipment totaled $97.6 billion; in 2007, the sector's expenditures

for nondurable medical equipment and durable medical equipment were $37.4 billion and $24.5 billion, respectively (U.S. Department of Health & Human Services, Centers for Medicare and Medicaid Services, 2008). In California alone, the Office of Statewide Health Planning and Development (2009) estimated that health care construction projects and the cost of supplies in 2008 amounted to $8.6 billion and $9.6 billion, respectively.

Understanding trends in health care spending on equipment and construction materials and their relationship to the reduction of hazardous chemicals in the health care supply chain is a central tenet of the movement toward "green purchasing." Kaiser, Eagan, and Shaner (2001) posit that by targeting purchasing mechanisms that specify HCOs' preferences for products and services that minimize negative environmental and human health effects, hospitals can leverage purchasing power to influence manufacturers to design and produce safer chemicals and chemical products. However, scholarly research has yet to investigate this proposition. This exploratory case study is the first of its kind to address this hypothesis in a large, not-for-profit health system that spends considerable sums on medical supplies and the construction of facilities.

Purpose of Study

This study aims to explore and document (a) why Kaiser Permanente (KP), the largest not-for-profit health system in the United States and an industry leader widely-recognized for its environmental stewardship (ES) efforts, expanded its environmentally preferable purchasing (EPP) practices by developing a guideline for purchasing chemicals (GPC) and chemical-containing

products and (b) how implementation of this guideline has progressed. In this investigation, case study methodology was used to understand the decision or set of decisions that led to KP's adoption of the guideline, to identify facilitators of and barriers to implementation, and to document impressions of KP's effectiveness in addressing "chemicals of concern." In the parlance of "green chemistry," chemicals of concern are those chemicals that are known or suspected of causing negative effects on human or environmental health.

The study's results provide a foundation for future investigators to pursue such policy considerations as (a) Can changes to HCO purchasing practices produce meaningful, measurable reduction of hazardous chemicals in the health care supply chain? (b) Can purchasing practices create demand and stimulate innovation in safe chemicals, chemical products, and production processes? and (c) Can hazardous chemicals in the supply chain be significantly reduced without comprehensive regulatory reform? This study begins an exploration into these issues. By providing an in-depth understanding of the purchasing practices of the largest not-for-profit health systems in the United States, it may inform the diffusion of purchasing innovations in the broader health care sector.

CHAPTER 2

LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

To date, limited research has analyzed the effectiveness of environmental initiatives in the health care sector. Douglas and Meltzer (2004) examined the barriers and opportunities of implementing an environmental management system in a United Kingdom hospital trust by using content analysis and case study methodology. An interpretive study aimed at examining how an environmental accounting management system was "greening" processes at a Danish public university hospital was performed by Fussel and Georg (2000). Dettenkofer et al. (2000) examined preliminary results from an environmental audit of University Hospital, Frieburg, and Tudor, Barr, and Gilg (2006) compared intended behavior with resulting actions in a case study of health care waste management in a large organizational setting in the Cornwall National Health System. Quinn, Fuller, Bello, and Galligan (2006) examined the development of an integrated pollution prevention and occupational safety and health worksite intervention and a strategy to assess alternatives in six northeastern U.S. hospitals. Although research has explored the role of group purchasing organizations (GPOs) as key actors in pollution prevention in the health care supply chain (Li, 2003), wide gaps exist in the current understanding and measurement of the effectiveness of HCO purchasing efforts, such as KP's. This study aims to inform that gap.

In the following chapter, a description of the mechanics of and factors influencing the health care supply chain will be provided. The Toxic Substances Control Act of 1976 (U.S. Environmental Protection Agency [EPA], 2010), the

federal regulatory framework intended to regulate chemicals before and after they enter commerce, will be described and proposed as a key factor influencing the mutability of supply chain dynamics at KP. Borrowing theoretical contributions from strategic management, organizational change, diffusion of innovations, and relevant portions of the reviewed literature, a conceptual framework for understanding industry leadership in purchasing chemicals and chemical-containing products will be proposed.

Procurement in Health Care Organizations

Supply Chain Dynamics

The ultimate success of addressing chemicals of concern at the HCO purchasing level is embedded in several fundamental contextual factors. HCOs purchase a vast array of products in large volume through procurement processes that involve varying purchasing arrangements. For instance, HCOs frequently enter into contractual agreements with suppliers, distributors, and GPOs that offer health care products at a volume discount (Eagan & Kaiser, 2002). As a consequence of this complex set of relationships, several strata of communication can exist between HCOs and manufacturers. Although price and functional attributes of products are typically discussed, the environmental performance of products often remains largely unknown (Eagan & Kaiser, 2002). Introducing a process whereby the environmental attributes of products are requested or expected as part of the supplier-purchaser product negotiation would likely introduce a complex set of operational issues into the procurement system for the purchaser and the supplier.

HCOs are under increasing pressure to contain costs and generate revenue. Often cost containment focuses on procurement, the expectation being that costs can be controlled through more effective purchasing practices. Because supplies and purchased services account for hospitals' second largest expenditure,[1] *supply chain management* is increasingly recognized as an area of prime importance in HCO performance (Schneller & Smeltzer, 2006). However, current models for improving supply chain management typically focus on cost reduction, GPO relationships,[2] inventory and distribution processes, and organizational design and management rather than the environmental performance of products in the supply chain.

In addition to complex HCO purchasing arrangements and competing purchasing priorities, the number of chemical products in the health care supply chain is vast. The following sections will outline primary points of entry.[3] To reduce chemicals of concern, two of the most important areas are materials used in the construction of health facilities and medical equipment and supplies.

Construction of Facilities

Numerous chemicals of concern enter the health care environment in the form of building materials. Rossi and Lent (2006) outline the relationship of

[1] Personnel is the primary cost.

[2] Purchasing in health care organizations (HCOs) is typically centralized into one department and transactions for products may be as simple as one transaction or as complex as negotiation through a group purchasing organization (GPO; Eagan & Kaiser, 2002). GPOs are influential actors in the acquisition of health care products. Many hospitals throughout the U.S. belong to one or more of these organizations. HCOs are often required to procure a pre-established dollar amount from GPOs and are customarily restricted in various areas of product choice. GPO contracts with suppliers are characteristically multiyear commitments, which can restrict or complicate the substitution of products of concern with less hazardous products (Eagan & Kaiser, 2002).

[3] The list of chemicals in this discussion of points of entry is not intended to be exhaustive. For example, pharmaceuticals are not covered here because they are regulated by the U.S. Food and Drug Administration (FDA) and are not controlled under the purview of the Toxic Substances Control Act (TSCA).

materials and products in modern health care facilities. Building and office materials introduce synthetic industrial chemicals into hospital casework, ceilings, curtains, floors, furniture, and medical equipment that may release numerous chemicals into the work environment (Rossi & Lent, 2006). Adhesives, carpeting, manufactured wood products, and upholstery can emit volatile organic compounds like acetylaldehyde, formaldehyde, naphthalene, and toluene from carpets, finishing materials, and particle board (Rossi & Lent, 2006; Vitorri, 2005).

Products containing polyvinyl chloride (PVC), such as those in carpets, flooring, and wall-coverings, may also release hazardous additives, including endocrine disrupting phthalate plasticizers and heavy metal stabilizers (Vitorri, 2005), while harmful dioxins are created in the manufacturing process. Much of marketed and installed wire and cable is also insulated with PVC jacketing and stabilized with lead, a well-established neurotoxin (Vittori, 2005).

Evidence-based design. A movement toward *evidence-based design* in health care institutions is bolstering efforts to address an array of human and environmental concerns about the design and construction of health care facilities. Evidence-based design has been defined as the conscientious, explicit and judicious use of current best evidence from research and practice in making critical decisions, together with an informed client, about the design of each individual and unique project (Hamilton, & Watkins, 2009). This approach examines features that affect health and well-being as well as safety and quality. As such, design decisions can play an integral role in addressing the use of

materials with chemical properties of concern. Furthermore, developments in Leadership in Energy Efficiency and Design and the Green Guide for Health Care™, a best practices guide for healthy and sustainable building design, construction, and operations for the health care industry, present tools for reducing chemicals of concern in the health care environment. Several decision-making tools can enhance the environmental assessment of building materials by evaluating life-cycle inventories, production data of material, or energy flows. For an overview of available tools, see Forsberg and von Malmborg (2004).[4]

Medical Equipment and Supplies

A wide range of synthetic industrial chemicals also enter HCOs in the form of operational materials. To meet the variety of needs for cleaning and disinfecting the hospital environment, many chemicals are used. Examples of disinfectants commonly used in health care environments that are listed as chemical hazards by the National Institute of Occupational Safety and Health are formaldehydes, gluteraldehydes, iodine, isopropyl alcohol, phenolics, quaternary ammonium compounds, and sodium hypochlorite chlorine (1998). Floor strippers commonly used to maintain hospital floors can also contain chemicals, such as

[4] One such decision-making tool is The Pharos Project's Chemical and Material Library, a project of the Health Building Network, an NGO. The Pharos Project is an assessment tool that compares CAS registry numbers against over 20 national and international hazard lists covering more than 9,000 chemicals (CAS numbers are unique numerical identifiers for chemical elements, compounds, polymers, biological sequences, mixtures and alloys; the Chemical Abstracts Service (CAS), a division of the American Chemical Society, assigns these identifiers to every chemical described in the literature). The tool additionally assesses life cycle hazard consideration of materials. The tool assesses materials by rating them a) of urgent concern due to persistence or bioaccumulation, b) of high concern due to links with cancer, mutation, reproductive or developmental harm, neurotoxic effects, or endocrine disruption; c) of high concern due to possible carcinogenic, mutagenic and reprotoxic (CMR) toxicity and respiratory effects; d) of moderate concern or preliminary data of high concern; e) existing warning about potential problematic materials sometimes used with this material; and f) material studied and found not to cause listed health impacts (Healthy Building Network, 2010).

aliphatic petroleum distallates and nonyl-phenol ethoxylate, butoxyethanol, diethylene glycol, ethanolamine (a known sensitizer), and sodium hydroxide.

Synthetic industrial chemicals also enter the health care sector in numerous medical products. For example, PVC is widely used in the health care setting. The process of manufacturing PVC alone creates dioxins, furans, ethylene dichloride, and vinyl chloride monomer (Rossi & Lent, 2006). Further, plastics that are used widely in health care for the production of high-performance finishes and medical equipment, are developed from oil and natural gas. During the process of extracting these products from the earth, cadmium, mercury, and other toxins, such as arsenic, chlorophenols, polycyclic aromatic hydrocarbons, and xylene, are released into the environment (Rossi & Lent, 2006). During the refining process, benzo(a)pyrene, lead, naphthalene, and other toxic chemicals are released. The frequent use of PVC in the health care sector is a particularly troublesome environmental health issue because it presents several problems throughout its production, use, and disposal. These issues will be explicated in the next section to illustrate the significance of the production-use-and-disposal cycle of chemicals.

Polyvinyl Chloride: An Exemplar

In 1994, the EPA released a health assessment of dioxin and dioxin-related compounds that summarized an extensive body of research on toxicity, sources, and occurrence in the environment (U.S. EPA, 1994, 2007). The report evaluated dioxin's global distribution and range of negative environmental and human health effects, particularly its negative effect upon reproduction,

development, and immune function. Further, the report identified medical waste incinerators to be among the largest identifiable sources of the chemical. Public and environmental concerns about PVC production and disposal center on (a) the release of dioxins and furans[5] generated as byproducts during the production of PVC feedstocks; (b) the dispersion of plasticizers and metal stabilizers, such as cadium and lead, during use and after disposal; and (c) the formation of hydrochloric acid and novel toxic compounds, including dioxins and furans when PVC is burned (Rossi & Schettler, 2000).

PVC in disposable medical products is a source of chlorine, a chemical ingredient that is necessary for the formation of dioxins in incinerators (Kaiser et al., 2001. Dioxin is one of the most hazardous and environmentally stable tricyclic aromatic compounds of its structural class. Due to its low water solubility, dioxin in waterways adheres to sediment and suspended silt. Similarly, it will adhere to soil and can subsequently leach into groundwater. Dioxin accumulates in aquatic life and is highly persistent in the environment because the chlorine bonds in these molecules are resistant to chemical or physical breakdown (U.S. EPA, 2007). As a result, dioxin has become ubiquitous in U.S. food and water supplies. Many states and municipalities have issued fish advisories due to dioxin contamination (U.S. EPA, 2007).

Health effects. In occupationally exposed human beings, dioxins (a) have been associated with cancer of the lungs, thyroid gland, hematopoietic system; liver; and connective and soft tissue sarcoma (Thornton, McCally, Orris, &

[5] Chlorinated dioxins and furans are potent, persistent, and bioaccumulative environmental toxicants (Tickner, Schettler, Guidotti, McCally, & Rossi, 2001).

Weinberg, 1996); (b) are believed to have a half-life of 7 to 12 years (Wolfe et al., 1995); and (c) may cause a lifetime cancer risk in the general population as high as 1 in 1,000, a level that is a thousand times higher than the generally acceptable risk of 1 in 1,000,000 for environmental pollutants (U.S. EPA, 2007). Dioxins also pose a public health concern because of their effect on growth and developmental processes in animals and humans. In animals, dioxins cause cancer in multiple organ systems: Prenatal exposure in rodents can lead to breast cancer later in life Brown, Manzolillo, Zhang, Wang, & Lamartiniere, 1998). In rodents, minute exposures in utero may lead to permanent disruption of male sexual development, including delayed testicular descent, decreased sperm count, and feminized sexual behavior (Malby, Moore, & Peterson, 1989). Human epidemiological studies have found that dioxin is also carcinogenic in humans and can affect reproduction and development (Steenland, Piacitelli, Deddens, Fingerhut, & Chang, 1999).

Relatively small dietary exposures of dioxin have also been shown to increase risk and severity of endometriosis in primates (Rier, Martin, Bowman, Dmowski, & Becker, 1993). In humans, women with endometriosis have been shown to have higher levels of dioxin (Mayani, Barel, Soback, & Almagor, 1997). Dioxin has also been shown to adversely affect the immune system, creating increased susceptibility to infection (Birnbaum, 1995, Weisglas-Kuperus et al., 1995; Weisglas-Kuperus et al., 2000). Low levels of exposure during pregnancy also alter thyroid hormone levels in mothers and their offspring (Koopman-Esseboom et al., 1995. Through ordinary dietary consumption, the general

population carries a current body burden of dioxin that is near or above the levels that cause adverse effects in animal studies (Rossi & Schettler, 2000).[6]

Health care organizations and polyvinyl chloride. PVC is purchased, used, and disposed of in large quantities in the health care sector. It has properties that make it attractive in that setting: flexibility, optical clarity, resistance to kinking, strength, suitability for steam sterilization, surface finish, weldability and cost (Tickner, Shettler, Guidotti, McCally, & Rossi, 2001). PVC is the most widely used plastic in medical products and, in 1996, accounted for 27% of all plastic used in durable and disposable medical products in the United States (Rossi & Schettler, 2000). It is estimated that 75% of all PVC produced is used in building materials (Vitorri, 2003).

PVC, a chlorinated plastic polymer, can be adapted for many uses by the addition of fillers, flame retardants, lubricants, pigments, plasticizers, and stabilizers depending on the intended application (Rossi & Schettler, 2000). However, the opportunities to recycle PVC are limited, and PVC products can contaminate other recyclables if it is added to non-PVC plastics (Rossi & Schettler, 2000). Gloves, intravenous and blood bags, and tubing are the primary end-uses for PVC in disposable medical products, although other products used in hospitals may contain PVC, such as construction materials, furniture, and office supplies (Rossi & Schettler, 2000). In 1996, approximately 445 million pounds of PVC were used for the health sector in the manufacture of catheters, examination

[6] Because dioxins and furans are environmentally persistent, bioaccumulative, and fat-soluble, their concentration biomagnifies as they pass up the food chain. Human exposure to dioxin is primarily from sources such as beef, dairy products, fish, pork, and breast milk (Rossi & Schettler, 2000).

gloves, intravenous and blood bags, medical trays, testing and diagnostic equipment, and tubing (Rossi & Schettler, 2000).

Two environmental and human health issues involving the use of PVC in HCOs should be noted. First, as described above, the manufacturing and disposal processes of PVC produce dioxins that affect the environment at large. Second, when PVC is used in intravenous tubing and bags, the plasticizer (di-ethylhexyl phthalate [DEHP]) that makes it flexible may leach into intravenous fluids, causing direct exposure. DEHP can leach into solutions in varying concentrations (Tickner et al., 2001). Certain patient populations, such as those on dialysis or those who have hemophilia, may have long-term exposure to clinically significant doses of DEHP, while others such as neonates and developing fetuses may be exposed at critical points of development (Tickner et al., 2001). Particular concern has been raised for pediatric settings because newborns receive among the highest doses of DEHP in the human population from blood transfusions, extracorporeal membrane oxygenation, and respiratory therapy (Plonait, Nau, Maier, Wittfoht, & Obladen, 1993; Roth et al., 1988; Schneider, Schena, Truoug, Jacobson, & Kevy, 1989; Sjoberg, Bondesson, Sedin, & Gustafsson, 1985a, 1985b). DEHP can also cross the placenta (Singh, Lawrence, & Autian, 1975; Tomita, Nakamura,Yagi, & Tutikawa, 1986; U.S. Consumer Product Safety Commission, 1985) exposing a fetus secondary to maternal exposures. The National Toxicology Program of the National Institute of Environmental Health Science (Barrett, 2006) has expressed serious concern that DEHP may have an adverse effect on the developing

reproductive tract of male infants who are exposed to high levels of the chemical during medical procedures performed in neonatal intensive care units.[7]

The frequent use of products made with PVC is a particularly vexing environmental health issue for the health care industry. PVC exemplifies many life-cycle issues in health care yet represents only one of approximately 87,000 chemicals registered for commercial applications in the United States (U.S. EPA, 2008). Further, the PVC dilemma in health care exemplifies important problems that may be linked to the weakness of the federal government's regulatory framework for chemicals, the Toxic Substances Control Act (TSCA). TSCA will be discussed in the following sections.

Toxic Substances Control Act

Signed into law in 1976, TSCA established how the EPA is to review and regulate synthetic industrial chemicals.[8] Of all the environmental statutes, TSCA is the only law that enables the regulation of chemicals before and after they have entered commerce (U.S. EPA 2010). The law's objectives are three:

1. Chemical producers should develop adequate data on the health and environmental effects of chemical substances and mixtures;
2. Government should have adequate authority to regulate chemicals that present unreasonable risk to health or the environment and to take action on imminent hazards; and

[7] For a comprehensive review of risks from di-ethylhexyl phthalate (DEHP) in medical devices, see Tickner et al., (2001). The range of measurement and estimation of human exposures to DEHP from polyvinyl chloride (PVC) medical devices varies significantly in available studies. Alternative equipment suggestions are also provided in this publication.

[8] Chemical substances generally excluded from TSCA and Environmental Protection Agency 's (EPA) regulatory authority include food, pharmaceuticals, cosmetics, and pesticides, which are regulated by the FDA.

3. The government's authority over chemical substances should not create unnecessary economic barriers to technological innovation.

(TSCA, 1976; Wilson & Shwarzman, 2009).

Despite these stated objectives, studies conducted by the National Academy of Sciences (1984), the U.S. General Accounting Office (1994), the Office of Technology Assessment (1995), the Environmental Defense (1997), the U.S. EPA (1998), former EPA officials (2002), and the U.S. Government Accountability Office (2005) concluded that TSCA has not served the public, industry, or government well in assessing the hazards of chemicals in the marketplace or controlling those of greatest concern.

Chemical Production Projections

Despite growing public health concerns over negative health consequences linked to exposure to certain synthetic industrial chemicals, the manufacture and use of chemicals and chemical products continues to increase. The production and use of industrial and agricultural chemicals have seen rapid global increases over the past 50 years. Roughly 10 new chemicals are registered for use in the marketplace each day, yet only a small fraction of chemicals have been characterized for biological activity or human toxicity (Roe et al., 1997; Thornton, McCally, & Houlahin, 2002). Despite the lack of safety information, chemical production has sustained continuous growth nationally and internationally.[9, 10]

[9] The plastics industry, for example, has grown at the rate of 6% to 12% per year since the mid-1940s, with annual production in the United States reaching 85 billion pounds (338 pounds per person per year) in 1996 (Society of the Plastics Industry, 1997). In developing countries, plastics production is expanding at a rate of 40% per year (Society of the Plastics Industry, 1997). The global trajectory for overall chemical production is expected to increase approximately 3% per year, such that it will double every 25 years (Wilson, Chia, & Ehlers, 2006). The United States currently produces or imports 42 billion pounds of chemicals each day, 90% of which are created using oil, a nonrenewable feedstock (National Pollution Prevention and Toxics Advisory

Synthetic industrial chemicals are used in innumerable products and processes and, at some point in their life cycle, come in contact with humans and ecosystems (Wilson, Chia, & Ehlers, 2006). Chemical exposures and releases into the environment occur at numerous points in the life cycle, from design, manufacture, and distribution to use, treatment, and disposal. This contact prompts many concerns, most notably the risk of harm to human and environmental health. As the scale and pace of chemical production increase, biological and ecological effects of chemical exposures are an increasingly important public policy issue (Wilson et al., 2006) for the reasons detailed below.

Chemical exposures are one of the many environmental factors that can induce disease directly or can influence the initiation, progression, or recurrence of other disease processes (Delfino, 2002; Leikauf, 2002). More specifically, a substantial body of evidence exists on chemically induced diseases among workers and other highly exposed individuals and populations (Brooks, Gochfeld, Herzstein, & Schenker, 1995; Clayton & Clayton, 1993; Ellenhorn, 1996; LaDou, 1997; McCunney, 1994; Rom, 1998; Zakrzewski, 2002). It is well-established that certain populations, such as immigrants, minorities, and lower income groups are at heightened risk of exposure to hazardous chemicals and chemically induced

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Committee, 2005). According to Wilson et al., (2006), if these chemicals were converted to gallons of water, this volume would be the equivalent of 623,000 gasoline tanker trucks (each carrying 8,000 gallons), which would stretch from San Francisco to Washington D.C. and then back again if they were placed end to end. In the course of a year, this line would encircle the earth 86 times at the equator (Wilson et al., 2006).

[10] Wilson et al., (2006) explain global chemicals policy shift such as those in the European Union (EU). In a significant departure from current practice in the United States and previously in the EU, the recently initiated Registration, Evaluation, and Authorization of Chemicals (REACH) policy will now require chemical producers to *register* and supply basic health and environmental information to an EU chemicals agency for up to 30,000 chemicals in the marketplace. Of these, approximately 5,000 higher-volume chemicals will undergo more extensive *evaluation*. About 1,400 chemicals of greatest concern will potentially be removed from commercial circulation in an *authorization* process in which producers are responsible for seeking government approval to use these chemicals.

diseases (Morello-Frosch, 2002; Morello-Frosch & Pastor, 2001; Pastor, 2001; Pastor, Morello-Frosch, & Sadd, 2005). Accumulating evidence also indicates that children are uniquely vulnerable to the effects of chemical exposures (Landrigan, Kimmel, Correa, & Eskanazi, 2004; National Academy of Sciences, 1993; Schettler, Solomon, Valenti, & Huddle, 1999; U.S. EPA, 2003; Woodruff et al., 2004).

Furthermore, dispersion of chemicals into the environment has produced a host of problems locally and globally. In the United States, hazardous waste sites are increasing, while more than $1 billion is spent each year on Superfund site mitigation (O'Rourke & Lee, 2004). Assuming regulatory and industrial practices in the United States remain the same, the EPA expects that 217,000 new sites will be designated by 2033 (in addition to 77,000 current sites), requiring cleanup that will cost approximately $250 billion (U.S. General Accountability Office, 2005; U.S. EPA, 2004).

Critique of the Toxic Substances Control Act

In 2006, the California State Senate's Environmental Quality Committee and the California State Assembly's Committee on Environmental Safety and Toxic Materials issued a technical report synthesizing state, federal, and global chemical policy developments. The report, entitled Green Chemistry in California: A Framework for Leadership in Chemicals Policy and Innovation (hereafter referred to as the Green Chemistry Report) was intended to provide direction in response to global chemicals policies, which could position California to become a global leader in the innovation of safer chemicals and chemical

products (Wilson et al., 2006)**.** The report chronicles "long-standing weaknesses" in TSCA (Wilson et al., 2006). The authors reported that TSCA's 2006 inventory listed 81,600 chemicals registered for commercial use, 8,282 that are produced or imported at 10,000 pounds per year, and 2,943 that are produced or imported at more than one million pounds per year.[11] TSCA does not require chemical producers to generate and disclose information on the health and environmental safety of these chemicals or on the approximately 2,000 new chemicals that enter commerce each year.[12] Wilson et al. (2006) have stated that TSCA has placed procedural burdens on the EPA that have constrained the agency's capacity to act. [13] Additionally, the authors have contended that TSCA has not proved to be efficient in channeling federal funds to research cleaner technologies, such as green chemistry (Wilson et al., 2006; Wilson & Schwarzman, 2009). [14]

*Trade secrets and hazard communication.*Although proprietary information on the design and production of chemicals and chemical products must be protected to some degree, claims of trade secrets permitted under TSCA

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[11] Those produced at more than one million pounds are known as high production volume (HPV) chemicals. Although TSCA inventory has grown to 81,600 chemicals, there are 62,000 chemicals that were "grandfathered" during TSCA implementation and, therefore, did not require toxicity testing. Ninety-two percent of HPV chemicals currently in commercial circulation consist of grandfathered chemicals; only 248 (8%) new chemicals introduced since implementation of TSCA have reached HPV status.

[12] This phenomenon differs greatly from regulatory frames around pharmaceuticals, for instance. Proof of safety must be established *prior* to market entry.

[13] Since 1979, the EPA has used its formal rule-making authority to restrict only five chemicals or chemical classes, although in 1994 the agency reported that about 16,000 chemicals in the United States were of some level of concern on account of their structure and volume in commerce. Wilson et al., (2006) state that TSCA's "Safety Gap" prohibits governments from attaining information that they need to identify and prioritize chemical hazards systematically, nor the legal tools to mitigate known hazards efficiently.

[14] . The lack of support for cleaner technology is referred to as the "Technology Gap" by Wilson et al., (2006). According to the authors, the lack of both market and regulatory drivers has dampened motivation on the part of U.S. chemical producers and entrepreneurs to invest in green chemistry technologies. Furthermore, there has been virtually no government investment in green chemistry research and development (Wilson et al., (2006).

have significantly limited access to chemical identity and use. In 2005, 95% of premanufacturing notices, which producers must submit to the EPA before marketing a new chemical, contained information claimed as confidential (U.S. Government Accountability Office, 2005). An EPA assessment found that 90% of the confidential business information claims in premanufacturing notices concealed the identity of the chemical (U.S. EPA, 2003). Moreover, confidential business information allowances under TSCA inhibit transparency about chemicals hazards, despite other regulations that are intended to facilitate hazard communication, namely Material Safety Data Sheets (MSDSs; Kolp, Sattler, Blayney & Sherwood, 1993; U.S. Department of Labor, Occupational Safety & Health Administration [U.S.DL, OSHA], 2004; U.S. General Accountability Office, 1991). Concerns about the accuracy and consistency of information provided by MSDSs have been well-documented. In a review by the OSHA, several investigations also raised concerns about MSDSs being incomplete or containing out-of-date information. Additionally, the OSHA discovered that employers and employees find MSDSs difficult to understand (U.S.DL, OSHA, 2009).

Business and public policy implications. Joining those who have been critical of the lack of accurate information about chemicals, Wilson et al. (2006) have proposed that "The Data Gap," or lack of comprehensive, robust, standardized information on the toxicity and ecotoxicity for most chemicals, has created great difficulties even for large firms to identify hazardous chemicals in their supply chain. Furthermore, along with consumers, workers, and small

business owners, these firms do not have reliable information on safer alternatives. The authors posit that the "Safety Gap" has created a regulatory environment in which governmental agencies do not have the information they need to systematically identify and prioritize chemical hazards or the legal tools to efficiently mitigate known hazards. Finally, in what they refer to as the "Technology Gap," the authors propose that the lack of market and regulatory drivers has dampened the motivation of U.S. chemical producers and entrepreneurs to invest in "green chemistry technologies."[15] These gaps are summarized in the Table.

Table

Gaps in the Toxic Substances Control Act

Gap	*Description*
Data Gap	Lack of comprehensive, robust, standardized information on toxicity and ecotoxicity for most chemicals.
Safety Gap	Lack of ability for government agencies to systematically identify and prioritize chemicals of concern; continued circulation of chemicals in commerce that pose a potential threat to public and environmental health.
Technology Gap	Lack of industry and government investment in green chemistry and technology.

Note. Adapted from "Green Chemistry in California: A Framework for Leadership in Chemicals Policy and Innovation" by Wilson, Chia, and Ehlers (2006).

[15] Green chemistry technologies are defined as the invention, design, and application of chemical products and processes to reduce or to eliminate the use and generation of substances hazardous to human health and the environment (Anastas & Warner, 1998).

Information asymmetry. Guth, Dennison, & Sass (2007) have suggested that the lack of chemical safety information for many products has prevented the chemicals market from operating as a free market. In the ideal free market, consumers purchase goods and services, which are produced according to the laws of supply and demand. For demand to reflect what consumers truly value, consumers must have access to all of the information that would affect their choice of product (Guth et al., 2007). Without such information, the price paid for goods and services will not reflect actual preferences. Thus, consumers will purchase goods and services they would not otherwise if given full information. In this scenario, the market is said to be "inefficient" because it is not producing goods and services that reflect the true preferences or desires of consumers. Lack of information in the marketplace creates "market failure" by preventing the laws of supply and demand from driving the market to produce what consumers really want (Guth et al., 2005). The concept and consequences of this process, termed *imperfect information* or *information asymmetries*, has developed over several decades in the field of information economics.

Under current TSCA regulations, chemical companies can determine the chemical composition of their products, but other market actors cannot obtain this information or information on product safety. As previously discussed, much of TSCA-required information on chemicals that the EPA receives is not publicly available under confidential business information allowances, thus creating information asymmetries and a Data Gap for consumers and businesses using chemicals. Guth et al. (2005) contend that TSCA offers few mechanisms to

monitor, audit, or penalize industries for providing incomplete or incorrect information or to otherwise ensure the reliability and credibility of information provided by industry. This lack of credibility and reliability undermines the usefulness of available information and, to the extent that is incomplete or inaccurate, leads to incorrect or uninformed management of hazardous chemicals.

The problems with chemical information and management are highlighted by Wilson et al. (2006) who contend that lack of quality information about chemical and chemical products is posing fundamental problems for businesses who use them. To address these problems, some large businesses have been implementing strategies to identify hazardous chemicals in their supply chain and to remove them from operations. The *Green Chemistry Report* identifies KP as one such organization. In "Kaiser Permanente Confronts the Data Gap," the report explains the significant effort that this unique industry leader has exerted to understand chemicals of concern in its organizational supply chain. An overview describes KP's rigorous search to purchase products that avoid the use of carcinogens, mutagens, and reproductive toxins and persistent bio-accumulative toxins. As the purchaser of thousands of chemical substances and materials for which limited information was available, KP reportedly "operated under considerable uncertainty about the safety of its operations" (Wilson et al., 2006, p. 39).To remedy this situation, KP began asking suppliers to disclose the chemical composition of their products.

In implementing this effort, KP faced what the *Green Chemistry Report* calls the Data Gap or lack of chemical information in the market, and, as a result,

has “shouldered the responsibility of developing screening tools to assess the toxicity and ecotoxicity of the chemicals and materials it purchases” (Wilson et al., 2006, p. 39).

Research Questions

To document the organizational and contextual challenges alluded to in the *Green Chemistry Report* and to explore KP’s innovative purchasing process to address chemicals of concern, this study investigated and describes KP’s experience in adopting and implementing a GPC and a supplier disclosure process.

To explore and document why KP became interested in the development of a GPC, the first research question was formulated to capture those events, factors, and conditions that occurred in the *organizational field* and within the organization that influenced adoption:

Research Question 1: What were the internal and external factors at Kaiser Permanente that influenced the adoption of a guideline for purchasing chemicals and chemical-containing products?

To explore and document this study’s second aim, how implementation of the guideline progressed, three additional questions were posited. Research Question 2 was formulated to understand the sources of information that were used to understand product chemistry and how decision making addressing chemicals of concern occurred:

Research Question 2: How were chemicals of concern in Kaiser Permanente's guideline for purchasing chemicals and chemical-containing products understood, prioritized, and targeted?

Research Question 3 was formulated to capture the challenges experienced within the organization (the *organizational characteristics*) and within the organizational field as the guideline was implemented. This question also discusses Kaiser Permanente's successes and lessons learned from the implementation process:

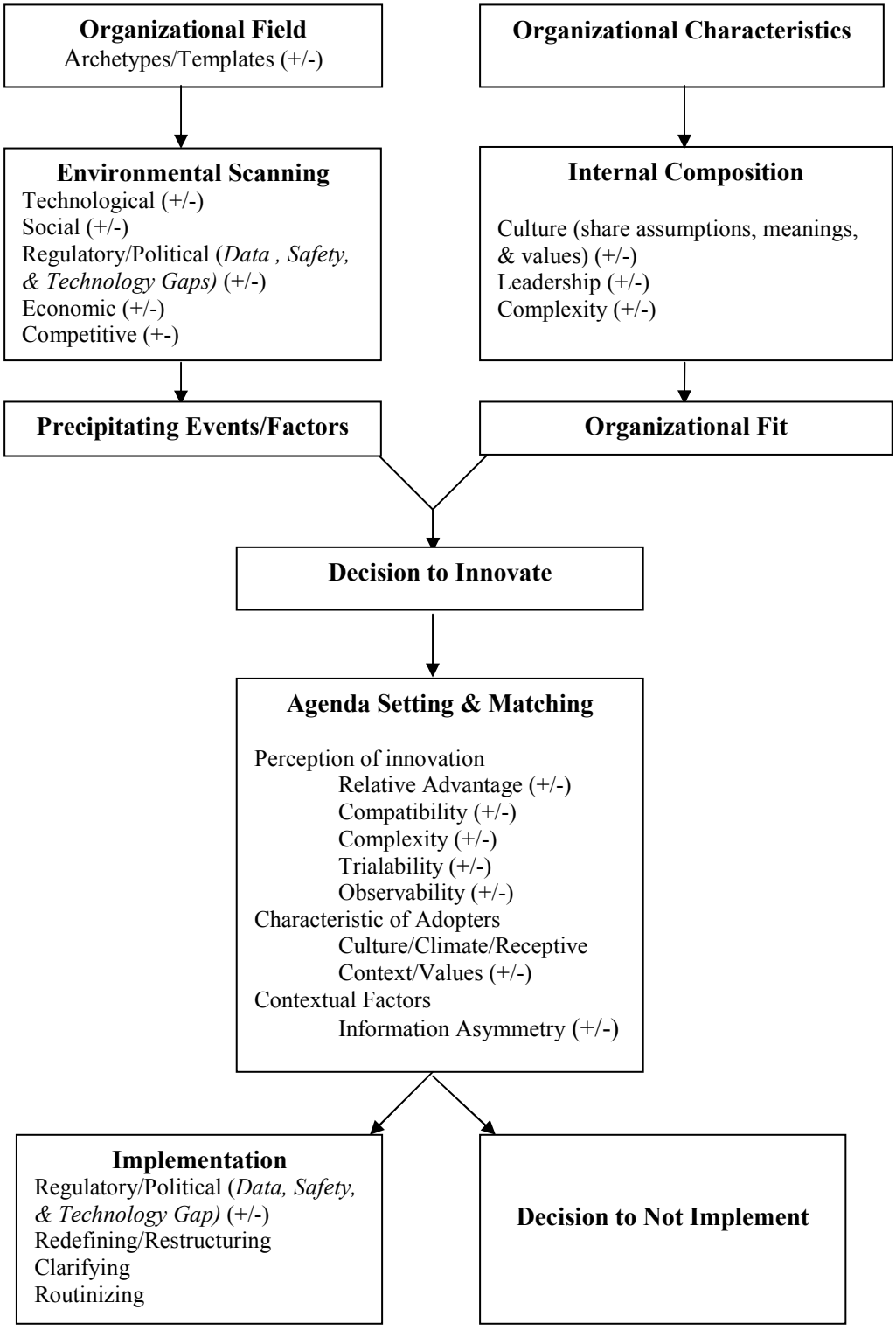
Research Question 3: What were the barriers to, successes of, and lessons learned from implementing the guideline for purchasing chemicals?

Finally, Research Question 4 aims to capture the accuracy of and organizational experience with challenges proposed by Guth, et. al (2007) and Wilson et al. (2006):

Research Question 4: How did the Data Gap, Safety Gap, and/or Technology Gap motivate adoption or create barriers to implementation?

In this study, the unit of analysis was the decision or set of decisions to adopt and implement KP's GPC. Because scholarly research is limited on how businesses have addressed chemicals of concern in their supply chains, an ad hoc conceptual framework for industry leadership in purchasing chemicals and chemical-containing products was proposed (see Figure 1). The theoretical contributions to this model and the key propositions for anticipated research findings are set forth in the following sections.

*Figure 1.*Conceptual Framework for the Innovation Process in Health Care Organizations



Theoretical Framework

The conceptual framework for industry leaders in purchasing chemicals and chemical-containing products was developed from organizational change and development, strategic management, and diffusion of innovations theories. This discussion and the conceptual framework in Figure 1 are organized around three clusters of influence that correlate with the rate or spread of a change all industries: (a) contextual factors (organizational field), (b) characteristics of the people who adopt an innovation (organizational characteristics), and (c) characteristics of the innovation itself (Berwick, 2003). These processes occur within a context that involves the structures, processes, and patterns of the organization that make up the organizational system.

The Organizational Field

Understanding organizations as systems began with Ludwig von Bertalanffy's (1950) foundational work. Before von Bertalanffy developed his general systems theory, scientific investigation had focused on explaining observable phenomena by reducing them to an interplay of basic units, acting independently of each other or as isolated closed systems. His general systems theory was concerned with the wholeness of an organization or phenomena not resolvable into local events. He proposed that organizations are dynamic in interaction and consist of systems with a multitude of parts and processes so interrelated and interdependent that a small change in one part necessitates changes and adaptations in other parts (Wilson & Rosenfeld, 1990). The original

intent of the general systems theory was to identify concepts, principles, and patterns that could be readily applied and transferred from one system to another.

The general systems theory paved the way for a more contemporary understanding of organizations, as outlined by renowned psychologist, Kurt Lewin (as cited in Marrow, 1969). According to Lewin, an issue is held in balance in a system or organization by the interaction of two opposing sets of forces in a "force field:" those seeking to promote change (*driving forces*) and those attempting to maintain the status quo (*restraining forces*). In such a system, the driving forces must prevail over the restraining forces to accomplish organizational change. Lewin's discussion (as cited in Marrow, 1969) of driving forces and restraining forces in the force field apply to the factors that either inhibit or facilitate organizational change or innovation. Varied internal and external stimuli can occur simultaneously inside and outside of an organization or in the organizational field. The organizational field is dynamic, changing with time and experience; behavior may be viewed as a function of the field that exists at a particular time. In Figure 1, driving and restraining forces of change are signified by plus (+) signs and negative (-) signs.

Organizational stability. Regarded as a theory of organizational similarity and stability, institutional theory posits that powerful forces in the external environment not only create stability but also may prevent transformational organizational change (Buckho, 1994).These institutional forces are expressed through *archetypes*: models of behavior and templates or formats of structure and function. These concepts elucidate why sectors of organizations behave as they

do, are structured as they are, and what factors encourage or discourage them from change or innovation.

An archetype is a set of structures and systems that embodies an interpretive scheme or set of beliefs and values. The concept of organizational templates refers to function, which is determined by cognitive interpretation as to appropriate action. According to institutional theory, the organizational field and the archetypes and templates within in it influence organizational actors to accept the prevailing organizational templates as appropriate, correct, and the "right way of doing things"' (Greenwood & Hinings, 1996). Supply chain management in HCOs offers a pertinent example: The predominant focus centers around cost containment, GPO relationships, inventory and distribution processes, and organizational design and management (Schneller & Smeltzer, 2006) rather than environmental performance of products.

Organizational characteristics. Understanding that archetypes and templates are stabilizing forces in organizations, researchers began to question why some organizations adopt change even when faced with similar external stimuli. This led them to question the internal makeup of organizations. According to Greenwood and Hinings (1996), elaborations on internal and external forces that affect change are significant because alternative organizational templates may be introduced. Although organizations may have prescribed ideas about structural organization, the salience and clarity of the templates may change over time. Although some organizations may not respond initially to a template of organizing, they may respond gradually to evolving and

competing prescriptions. Thus promoting adaptation, an underlying assumption in the literature of organizational change, is that change is good or ultimately beneficial to organizations. This development in organizational change theory led to two fundamental questions: How do individual organizations respond? and Why do they differ in their responses? (Greenwood & Hinings, 1996).

Concepts from strategic management can also be useful in understanding proactive, internal, organizational characteristics that facilitate change through effective identification of and action on issues arising in the organizational filed. According to strategic management principles, one the greatest challenges in managing an HCO is scanning the external environment (the organizational field), to identify likely changes and then planning for the effect of those changes on the organization (Swayne, Duncan, & Ginter, 2008). Environmental scanning assumes that HCOs must continually cope with change and complexity in such key areas as competition, economic trends, social-demographic characteristics, legislative-political issues, and technological advances. In scanning the environment for emerging issues in these areas, organizations can strategically adapt and implement change. Thus, theory development to understand and predict organizational behavior has moved from identifying forces that affect a relatively passive organization to actively managing an organization's response to the force field in which it finds itself.

Berwick (2008) points out that implementing a change or innovation is a major challenge for all industries, yet the health care industry faces unique obstacles to meaningful change. HCOs consist of complex organizational

arrangements. Plsek (2001) has described HCOs as having one of the most complex systems of any industry because of the levels of uncertainty that can be introduced into the system: Individual agents (e.g., physicians) can act in wholly unpredictable ways, and their actions, which are so interconnected with other hospital personnel, can change the context for other agents (e.g., allied health personnel). Membership in the system can also change, and agents can be members of several systems simultaneously (e.g., health care providers and management). The behavior of a complex system emerges from the interaction between agents and is often nonlinear. In this way, the layers of complexity and unpredictability in HCOs add to the challenges of planned organizational change or innovation implementation.

Echoing Bertalanffy, Plsek (2001) focuses on the importance of connections and interactions between components in health care systems, noting that a health care system is a macrosystem consisting of many microsystems. Plsek also distinguishes between adaptive and mechanical systems, explaining that change in mechanical systems (such as in a production line) can be predicted in great detail, but in complex systems like HCOs, the parts have the ability to respond to change in fundamentally unpredictable ways (Sweeney, 2005). The introduction and implementation of change or innovation into HCOs is widely recognized as a complex process (Fleuren, Wieffernick, & Paulussen, 2004) that can be affected by positive and negative factors.

Organizational culture. Undergirding all organizational efforts toward meaningful change, in HCOs and other systems, is the key concept of

organizational culture. Organizational culture has been defined as the implicit, invisible, intrinsic, and informational consciousness of the organization which guides the behavior of individuals and which shapes itself out of their behavior (Ginter, Swayne, & Duncan, 1996). An organization's culture is made meaningful by experiences; shared understanding of how things are done; shared assumptions, meanings, and values that are subjective as well as those that are objective, that is, aspects of organizational culture that can be heard and witnessed[16] (Ginter et al., 1996). Many early studies of organizational culture focused on how influential founders affected their organization, linking organizational culture with leadership (Anderson-Wallace & Blantern, 2005). Although a wide variety of conceptions exist, Smircich (1983) suggests that two main perspectives of culture have emerged over time. The first treats culture as a critical variable, a component part of an organization; the second treats culture as the "root" metaphor for organizing or a lens through which to view organizational life (Anderson-Wallace & Blantern, 2005; Smircich, 1983). Through this lens, culture is seen as something the organization is, not as something the organization has. The research spawned by this perspective explored the phenomenon of an organization as subjective experience and investigated the patterns that make organized action possible (Smircich, 1983).

The influence of leaders. Organizations are comprised of individuals who may be stakeholders in any innovation being developed. Individuals can also belong to one or more informal groups that arise from the social needs of an

[16] Such as from stories that are told from one generation of employees to another, from the ceremonies and rituals of the organizations, etc.

organization's employees.Individuals in groups influence one another in various ways, including how coworkers perceive a problem or a solution to a problem. Individuals within groups may also have diverse goals or objectives, levels of motivation and enthusiasm, or styles of communication (Kunda & Brooks, 2000).

Opinion leadership is the degree to which an individual is able to influence other individuals' attitudes or overt behaviors informally in a desired way with a relative frequency (Rogers, 2003). Such leadership is not necessarily a function of an individual's formal position or status in the system. Opinion leadership, however, is earned and maintained by the individual's technical competence, social accessibility, and conformity to the system's norms, an aspect of organizational culture. An opinion leader's influence can be either a driving or a restraining factor for change. Furthermore, the *influence of champions*, those charismatic individuals who can overcome indifference or resistance to innovation in organizations or systems, has been credited with the ultimate success or failure of innovation (Rogers, 2003). Thus, the influence of individuals as driving forces for accomplishing meaningful change or innovation in organizations is most important. The influence of leadership, in its many formal and informal representations, is posited to be a critical factor that influenced KP's adoption of a purchasing innovation.

The process of innovation. The innovation process in organizations is characterized by two activities: a) the initiation of information gathering, conceptualization, and planning for the adoption of an innovation and b) the implementation, which consists of all of the events, actions, and decisions

involved in actuating the innovation (Rogers, 2003). Agenda setting and matching are said to occur during the initiation phase. The former describes the phase in which organizations identify a problem perceived to require an innovation. In the matching phase, the organization's problem is "fit" with an innovation. During implementation, three activities occur: *redefining-restructuring*, *clarifying*, and *routinizing* (Rogers, 2003). Redefining-restructuring consists of modifying or reinventing the innovation to fit the organization and/or alteration of the organization to fit the innovation. Clarifying refers the phase in which the relationship between the organization and the innovation becomes more clearly defined. Routinizing refers the phase in which the innovation becomes wholly integrated into the organization's activities and loses its identity.

According to the theory of diffusion of innovations, several characteristics explain how organizational decision making occurs during the adoption of an innovation.[17] First, *relative advantage* is the degree to which an innovation is perceived as better than the idea that it supersedes (Rogers, 2003). The degree of relative advantage can be measured in economic terms, but social prestige, convenience, and satisfaction are also important. The greater the perceived advantage, the more rapid will an innovation be adopted (Rogers, 2003). Second, *compatibility,* or the degree to which an innovation is perceived as being consistent with existing values, past experiences, and the needs of potential adopters, is another important characteristic. An idea that challenges the values

[17] As with the theory of organizational change, an underlying assumption in Rogers' theory of innovation is that the inherent advantage of innovation that is that it is better or more efficient than the old way. The theory of innovation has historically been criticized for being pro-innovation. In other words, innovation should be diffused more rapidly and the innovation should neither be reinvented nor rejected (Rogers, 1995).

and norms of a social system will not be adopted as rapidly as an innovation that is deemed compatible (Rogers, 2003). Furthermore, the adoption of an incompatible innovation often requires the formation of a new value system, which is a relatively gradual process. Third, *complexity*, the degree to which an innovation is perceived as difficult to use or understand, will determine the rate of innovation. Some innovations may be readily comprehended by most of an organization's members, while others may be more complicated and are adopted at slower rates (Rogers, 2003). Fourth, *trialability* is the degree to which an innovation may be experimented with on a limited basis. New ideas whose implementation is graduated will generally be adopted more quickly than innovations that are not separable (Rogers, 2003). Finally, *observability* is the degree to which the results of an innovation are visible to others. Hence, the easier it is for individuals to see the results of an innovation, the more likely they are to adopt it (Rogers, 2003).

The following sections elucidate how contributions from the theoretical literature apply to decision making at KP. This presentation follows the order of the conceptual framework in Figure 1. Purchase of Chemicals and Chemical-Containing Products at Kaiser Permanente.

This study's research questions posit that external factors (the organizational field*)* and internal factors (organizational characteristics*)* influenced KP's decision to adopt a purchasing innovation. Through environmental scanning*,* it was anticipated that KP identified and interpreted an event or set of events in the organizational field that required action. In other

words, it was anticipated that KP would respond to evolving or competing prescriptions of organizational archetypes and templates in response to issues that arose at that time. Because of concerns over the lack of information about chemical hazards in the organization's supply chain, it was anticipated that KP would create a new template of purchasing practices to address chemicals of concern. Central to this study is the key proposition that KP lacked sufficient information about chemicals and chemical products in its supply chain due to information asymmetries and/or the Data Gap in the organizational field. Thus, it was driven to adopt a purchasing innovation to garner sufficient information.

Proposition 1: Kaiser Permanente's adoption of a guideline for purchasing chemicals and chemical-containing products was driven by a lack of sufficient information about products in its supply chain.

Further, it was anticipated that the health care industry could not offer satisfactory archetypes and templates to address chemicals of concern. The absence of such information would facilitate an innovation in purchasing practices. The issues in the organizational field that were anticipated to play a role in KP's evolution toward adoption of a purchasing innovation are derived from strategic management theories. Technological issues were anticipated to be restraining factors due to the lack of alternatives, the Technology Gap (Wilson et al., 2006). Further, societal concerns over chemical pollution were anticipated to be a facilitating factor. Regulatory and political factors were predicted to be principal driving factors in this investigation because it was anticipated that KP was driven to develop its innovative GPC to address information asymmetries

and/or the Data Gap created by TSCA. Economic influences were expected to be a facilitating factor because KP is the largest not-for-profit health care system in the United States and its ability to influence suppliers with its purchasing leverage is considerable. Conversely, competitive factors were expected to have a negative or restraining effect because improved environmental performance was not projected to gain KP more health plan members or other competitive advantages.

Although KP's particular motivation and internal composition was largely unknown before the study, it was hypothesized that KP likely possessed several organizational characteristics that are found in innovative organizations. A second key proposition in this study posits that KP would be driven by internal characteristics found in innovative organizations: an innovative culture (shared assumptions, meanings, and values), and influential formal and informal leaders (champions and/or opinion leaders).

Proposition 2: Kaiser Permanente's adoption of a guideline for purchasing chemicals and chemical-containing products was driven by organizational culture and leadership.

Complexity was viewed as a restraining force because HCOs are complex systems whose purchasing practices involve complex decisions and relationships. Furthermore, it was hypothesized that precipitating events or factors, scanned in the external environment, would be fit with internal organizational drivers leading KP to the decision to innovate the GPC. It was anticipated that KP would progress through stages of agenda setting in which it identified a problem perceived to require an innovation and matching an innovation to address the problem or

problems. In the *perception of innovation* portion of the model, relative advantage of the innovation refers to the degree to which an innovation is perceived as better than the idea that it supersedes. Relative advantage was predicted to be a positive influence because available information about product chemistry, such as MSDSs, were not expected to provide sufficient information for KP's needs. As previously discussed, the innovation was thought to possess compatibility with organizational values and was designated as a facilitator. Complexity was viewed as a restraining force because of the wide array of products purchased and the complexity of purchasing processes in a typical HCO. Trialability was anticipated to be a driving force because KP was expected to experiment with the innovation on a limited basis to decide whether or not to continue its use. Observability was not expected to be influential because it would have been difficult for KP to observe societal benefits, which are not easily witnessed or measured.

Characteristics of adopters refers to the compatibility of the innovation with the values and experience of the adopter. As previously discussed, because the adoption of a GPC was anticipated to be compatible with KP's values, it was designated as a facilitator. Although information asymmetry was predicted to be a driving force in the adoption, agenda setting, and matching phases, it likely served as a significant barrier to implementation of the guideline and attendant processes because of manufacturer protections under the trade secrets or confidential business information allowances of TSCA.

Implementation of an innovation was anticipated to follow the processes of diffusion: redefining-restructuring, clarifying, and routinizing. Although

directionality as a restraining or driving force is not predicted in this portion of the model, these phases of implementation were expected to be influenced by the restraining function of information asymmetries and/or the Data Gap, Safety Gap, and Innovation Gap.

Proposition 3: The implementation and effectiveness of Kaiser Permanente's guideline for purchasing chemicals and chemical-containing products would be constrained by the Data Gap, Safety Gap, and Technology Gap.

Conceptual Framework Assumptions

In assessing the applicability of the conceptual model in Figure 1 to KP, several assumptions have been made. The model assumes (a) an orderly progression of events from adoption to implementation, (b) that the interviewees could accurately recollect the external factors that influenced KP's adoption and innovation of a GPC, (c) that interviewees would be honest and transparent about the events surrounding adoption and implementation of the guidelines, and (d) that interviews and documents would elicit adequate information about the process.

CHAPTER 3

RESEARCH METHODS

This investigation employed case study methodology, which attempts to capture the complexity of an investigated phenomenon when it is not readily distinguishable from its context (Yin, 2003). Schramn (1971) proposes that the essence of a case study (i.e., the central tendency of all types of case studies) is the effort to illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result. According to Stake (1995), the qualitative case study aims to find greater understanding by studying a case's uniqueness and the complexity within its contexts. This study had two research aims: (a) to explore and document the decision or set of decisions that led KP to develop a GPC, and (b) to explore and document KP's implementation of the guideline. Additionally, overall impressions of the guideline's effectiveness in addressing chemicals of concern were investigated. To answer the four research questions, data collection included in-depth interviews and review of archival and current documents. The compilation and analysis of information provided by the many respondents and documents help to identify the convergence of perspectives, or facts, from the triangulation of multiple sources.

Quality Measures

The following section outlines the characteristics or tests commonly used to establish the quality of empirical social research. These include *construct validity,* the establishment of correct operational measures of the concepts being studied; *internal validity*, the establishment of causal, as distinguished from

spurious, relationships; *external validity*, the establishment of the domain to which a study can be generalized; and *reliability*, a demonstration that the operations of a study can be repeated with the same results (Yin, 2003).

Construct validity was assured using three tactics: the use of multiple sources of evidence, establishing a chain of evidence, and case-study review by key informants (Yin, 2003). This study included the use of interviews and documents as sources of evidence, established a chain of evidence by manual coding interviews and organizational documents using Atlas.ti® software, and enlisted key informants to review the final results.

This study used a pattern-matching technique to assure internal validity. If patterns of empirical data coincide or match with predicted patterns, the results are said to strengthen the study's internal validity. The validity of coding is increased if, in relationship to other variables, it "behaves" as expected (Weber, 1985) or has "predictive validity."

External validity, or generalization of this study's findings, may be problematic due to the study's exploratory nature and the unique circumstances at KP during this time period (Yin, 2003). Further study will be required to validate the study's generalizability and to develop its conceptual framework. However, this study may be a useful exemplar for other HCOs or businesses that may confront similar barriers and concerns about the management of chemicals in the organizational supply chain.

To assure reliability, all interviews and documents were organized using Atlas.ti® software, and procedural steps were documented in sufficient detail that

subsequent researchers can replicate this study in another setting (Yin, 2003a). Content analysis was used in this study to conform themes to the research questions to identify stable data-context relationships. These themes, along with the documents and interviews that supported them, can be found in Appendix A (Interview Themes by Research Question). Each transcript and document in this study was coded at least twice and, in most circumstances, several times to ensure the stability of the coding schemes (Krippendorff, 1980; Weber, 1985).

Data Collection

Data were collected primarily at KP headquarters in Oakland, California and additional interviews were conducted at nongovernmental organization (NGO) offices and other locations. The sample comprised 19 key informants at various levels of management with diverse responsibilities and professional backgrounds (see Appendix B for interview participants and role description). Interviews were conducted between February 2009 and March 2010. The first participant, who had a historical connection to the process on innovating a GPC, was a key actor in and director of KP's ES efforts. This participant provided the names and contact information of other important informants who in turn recommended other participants who could deepen understanding of the phenomenon. This recruitment technique, called *snowball sampling*, was used to identify additional potential participants until all thematic findings were saturated. All of the informants were interviewed because of their knowledge of KP's efforts to reduce hazardous chemicals in the organizational supply chain, position within

the organization, and job function. Referrals could be made from within or outside of the participants' respective departments or areas of expertise.

Each participant was sent a letter informing him or her about the study, assuring the confidentiality of their participation, and requesting their agreement to participate. Verbal consent was deemed to be agreement to participate. Thirteen in-depth interviews were conducted with key informants from KP's headquarters. Two declined to be interviewed, and one was not available during the study period.[18] Six representatives of partnering NGOs were invited to participate in this study; five agreed. These interviewees had knowledge of KP's purchasing efforts or were involved in providing information about product chemistry or offering guidance to KP to reduce chemicals of concern in its supply chain.

Interviewees were assured that the information they provided was strictly confidential. In keeping with this pledge, the source or sources of information from the interviews are referred to in general terms. The interviews, which lasted between 1 and 2 hrs, were audiotaped in all but one instance at the interviewee's request. The tapes were then transcribed verbatim and loaded into Atlas.ti® for coding.

Interviews and Document Review

A semistructured interview guide was formulated to employ pattern-matching technique for the conceptual model in Figure 1 as it related to KP. Interviewees were first asked to describe their role with or position at KP. To understand the external (organizational field, environmental scanning, and precipitating factors or events in the model) and internal factors (internal

[18] The omission or unavailability of the interviewees who declined may introduce reliability and validity bias.

composition and organizational characteristics) that led KP to adopt a GPC, interviewees were then asked the following questions.

1. What is your understanding of when and why KP became interested in product chemistry?
2. What were the precipitating factors or events that led KP to the development of a chemicals purchasing guideline?

To understand decision making on chemical efforts (in the decision-making, agenda setting, and matching portion of the model), interviewees were then asked:

3. How were chemicals of concern prioritized, understood, or targeted?
4. How was information regarding product chemistry gathered or interpreted?
5. What course of action was taken to address chemicals of concern?

To understand what happened after the guideline was implemented (in the implementation portion of the model), interviewees were asked

6. What happened over the course of implementation?
7. What have been some of the successes, barriers, or lessons learned?

The interviews concluded with these final questions:

8. What are your impressions of the effectiveness of purchasing efforts?
9. Is there evidence to support that KP has influenced the design of safer products?
10. How does KP benefit from visibility and leadership on the issue of product chemistry?

An interview tool similar to that above was designed for the NGO interviewees (see Appendix C for interview guide for representatives from nongovernmental organizations). Documents that delineated the progression of the adoption and implementation of KP's GPC were also gathered or located to triangulate data (see Appendix D for KP's supporting documents on purchasing chemicals).

Data Analysis

Using Atlas.ti® software, 19 transcripts and 22 documents were analyzed to develop and assign themes according to each research question. All documents and transcripts were analyzed using thematic content analysis techniques (Krippendorff, 1980). Each transcript and document was analyzed first by open coding, as described by Strauss and Corbin (1998). Prominent codes were grouped into themes and organized by research question. Using pattern-matching technique, the empirically based patterns that emerged from data analysis were compared with predicted patterns of organizational behavior described in Chapter 2. The results of this analysis will be described in Chapter 4.

Human Subjects Assurance

This research study was approved by the Committee on Human Research, University of California, San Francisco (CHR # H945-33550-01).

CHAPTER 4

RESULTS

The study's analysis of KP's adoption and implementation of a GPC is presented in this chapter. Also provided are descriptions of KP's organizational structure, its ES Program, and its purchasing processes. The analysis of interviews and documents will be discussed in the order of the interview questions that were presented in Chapter 3. Finally, empirical findings will be compared with anticipated findings.

Research Setting

Today, KP is a consortium of three distinct entities: the Kaiser Foundation Health Plan and its regional operating subsidiaries, Kaiser Foundation Hospitals, and autonomous regional Permanente Medical Groups. KP is the largest not-for-profit health plan in the United States, with an operating revenue of $40.3 billion, an operating income of $1.5 billion, and a net income of $794 million in 2008. KP has 35 medical centers and more than 500 ambulatory care facilities. KP's facilities comprise more than 60 million square feet, serve 8.6 million members and employ 167,338 workers, of whom 40, 451 are nurses and 14, 641 are physicians. KP operates in Colorado, Georgia, Hawaii, the Mid-Atlantic Region (Maryland, Virginia, and Washington, D.C.), the Northwest Region (Northwest Oregon and Southwest Washington State), and Ohio. Its regional headquarters (often referred to as national headquarters) is located in Oakland, California and comprises the Kaiser Foundation Health Plan, Inc., Kaiser Foundation Hospitals

and their subsidiaries, and The Permanente Medical Group. KP's history can be found in Appendix E.

Environmental Stewardship at Kaiser Permanente

KP's system-wide ES Program focuses on reducing health risks associated with environmental factors as part of the organization's commitment to healthy communities and a healthy environment.[19] Currently, KP's ES[20] programs are structured around three central foci: (a) *environmentally responsible purchasing,* which incorporates environmental consideration into national purchasing contracts; (b) *sustainable operations,* which include initiatives such as the use of green cleaning products, reduction of greenhouse gas emissions, integrated pest management practices, energy conservation, and waste minimization programs; and (c) the *high performance buildings* program, which focuses on reducing the environmental footprint of medical facilities through site selection, design, construction, operation, and maintenance. KP's vision of ES is to "provide healthcare services in a manner that protects and enhances the environment and the health of the communities now and for future generations." KP's strategy development includes a formal integration of ES into its business strategy and operations and the establishment of guiding principles, organizational operating commitments, and actions to improve the health of communities they serve.

[19] This description of the environmental stewardship (ES) program at Kaiser Permanente (KP) was summarized from Documents 7-12 in Appendix D.

[20] According to the EPA, environmental stewardship is the responsibility for environmental quality shared by all those whose actions affect the environment. (www.epa.gov/stewardship/)

KP's ES Council is responsible for establishing the organization's overall strategy not only to advance its environmental performance but also to improve the performance of the entire health care industry. To continuously improve environmental performance within its organization and the industry at large, KP collaborates with academic institutions, government agencies, nonprofit organizations, and the industry as a whole to provide open-source sharing of research, information, best practices, and lessons learned.[21]

Currently, the priorities of the ES Program are initiatives on climate change, safe chemicals, and sustainable food. Although climate change and sustainable food initiatives will not be discussed here, the organizational guideline on chemicals and chemical-containing products will be detailed. KP's guideline on safe chemicals begins the commitment to advance an economy where the production and use of chemicals are not harmful for humans as well as for the global environment and its non-human inhabitants.[22] KP's strategy on chemicals comprises five guiding principles:

1. U*nderstand product chemistry*: To increase the transparency of the chemical constituents in products KP buys, KP will request product chemistry data from suppliers.
2. *Assess and avoid hazards:* KP will encourage suppliers to use chemicals with inherently low hazard potential, eliminate chemicals of high concern, minimize exposure when hazards cannot be prevented, and redesign

[21] This information was summarized from Document 12.
[22] This information was summarized from Documents 1 & 12.

products and processes to avoid the use and/or generation of hazardous chemicals.

3. *Commit to continuous improvement* by creating a framework for the review of product and process chemistry, and promote the use of chemicals, processes, and products with inherently lower hazard potential.
4. *Support industry standards* that, in KP's opinion, eliminate or reduce known hazards and promote a greener economy, including support for green chemistry research and education.
5. *Inform public policies* by being part of the public dialogue that advances the implementation of the aforementioned principles.

Purchasing Process

At KP's headquarters, each product decision is made by Sourcing and Standards Teams (SSTs) decide which products to purchase. When a product is being considered for a contract, it is reviewed by an SST, whose multidisciplinaryich is comprised of team members analyze it and review possible alternatives. SSTs recommend medical product recommendations to KP's National Product Council, a high-level, decision-making group that is chartered to provide leadership and support and to act as the governing body of the decision-making process. For nonmedical products, Facilities National Standards define utilization guidelines in contracts. Although some contracts may undergo more deliberation than others, all national contracts that are awarded go through this vetting process.[23]

[23] Information was gathered from Interviewees 1, 2, 3, and 4 and Documents 1& 2.

Environmental Purchasing Policy

KP's environmental purchasing policy supports KP's mission through its commitment to the principles of EPP, which must be applied to all major purchasing decisions. The policy is implemented by KP's Sourcing Core Groups (and supported by purchasing and environmental stewardship staff) who evaluate the environmental effect of products and services to insure that they are healthy, safe, and environmentally sound. The policy also requires that KP personnel who are responsible for product selection inform suppliers and the marketplace at large that it expects suppliers to develop price-competitive products that conform to the principles of EPP.[24]

KP's EPP policy states a preference for products and services whose environmental impact is projected throughout its the life cycle. As such, KP states a preference for "green chemicals" that are inherently less hazardous and release little to no toxic byproducts during their life cycle. Its purchasing personnel, therefore, take a precautionary approach to selecting products and services acknowledging "that federal and state regulations and standards do not always address the critical issues concerning public and environmental health" while being "mindful of environmental and public health concerns brought to the forefront through independent and rigorous research." Thus, KP's EPP policy aims to avoid products that contain (a) persistent bioaccumulative toxic compounds; (b) bisphenol-A; (c) carcinogens, mutagens, and reproductive toxic chemicals; (d) halogenated flame retardants; (e) chlorine containing flame retardants; (f) latex; (g) mercury; (h) phthalates; (g) PVC; and (h) volatile organic

[24] This information is summarized from Documents 1 and 2.

compounds and semivolatile organic compounds. This study examines the adoption and implementation of this portion of the EPP policy, which has previously been introduced as the guideline for purchasing chemicals and chemical-containing products (GPC).

In the following sections, the analysis of interviews and documents will be presented. Findings are presented thematically in order of research question posed (see Appendix A for interview themes by research question). First, external and internal factors influencing KP's decision to innovate and adopt a GPC will be addressed. Next, the processes involved in deciding to adopt and implement the guideline will be outlined. Organizational barriers to implementation and organizational successes will be described. Finally, anticipated and empirical results will be compared.

Factors Influencing the Decision to Innovate

As shown in Figure 1, it was anticipated that internal and external factors would influence KP's decision to innovate and adopt a GPC. To understand the GPC's historical development and the decision or set of decisions leading to its adoption, key informants were asked to discuss their understanding of when and why KP became interested in product chemistry and their understanding of the factors or events that led KP to develop this guideline.

Varied external and internal stimuli can occur simultaneously within and outside of an organization. Changes in one part of the system can be expected to influence or require changes in another part. It follows, then, that to understand the factors that led KP to adopt a GPC, many events, or threads of events, in the

organizational field and within the organization were perceived to influence the decision to adopt a purchasing innovation. Those events and factors will be discussed in the context of external factors in the organizational field and by internal factors referred to as organizational characteristics.

Organizational Field

The centralization of purchasing during the late 1990s was consistently cited as a critical factor in KP's ability to leverage its purchasing power with suppliers and manufacturers. However, several important external events in the organizational field informed internal decision making about centralization. One such set of events was a series of legal cases that emphasized the need for KP to standardize practices across its organization.[25] These events led to some unintended but significant internal developments. An influential managing partner of the law firm advising KP on these suits was subsequently appointed to its Board of Directors, and an associate attorney was hired into KP's legal department.[26] In addition to delineating KP's legal risk in the environmental cases, these lawyers also recommended how KP could develop its organizational environmental leadership for the future. Subsequently, KP hired experts in environmental health and safety, one of whom would become a principal actor in a grass-roots movement to build KP's ES.[27]

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[25] The economic benefits of centralization of purchasing and other operations had been proposed in the past. However, resistance was overcome due to the events discussed in this section.

[26] Following the series of legal cases, KP decision makers decided to bring aboard this attorney as an employee of KP, once it recognized the need for diligence in the organization's environmental performance.

[27] This actor would also serve as director of environmental health and safety (EH&S) and ES.

Legal Signaling and Centralization

As mentioned, the series of legal cases in the mid-1990s highlighted the need for centralization. Environmental initiatives before that time were performed sporadically or reactively to basic legal-compliance requirements. However, the series of legal suits brought by the district attorney of a Northern California county, one involving the mishandling of hazardous wastes from a KP facility and another involving service water discharges, magnified the need to improve environmental operations. According to a senior official at the time: "Out of this, we began to realize our [legal] exposure if we failed to meet certain types of environmental stewardship kinds of responsibilities, and there was certain shock value to that realization." [Interviewee 7or I7]. In light of the law suits and the recommendations of the advising attorneys, the senior official explained

> It was in that context that we also began to realize that there were a number of things that we could do that would be both very proactive, very positive, and that could have a significant impact on the organization as a leader in this field.[I7][28]

Spurred by these events, KP would begin to explore and innovate new archetypes and templates for environmental operations.

Although the fines KP incurred from the legal cases were reported to be nominal, the senior official contended that "It was certainly an indicator that we weren't being compulsive about disposal as we needed to be." In describing the decision-making processes that occurred during this time, this senior official explained:

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[28] These moves accompanied several significant changes that KP was making in the organization during that time regarding quality, safety, efficiency, affordability, and community service. These collective strategic efforts were intended to create a positive leadership identity for KP.

> What happens then in an organization is that you try to figure out what the levels of response might be, which could be a minimalist, reactive sort of thing to comply with the law up to a reactive or proactive sort of approach that positions you much more as a leader in the field and in some way positions you ahead of the curve in terms of the way companies at that time, healthcare institutions at that time, were responding to environmental threats that we were exposed to and dealing with all the time due to the nature of the health care business. What [the two attorneys] did was to lay out the options for us, and we looked at the middle to high road choices. That's when we brought in Workplace Safety to help Kaiser be more proactive in terms of environmental hazards and toxic management. [I7]

During this period of time, California's appellate court heard a case, *People vs. Matthews*, that would prove to have a significant effect on KP's decision making. According to an attorney handling KP's environmental cases at the time:

> The *People vs. Matthews* case made it clear that executives at a pretty high level could be liable for environmental issues that arose at the line level—meaning issues that did not come to the attention of the senior executive-if the executive had failed to put in place systems that were designed to prevent such things. So that Court of Appeals decision is what I presented to Kaiser. [I9]

The fear of legal exposure proved to be a most influential motivator. The senior official explained:

> What we learned about our exposure was that, due to way the law was written at that time, if there were significant violations of the law, it was considered a criminal offense punishable by fines and potential of imprisonment for officers of the organization. [I7]

Further, it was determined that KP's Board of Directors could be held liable for events that occurred under their directorship. If the organization could have been sued was not clear, but potential liability for the organization and for the board members in particular remained at issue, specifically that senior officials could

have been sentenced to jail had they been egregious in handling certain environmental situations. The senior official offered this historical account:

> And so that was a very, very powerful set of incentives to join with very powerful economic incentives to call for more centralization or control over [organizational processes]. It was incredibly powerful to realize that the normal protections you had were suspended in the case of egregious environmental degradation. That you could actually go to jail certainly caught our attention. [I7]

Before the mid-1990s, KP's purchasing processes had occurred at the regional or even hospital level. Previous organizational efforts to centralize purchasing had met crippling resistance that derailed any attempts at reform. In light of the risk of legal exposure, however, the senior official explained:

> The kumbaya method hadn't worked. The regions were told to get in line. They were given no choice in the matter. Before that, though, it was extremely difficult. All we could really do was shame or scare people into compliance. Send out the guideline [to the regions], hold your breath, and hope to hell they'd comply. [I7]

Although centralizing purchasing at the national level was expected to save a significant economic rewards, the regions would have to relinquish control of purchasing decisions. Centralized purchasing offered KP tremendous advantages in market leverage and cost savings because the volume of products purchased represented a significant portion of operational costs. Under the independent purchasing model, KP had little purchasing leverage. The senior official explained:

> We had a real fight on our hands. A real power struggle between economics-which really mattered to the Board of Directors and to the corporation which was Kaiser Foundation, Health Plan, and Hospitals, and power, which really mattered to the independent medical groups. They weren't affected by the economics. They're economically independent. And so, we fought with that for two or three years before we began to centralize several things. But it was a real battle. There was never

> agreement that is what we needed to do…so the 90s were all about changing the model and gathering the economies of scale, what we call the intellectual economies of scale, with the value of having independence and autonomy. But it was a lot of the battles that were fought in the late 90s, when we re-grew that balance, that laid the groundwork for some of the things that are now occurring, for example with environmental purchasing and green building standards, national standards. But it took more than a decade to get it all in place. [I7]

On KP's evolution toward centralized decision making, the attorney offered another account. Recognizing that KP's operational structure entrusted a great deal of autonomy to facilities at the local level, the attorney delineated KP's risk of relying on local safety officers who must understand a universe of laws and implement facility-level safety systems. Although regulations on hazardous waste streams were clear, chemical waste issues were not well-understood and were typically handled on a chemical-by-chemical basis, which further emphasized the dangers of decentralization.

> The only available literature at the time was really for heavy industries. There was nothing designed for the medical industry. There was no publication that laid out 'here are the chemicals in the healthcare industry and here's how you properly handle them.' So my other recommendation was that we needed to develop [guidelines].[29] And it didn't make sense to develop them on the individual or regional level. It made sense to develop that at a central level…so that's really what we recommended to Kaiser was to be very proactive in going out and looking for waste streams whether or not there were regulations…but to look at [wastes] from more of health and safety perspective and try to anticipate these things. And we wanted to provide a central place where safety officer could then go to see how to manage them [I9].

After visiting several regional facilities, the interviewee explained that it became clear that KP needed better coordination, centralized support, and a core set of experts who could leverage knowledge across facilities:

[29] The interviewee explained that KP went on to develop an extensive series of guidelines identifying best practices for handling health care waste streams. These guidelines were reportedly the first of their kind: "We were the leaders in this area."

> We recommended that KP begin thinking of programmatic solutions—of a programmatic design. So that was really a big change for the organization—to set up a system for the entire organization where you brought in really high-level experts [I9].

If accepted, this recommendation would afford KP the highest level of protection and the highest level of environmental performance:

> It wasn't about just basic compliance. The initial [legal] cases weren't the dominant decision-making piece. It was about doing things right and doing them well…And from that we really did decide to aim for true leadership on this [I9].

Based on these recommendations, KP hired a technical expert from a leading computer manufacturing company to head its national environmental health and safety department. This individual is credited with bringing a team of high-level leaders into the organization, one of whom was a key actor in grass roots environmental stewardship who later served as a Director of Environmental Health and Safety and as Director of the ES program.

In summary, the impetus for centralization did not arise from environmental scanning but from unpredicted legal events that brought the need for a conscientious response to the fore. Prompted by these events, KP decision makers at the highest level embraced a new leadership role and began to centralize processes to gather "intellectual economies of scale" [I7]. Key players, hired as a consequence of these events, would lead KP's environmental efforts, while centralization of purchasing would significantly bolster KP's leverage with suppliers in future environmental purchasing endeavors.

In describing why KP became interested in product chemistry, the senior official explained that several leadership initiatives grew out of the 1990s.

Furthermore, ES such as that with chemicals, was viewed as being mutually beneficial to other strategic leadership initiatives that KP has championed.

> There is a collective identity that creates a reinforcing logic here. If you are the best at quality and the best in safety and the best in community service and the best in environmental stewardship, then these really reinforce each other…what began to happen competitively was, in the 90s, we set out to establish ourselves in quality, safety, and affordability—as the leader. And we fought battles against the belief that you couldn't be of the highest quality and be affordable…we pushed very hard on the quality, safety, and affordability message and began to take a leadership role in the quality and safety fields especially in the latter part of the 1990s. This was very uncomfortable for the organization at the time…but it now it seems maverick. We are now the leaders in the patient safety movement. And Kaiser has taken this movement farther than any of us involved with it at that time could've wanted or hoped for. But it's just an example, where, if you look at what the inside forces are today in environmental stewardship efforts, it is really part of a larger leadership agenda or leadership image for the organization that began back then. [I7]

The Dioxin Report, Health Care Without Harm, and Coalition Relationships

In addition to the events of the 1990s, the EPA issued an important report that signaled the need for the health care industry to change its incineration practices. Although KP had begun to move away from incineration before this time, the release of the EPA's Dioxin Reassessment Report (U.S. EPA, 1994) and a partnership with a newly formed organization, Health Care Without Harm (HCWH), and its coalition members, would inform KP's purchasing initiatives over time. As discussed in Chapter 2, the dioxin report summarized an extensive body of research on dioxin's toxicity, sources, and occurrence in the environment (U.S. EPA, 1994). The report chronicled dioxin's global distribution and a range of negative environmental and human health effects, particularly on reproduction, development, and immune function. Of great concern was the assessment that

medical waste incinerators were among the largest sources of dioxin emissions.[30] According to KP's ES director, "The report was a wake-up call to the health care industry." [I1]

The EPA report spawned the HCWH, a coalition of organizations who were concerned about the troubling findings of the EPA report.[31] The coalition was founded to advocate for environmentally responsible health care practices. In response to the dioxin report, HCWH initially targeted the reduction of PVC in the health care industry. As an early partner with HCWH and its coalition members, KP led significant initiatives to address PVC (and mercury) in the supply chain. The coalition fostered strategic alliances that would later be instrumental in addressing other chemicals of concern. The coalition's early work would foster personal and organizational relationships that would lead to refinements in KP's GPC and the attendant disclosure process that will be discussed later.

Green Building Movement

KP's active participation in the green building movement informed its purchasing efforts. KP created the Eco Tool Kit [Document 7, or D7], a guide for environmentally responsible design and construction practices and later contributed significantly to the Green Guide for Health Care™ [D18], a best practices guide for healthy and sustainable building design, construction, and operations. KP has since created numerous design standards, and more recently,

[30] Although KP was mainly using autoclave technology during this time, it targeted PVC reduction in its supply chain.

[31] Health Care Without Harm's (HCWH's) current members include an international coalition of hospitals and health care systems, medical professionals, community groups, health-affected constituencies, labor unions, environmental and environmental health organizations, and religious groups.

has co-created the RIPPLE database [D15], an open-source, searchable database that provides evidence-based design strategies that includes these design standards.

The development of green building expertise became an instrumental function of KP's work with chemicals and was influenced by its efforts to centralize purchasing. In KP's facilities division, the national contracting program began focusing on building products and systems that were furnished and installed by a contractor rather than those that were purchased by KP for operations or to furnish a building. The intent behind this strategy was to leverage KP's purchasing power to obtain better pricing and better service from suppliers. An interviewee with oversight of KP's green buildings program described this type of standardization in relation to the organization's initial efforts to reduce PVC in its facilities:

> This movement was all about standardization of certain things that we were using in our buildings. The national standards apply to any kind of construction, renovation, or new building. Everything. So whatever we put in our standards gets done whether it's Hawaii or Baltimore and everything in between. So, several millions of dollars a year. Around 1999, we started to get all this information about PVC and the problems with PVC in building products. In 2000, when we started the Green Buildings Committee, one of our very first campaigns was to reduce PVC in the products that we were buying. And we knew it was in carpet, and so that's where we started. [I3]

KP garnered expertise and strengthened its leadership in green building in several ways. Notably, KP partnered with external organizations from the green building movement to further develop its internal expertise. For example, KP hosted a green building conference to which several hundred architects,

contractors, designers, and a wide range of other groups were invited. Speakers addressed the minimization or elimination of building materials and operational products that were known to have negative environmental impact. The topics ranged from cleaning chemicals of concern to energy conservation. Reportedly, KP held the conference to glean information on best practices that could be integrated into its organizational practices and to refine and build their leadership capability in green building practices. According to the ES director,

> It was really through this kind of effort that we could then step back and say given where we are today, our resources, and the expert advice we received, here are the things we're going to be focused on going forward. [I1]

External Factors and Relationship to Model: Summary

In summary, interviewees were asked to explain when and why KP became interested in product chemistry and to explain the events that led to its adoption of the GPC. Several external influences were provided. It was anticipated that the lack of sufficient information about chemicals and chemical products in the organizational field would drive KP to innovate a GPC. The lack of product alternatives, described later in this chapter, actually served as a driver to adopt the guideline. For example, through direct partnership with manufacturers, KP innovated a PVC-free carpeting product to fill the "innovation gap." The study's results supported the conceptual framework's assumptions that broader social issues and interests in chemicals influenced KP's interest in product chemistry. These issues took form in the green building movement and response to the dioxin report. There was support for regulatory and political drivers, but these are described in greater detail in the decision-making portion of

this chapter. Although the impetus of legal drivers was not considered in this model, the legal suits involving the mishandling of regulated materials served to drive centralized purchasing at KP and fostered the development of EPP purchasing.

Economic drivers related to size and purchasing power are described later in this chapter. However, centralizing purchasing bolstered KP's economic advantage in exerting purchasing leverage. Although no competitive advantage was anticipated, this proposition was not fully supported because KP's leadership on ES was viewed as being mutually beneficial to other leadership initiatives. Although not directly monetarily quantifiable, ES leadership served to bolster KP's influence in the marketplace and within the industry. This portion of the theoretical model and findings are discussed in detail in the Successes and Benefits section of this chapter.

Organizational Characteristics

Several organizational characteristics influenced KP's leadership on product chemistry. KP's culture and industry leadership served as drivers in the adoption of an innovation in purchasing chemicals and chemical-containing products. KP's founders, mission, history, and business model were found to bolster KP's culture and industry leadership. The following sections will explicate the internal organizational characteristics that drove KP's decision to adopt a GPC.

Influential Founders

KP's purchase plan for chemicals and chemical-containing products was reportedly influenced by its early founders, Henry Kaiser and Sidney Garfield, MD, who developed a health care delivery model in which injury and disease prevention were not only valued but viewed as being ultimately profitable [D16]. Interviewees described KP's interest in minimizing chemicals of concern in the supply chain as a natural extension of this preventative health care model. When asked why KP took a leadership position in addressing supply chain issues, interviewees voiced a common theme: the influence of KP's founders and the establishment of a prevention-centered mission and culture. One such opinion was presented by the director of ES:

> We didn't just jump on the green bandwagon when it became fashionable to do so. Kaiser has long had a prevention focus beginning as far back as the 1950s with Henry Kaiser's requirements for air emissions controls on smokestacks. This far back Henry Kaiser was saying, "We want to be part of the solution, not part of the problem." In 1963, Rachael Carson[32] gave her last keynote address before her death to a conference of Kaiser physicians, which shows that interest in chemicals and health reach far back. Even despite how controversial it was at the time, Kaiser physicians were asking to be informed. [I1]

Another interviewee who directs green building projects, who concurred with the observation above, described KP's historical interest in prevention in this way:

> I think the reason KP adopted the chemicals work is embedded in the corporate culture. Some of that is embedded in the business model. As a not-for-profit pre-paid health plan, the company is all about preventive health care. And the concept is: if you keep the health plan members away from the hospital by keeping them healthy and delivering the care

[32] Rachael Carson is the author of *Silent Spring*, a book published in 1962 that is widely credited with helping launch the environmental movement.

> through the clinics, you're going to save money. So it's an understanding of how a chronic disease impacts our costs--and obviously impacts the members of the health plan. If you look at how Kaiser started with Henry Kaiser--the whole reason why he brought Dr. Garfield out to the desert to provide health care to his workers was to reduce absenteeism. And why he agreed to the first HMO to take care of the families that were out there--same kind of thing. Reduce absenteeism, have happy workers, those sorts of things. So looking in a holistic way and understanding that relationship has been around forever. [I3]

Expanding on the influence of KP's influential founders and its revolutionary business model, a director of public relations explained that KP's health care delivery model has always been driven by wellness and productivity and, thereby, injury and illness prevention. The interviewee explained that Henry Kaiser's incentive in offering health insurance was to attract shipyard workers. Kaiser and his partner, Dr. Garfied, envisioned the creation of a productive workeforce from those men and women who had been prevented from serving in World War II because they had an existing medical condition. Further, Dr. Garfield began to investigate occupational injuries and how to minimize them to further reduce costs, prevent injury and disease, and optimize productivity. Reflecting on KP's foundational attitude toward productivity and injury prevention and the application of its business model to shipyard workers, the public relations specialist observed, "When you play this scenario forward today, it's pretty obvious why we're so interested in prevention today." [D16, I12]

Kaiser Permanente's Mission of Prevention

In describing the organizational fit between KP's mission and its concern over the negative effects of chemical exposures, an interviewee responsible for environmental stewardship explained:

> As a health care provider, our mission is to improve the health of the community we serve and if we are using products that may be unfavorably impacting the health of the communities we serve, well that's the driving factor for all of this…the main factor that drove us was alignment with our mission. [I1]

Reiterating this connection to mission, a director of risk management asserted that many leaders had come and gone during his tenure at KP,and organizational priorities had shifted with changes in the economy or company leadership. However, the interviewee stated:

> The organizational mission had always been the same, which is to improve the health of the members in the communities we serve…And so when we started thinking about the environmental piece, it was obvious to us that there was a connection between protecting the health of the communities we served and our business function--that we actually had an obligation to do this work. It wasn't anything but maybe aspirational at that point in time other than this is what our mission is. How could we not do this work? [I11]

Deliberate Matching

Early on, discussions and collaborations solidified the connection between KP's mission and its role as an environmental steward. According to an executive member who oversaw workplace safety [I11], the ES director began working with KP's (then) CEO to define KP's mission and ES work. The CEO would later coin the saying, "Environmental stewardship is preventative medicine on a grand scale." This influenced KP's strategic vision of environmental stewardship as a natural extension of its niche in the market as a leader in preventative medicine. The executive who oversaw workplace safety added, "We thought of this as just sort of a natural expansion of what we thought we were already good at--which was trying to protect people from getting sick in the first place" [I11]. A senior industrial hygienist described the linkage of mission and

purchasing chemicals this way, “Why do we do this? Because prevention is what we’re all about.” [I6]

Organizational Culture

Interviewees also perceived that KP’s organizational culture of industry leadership and prevention strongly influenced its work with chemical products. When asked why KP had taken a leadership role in understanding and addressing chemicals of concern in the supply chain, an interviewee responsible for government relations simply stated, “To just really be honest about it, this is in Kaiser’s DNA. It’s just the way that it is here.” [I13] Interviewees consistently stated that KP’s organizational culture clearly underlies its innovations in purchasing: That’s “just the way it is.”. Reinforcing culture as a driving factor, an environmental purchasing manager explained, “It’s just that there is an appetite here. There’s just a general willingness to learn and incorporate this.” [I2] A legal representative regarded Kaiser’s innovative culture thus:

> The thing about Kaiser that’s so good is that the goal in hiring staff is not just to hire technocrats. The goal is to hire people with a vision for what will put us in the lead in industry.” [I9]

Learning culture. How KP’s organizational culture shapes the thinking and commitment of new members is evident in the following account of an executive staff member who had been newly hired to oversee facilities construction:

> You know, I’m not an environmental expert. I came to Kaiser in 2004 thinking that I had a large shared service that was in charge of the largest billing program in the history of American healthcare and that [ES] wasn't my job. And so when [the director of ES] came to see me initially I said, ‘I’m so glad you’re here so that there’s somebody who can actually work on these things.’ Because, hey, it wasn’t necessarily my job. And I said,

> "I'm glad we do this, I'm glad this is part of what we do, I'll be very supportive." But I don't want to kill myself over this 'cause I've got other stuff I'm supposed to do, right? I'm not an environmental chemist, but there's other stuff I know, right? But then--then I started learning. I started learning because I was here, because there was a group of people who are really interested in it. I thought oh, you know, I would love for this to be someone else's job. But it can't be. I have to lead from my position as well. So I think actually the organization brought me along. [I5]

Echoing this account, a director of purchasing reflected on his initial experiences at KP. In addition to being responsible for several sourcing areas, which were integral to his new role, he was also expected to fulfill ES responsibilities inherited from his predecessor. The import of those responsibilities was shared in a memorable way: The outgoing director gave his replacement a copy of Dr. Seuss' book, *The Lorax.*[33] The new purchasing director described how he acclimated to his role and learned of the relationship between KP's organizational culture and ES. Noting the striking difference between KP's culture and other places of employment, the purchasing director commented, "I mean, it just - it absolutely had not been even vaguely discussed in any of my previous roles. And I had worked with a number of different organizations in financial services, in manufacturing, even in high tech." [I4] In agreement, the environmental supply chain manager explained the differences between KP and other HCOs regarding her skill set in environmental purchasing, "I would have to say is that in other health systems I have worked with, I've not had the reception I've had here." [I2]

A sourcing director characterized the ES culture at KP in this account:

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[33] *The Lorax* was published in 1971.This children's book is commonly recognized as a fable chronicling industrialized society and the plight of the environment.

> We had a leadership meeting just two months ago where the chairs of about 35 different purchasing groups got together and talked about successes talked about some of the challenges and ways of working going forward. The whole theme of the conference was around the environmental topic this year so this was absolutely critical audience because these are the people who sit on the committees who select all of the medical products we use across the industry. And it wasn't a hard sell. I mean, it never is a hard sell, this topic in this organization. People are extremely aware of it. There's a very strong passion around it, motivation around it, and a lot of these groups have been doing some great things for a number of years already so, you know, so it's kind of old news for some of them. [I4]

A culture of safety. Integral to KP's environmental stewardship culture is a culture of safety, which the organization has dubbed "The Three Safeties." These comprise the central foci of patient safety, worker and workplace safety, and environmental safety. Although the interviewees often referred to the Three Safeties, their development is extensively chronicled in this section by an interviewee who oversaw workplace safety. His account is particularly illustrative of KP's decision makers' ability to transform a strategic vision into meaningful organizational culture. The interviewee explained that KP's national leadership clearly understood the logical and synergistic linkage between the company's mission and implementing the Three Safeties. Further, the early decision makers believed that "a culture of safety could be advanced in a more efficient and effective manner if KP could connect the dots internally and subsequently assist others in identifying where the connections were." [I11]

Initial discussions of the connection between patient and workplace safety were rooted in KP's early safety efforts. Following the 1999 release of the Institute of Medicine's report, To Err is Human: Building a Safer Health

System,[34] which drew increased attention to patient safety, KP began to examine how it could minimize patient-care errors. More important, KP's leaders understood and examined the critical connection between patient and workplace safety. According to this interviewee:

> As we began talking to our colleagues in the field and leaders in the organization, we understood that it was going to be hard to reach the organization's quality aspirations in terms of high quality affordable healthcare and to be the safest place to give care if we're not the safest place to get care. [I11]

The decision to develop a comprehensive culture of safety began with a vision of KP becoming "the safest place both to give and to get care," whereby the "give" referred to those providing health care and the "get" referred to those receiving medical services [I11]. Illuminating the care-giving environment, the caregiver, and the patient safety connection, the interviewee explained:

> We recognized that we couldn't actually be the safest place to get care if we weren't the safest place to give care. A healthcare organization can't put its own staff in harm's way, have them out of work or be a member of the "working wounded" due to an occupational injury, and at the same time provide the highest level of quality care possible. The bottom line is that it's hard to give your best when you're not at your best...and if you've been injured on the job, by definition, you're not at your best. This notion was something that people could wrap their heads and hearts around. The connection between workplace safety and patient safety spoke to the broader value of a culture of safety...not worker safety, not patient safety, just safety. [I11]

Over time, KP decision makers and departmental strategists began to refine and consolidate notions of a "culture of safety", seeing it as a whole rather than as disparate elements: patient, worker, and workplace safety. The interviewee stated, for example, that KP investigated an employee back injury and

[34] To Err is Human: Building a Safer Health System was the seminal report released by the Institute of Medicine in 1999 that brought awareness to systemic occurrences of medical errors in the United States and called for comprehensive reform.

a patient injury caused by medication error in the same manner. Root cause analysis was fundamentally the same,as was the response of the hierarchy of controls to inform subsequent action to diminish or eliminate the opportunity for error or injury. In a similar way, KP began to apply the hierarchy of controls to the notion of environmental stewardship and the purchase of chemicals and chemical-containing products. The interviewee elaborated:

> Like with chemical substitutions: if we can't totally eliminate the chemical from our inventory, how can we purchase a less harmful chemical? So the methodologies and the mindsets are really identical for all three of those areas and so that's how we began to sort of start connecting the dots way back then. [I11]

Individual Leadership

KP's ES director, who also had executive responsibility for workplace safety, was universally cited as being central to advancing KP's ES program. As alluded to earlier in this chapter, KP organizational concern for workplace safety began in the mid-to-late 1990s. It was then that the ES officer and a superior were hired to bring KP needed expertise in safety and environmental health. An early member of HCWH recalled the historical development of ES at KP, "So [the environmental stewardship director] is the hero in the Kaiser story. She had the portfolio to move environmental stewardship at Kaiser, and she had a very supportive boss." [I15] Echoing this opinion, the industrial hygienist added, "This whole [chemicals purchasing] movement is really [the environmental stewardship director's] story. It came from her leadership." [I6]

An interviewee from a partnering NGO described how KP's ES officer deftly shepherded ES at KP:

> Corporations are made up of individuals and you need champions to move issues forward organizationally. There is this other translational role where you have to take what you see in the world--like [KP's ES director]--she sees and hears and participates in what these NGOs or HCOs are doing and she has to take that and bring that into her organization and translate it into language that will resonate within the organization. It has to be tempered and structured in a way and done in a way that doesn't move things too fast but enables it to move forward. I look at what [the ES director] does, and others who are able to do this, and am so impressed. Where really she takes ideas, and the processes and the way they work and moves them into the organization to be adopted and integrated. [I17]

This organizational actor was also a key player in the grass-roots movement to solidify ES as one of KP's ongoing priorities. Spawned by a group of like-minded employees in the 1990s, this grass roots effort advanced the principles of ES within the organization. The group of approximately 20 employees formed 'green teams' that addressed areas of company interest. Later, this group of ES leaders proposed to senior leadership a strategic vision for ES at KP. In adopting the group's recommendations in 1996, KP formalized its ES program and appointed a director to administer it.

Interviewees identified other leaders at the executive level who provided invaluable leadership. A KP executive who oversees national facilities described a senior official and original member of the Sierra Club[35] who often works in his office without turning on the lights.

> His assistant says he'll say, 'Well, you know, eventually your eyes adjust' [interviewee laughs]. So he's just this very passionate environmentalist and just a tremendously ethical man. Just somebody who's easy to follow, if you know what I mean." [I5]

[35] The Sierra Club is the largest and oldest grassroots environmental organization in the United States. It was founded in San Francisco in 1892 by John Muir.

An environmental supply chain manager also offered insight into executive leadership at KP, citing the chief procurement officer's commitment and passion to chemical issues.

> I thought because of the current economy that our environmental purchasing goals this year were just going to be sort of a "nice to have." I thought savings was going to be the bigger focus, but no, it's right up there at the top. That's because he's such a champion. And because he knows it's so critical to the organization's mission, so he wanted to make sure that our department was right on board. [I2]

Internal Factors and Relationship to Model: Summary

In summary, the elements of internal composition in the theoretical model (see Figure 1) are represented in this study's findings. Evidence exists to support the proposition that an internal culture of leadership and innovation drove the unique development of the GPC. Evidence also exists of influential founders and a mission and business model of prevention that facilitated the innovation and adoption of the guideline. Complexity of organizational processes was not mentioned, although it was predicted to be a restraining force. However, complexity in terms of the number of items purchased is discussed in this chapter's section on the implementation on an innovation.

To understand why KP adopted the GPC and how it was subsequently implemented, interviewees were asked a series of questions about the decision-making processes in the development and implementation of the guideline. As outlined in the decision-making portion of the proposed theoretical model, it was anticipated that KP would progress through stages of agenda setting and matching, that is, matching the problem of chemicals of concern in the supply chain with an innovation to address that concern. Although the matching of KP's

mission to chemicals work has been mentioned earlier, results obtained from this specific line of questioning are presented here.

Decision Making

To understand the decision-making processes involved in the development and implementation of the GPC, interviewees were asked how chemicals and chemical products of concern were prioritized, how information about product chemistry was gathered and interpreted, and what course of action was decided upon to address chemicals and chemical products of concern. Interviewees were also asked to describe the types or sources of information that explained product chemistry and informed decision making. The principal sources of product information were (a) supplier disclosure forms that identified product ingredients, (b) information exchange with academic and NGO partnerships, (c) direct dialogue with manufacturers and suppliers and (d), less often and where applicable, third party certification standards to understand product chemistry and company websites or Internet searches to gleen information about a company's sustainability efforts or product descriptions.

Prioritization and Information Gathering

Material safety data sheets. Interviewees reported that they rarely relied on MSDSs to understand product chemistry. If not forthcoming, interviewees were asked if they had consulted MSDSs. Presented here are some particularly revealing responses. An interviewee who is responsible for managing environmental supply chain initiatives responded in this way:

> I don't usually bother with them. I mean, I have in my desk drawer some MSDSs for laundry chemicals and I really have them printed out to show

> that for the same brand of chemicals, each MSDS looks different--and just to show what a mess they are. So, I just really have them to demonstrate to me that they are useless. [I2]

The ES director echoed this response, "They're useless." [I1] A research scientist from a partnering NGO who has historically collaborated with KP on building materials chemistry added this comment, "We use them to learn what we can but never assume that it's all there. There are too many holes in the MSDS process and so they're rarely comprehensive." [I14] An interviewee responsible for facilities planning and design indicated that MSDSs had been consulted as a source of product information, but they were not perceived to be detailed or reliable.

> It doesn't tell you much because it only goes down so far. It will show what they consider inert materials and they'll just give you a percentage. Well, they say it's inert, but it may not be inert, right? [I3]

Providing a similar perspective, an interviewee responsible for industrial hygiene at KP explained that MSDSs lack specificity:

> There's a delicate balance between allowing companies a competitive advantage in the marketplace between each other and being able to provide people who know what to do with [product] information-with enough information-to make enlightened choices. Everyone should not have to sign a non-disclosure agreement just to get information about products they use. I mean, we have so far to go. Currently, what we ask manufacturer's to provide in the MSDS is just very superficial information [I7].

Calling into question the mixed messages of some MSDSs that report products to be nontoxic but advise users to wear personal protective equipment, the industrial hygienist added:

> Manufacturers are essentially able to cover their assets from a liability standpoint by on the one hand saying use this, this, and this in terms of protective equipment, and then on the other hand saying it's completely

> non-toxic. So why would you advise us to wear a respirator if it's completely non-toxic? This is common. Or the language is so general that there is no specificity to that material at all, so it's not at all helpful to the people who are trying to figure out what it is they are actually working with. [I7]

Supplier Disclosure

To obtain factually accurate information on product ingredients, KP devised and continues to refine its supplier disclosure process, which requires suppliers to disclose the presence of those chemicals or chemical classes of concern listed in the GPC. In describing how chemicals of concern were prioritized and how the supplier disclosure tool and GPC developed, the ES officer explained that chemicals were identified as high priority as they came to be known as a chemical of concern. For example, early initiatives dealt with the minimization of mercury, PVC, and later DEHP or the establishment of a solvent recycling program to greatly reduce the number of solvents entering the supply chain. The ES director explained the GPC's eventual expansion and KP's ensuing reliance on supplier disclosure of product chemistry:

> The work bubbled up to the point to carcinogens, mutagens, and reproductive toxins a number of years ago. Four or five years ago we began talking in those terms and created supplier disclosure forms that referenced those materials. And they had to tell us: "Does your product have any carcinogens?" The bottom line was, somehow or another we wanted to get back information from suppliers. We wanted to know what their answers were to those questions. [I1]

As recounted by multiple interviewees, KP's initial disclosure process was a conditioning tool meant to alert suppliers that product chemistry was most important to Kaiser. The purchasing director reflected:

> I think we seriously questioned how much meaningful information we got back from the type of disclosure form that we were using back then but

> that's something that we've looked at and have been really trying and take to the next level.

The product disclosure process was also informed by KP's requirement that suppliers disclose chemicals in their carpet and resilient flooring. According to an interviewee who directs the green building program, KP developed a questionnaire for flooring products that requested full disclosure of the product chemistry, raw material usage, manufacturing process, embodied energy, water usage and discharge practices, plant characteristics, and waste stream characteristics. Furthermore, KP provided manufacturers with a list of chemicals of concern and required that they disclose the presence of priority chemicals in their products.

Organizational Partnerships

Central to KP's initiative to understanding product chemistry was a constellation of organizational partnerships. These partners worked with KP to develop strategies for obtaining product chemistry or they provided KP with valuable information. Speaking to this process, a green building program director commented that KP's High Performance Building Committee lists among its members NGO partners such as HCWH and Healthy Building Network.[36] He said, "These groups have really worked very closely with us over that last 10 years or so educating us around product chemistry and either providing their services or access to scientists who do evaluations with us."[I3] The importance of NGO partnerships was confirmed by a purchasing director,"Without question

[36] Healthy Building Network aims to transform the market for building materials to advance the best environmental, health, and social practices. More information can be found at www.healthybuilding.net

NGOs provide us with valuable input. We work a lot with Health Care Without Harm, Practice Greenhealth,[37] and with many other NGO organizations." [I4]

To illustrate KP's key partnerships with outside experts, the ES director enumerated collaborations with academic partners at the University of Massachusetts Lowell's Center for Sustainable Production[38] and the following NGOs: Center for Environmental Health,[39] HCWH, and Healthy Building Network. In describing a particularly rewarding NGO partnership, the ES director recounted an early attempt to understand which products in a neonatal unit might contain DEHP:

> We asked [a physician and scientific adviser with HCWH] and other folks with HCWH to come and help us sort that out. We actually went to the San Francisco neonatal unit with the nurse manager there, went into the storeroom and got everything that looked like plastic, brought it out to a conference table, and laid it all out and had these experts sort of touch and feel and look and say this probably has DEHP, this probably doesn't, this probably has vinyl. I mean, there was no other way to tell because the manufacturers weren't always telling us what was in their product. [I1]

The ES director added that expert nurses and physicians affiliated with HCWH identified products of concern and speculated which ones had the greatest potential for exposure. Based on this evaluation, KP then identified three alternative products to replace those suspected of exposing humans to DEHP. The products were rigorously tested, and the resulting data informed KP in its purchasing decisions of alternative products. The ES officer explained:

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[37] Practice Greenhealth is a membership and networking organization for institutions in the health care community that have made a commitment to sustainable, eco-friendly practices. More information can be found at www.practicegreenhealth.org

[38] The Lowell Center for Sustainable Production at the University of Massachusetts helps to build healthy work environments, thriving communities, and viable businesses that support a more sustainable world. The Lowell Center for Sustainable Production can be found at www.sustainableproduction.org

[39] The Center for Environmental Health's mission is to protect people from toxic chemicals and to promote businesses products and practices that are safe for the public and the environment. More information about the Center for Environmental Health can be found at www.ceh.org

> It was a very formal, structured process. But in the beginning, when you don't know what you don't know, you just set at a conference table with a bunch of products and maybe you're making wild guesses about what might be in it. [I1]

According to an environmental supply chain manager, organizational partners routinely assist KP in providing information omitted in the supplier disclosure process. For example, after reviewing the disclosure forms of two manufacturers of electronic products, the interviewee recalled that the answers to the disclosure questions seemed incomplete. To better understand practices in these companies, the manager called the Center for Environmental Health, an NGO, and solicited its assistance. The Center had experience with Clean Production Action,[40] another NGO, and its electronics disclosure process.

> So I called and said, " I really can't tell between these two suppliers.They really did a terrible job of filling out the supplier disclosure form. I don't have time through the sourcing process to push and push. What do you think of these two suppliers?" And they got back to me and said here's the movement with this company, here's the movement with that company, here's our experience working with them, there you go. They don't give me "you should choose them" or "you should chose them." I just try to make decisions based on the information provided then make my recommendation [I2].

Direct Dialogue with Manufacturers and Suppliers

KP representatives complemented the product information they obtained from the supplier disclosure process with direct dialogue with suppliers about product chemistry. Several examples were cited. According to the ES officer:

> What I'll say about manufacturers and producers is they come, in my mind, in three categories: those who their product is in synch with sustainability and they want us to know that and are very happy to let us know everything we'd ever want to know about their product. And, then

[40] Clean Production Action designs and delivers strategic solutions for green chemicals, sustainable materials, and environmentally preferable products. More information can be found at www.cleanproduction.org

> there are who have products that maybe have some gaps. They don't quite meet our needs but are very willing to work with us. An example of that is the organization that we ended up working with us to get us the PVC-free carpet. They went into it with eyes wide open to get the product we wanted and were fully disclosing their work along the way. And then the third group is the people who want to be our supplier but don't know, don't care, don't want to share some of the critical data with us. How we work with each one of those suppliers really differs. [I1]

An environmental supply chain manager explains that she regularly encourages suppliers to disclose product chemistry as a matter of practice:

> So maybe I'm not always giving them a disclosure form, but I will tell them "Look, the burden of proof[41] is on us. You need to be good advocates in the world. We don't want you lobbying against disclosure regulations," *et cetera*. So I'm communicating regularly with them as to how I want them to partner with us. Now, to whatever success level that is, I don't always know. But as a big consumer, I think is very important. [I2]

Kaiser Permanente and the carpet story. The "carpet story" crystallizes KP's organizational effort in innovation. Through direct dialogue and contractual agreements with manufacturing companies, KP stimulated innovation in the development of a PVC-free carpet. Most of the detail for this story comes from the green buildings program director. He recounted that KP asked five of the largest commercial carpet companies with a reputation for being green to bid on the development of this product. Confident in the companies' expected price estimations, gleaned from previous contractual agreements, KP's decision makers evaluated companies on aesthetics, performance, and sustainability endpoints, such as product chemistry. Failure to disclose ingredients, however, was not negotiable: "If they wanted to bid on the contract, which was worth several million dollars, they had to disclose product ingredients." [I3]

[41] The burden of proof typically refers to the burden placed upon downstream users of chemicals rather than manufacturers.

Given dioxin's negative effect on human and environmental health, KP's green building director emphasized that his company sought a carpet whose backing was PVC-free and that had the same performance characteristics as a vinyl product previously purchased. Although one company was found to manufacture a PVC-free carpet, the product could not pass KP's performance requirements for impermeability. With no acceptable products on the market, KP awarded two companies a 2-year contract that required them to develop a new PVC-free carpet that could meet all performance requirements — at no added costs.

KP devised a system of quarterly reviews with the companies. KP representatives were allowed access to the manufacturing sites, but they were required to sign nondisclosure agreements with the companies, which afforded the companies legal protections under confidential business information laws:

> We went out to their mills, we looked behind their kimonos to see what was going on. One of the companies had a secret lab. We had to sign special documents to go see that - where they were testing backing and fiber and different kinds of things. [I3]

Each quarter, the carpet companies were obligated to report to KP on their progress in developing a PVC-free carpet. KP performed beta testing on different products to evaluate durability and wear. In showcasing the winning product, the green building director observed:

> What happened at the end is this (hands interviewer a piece of carpet). This is ethos. And ethos comes from the film that's left over when you recycle safety glass. There's a great market for glass and safety glass. What's left over is called polyvinyl buterol. Pounds of this powder-that's the film in safety glass that keeps it from shattering, from spreading. So, they recycle the glass and they have this left over powder. So they figured out how to take that and turn it into backing. So they were doing two

> things: one, they were downcycling-because the [safety glass] was going to landfill, and they were providing a new product...And, so even though it's a vinyl, it doesn't have the chlorinated molecules in it. And so, it met the criteria. They beat the deadline. They came out with it about 8 months before the deadline. I got to actually be there when it came off of the production line which was pretty cool. It didn't cost us anymore--and since 2004, that's what's been going into all of our buildings. [I3]

Decision Making and Relationship to Model: Summary

As chronicled above, KP invested considerable resources to understand and address chemicals in their supply chain. Concluding that MSDSs were unreliable and inconsistent sources for the detailed information they desired, KP managers implemented several innovative strategies: the use of supplier disclosure forms for chemical information, partnerships with NGOs and their members that provided expert advice and resources, and direct dialogue and contractual agreements with manufacturers and suppliers. These findings support the assumption that KP adopted a GPC and attendant supplier disclosure to overcome information asymmetries and the Data Gap created by regulatory barriers. However, these successes are quite limited in proportion to the number of products in the organizational supply chain. Although there was support for the proposition that the GPC's attendant supplier disclosure had relative advantage over inadequate and conflicting information provided by MSDSs, the complexity of the information garnered through this process and the lack of human resources to comprehensively address, understand, or verify information were substantial restraining forces. Support for supplier disclosure trialability was demonstrated by KP's creative and sustained effort to communicate to suppliers that product chemistry was important to the organization (the supplier disclosure

process, which has been continually refined, will be discussed in a later section). KP's GPC and supplier disclosure innovations were not only compatible with, but driven by, the organization's culture and values as discussed previously. To further understand the refinements, or redefining-restructuring, clarifying, and/or routinizing, of the innovation, interviewees were questioned about its subsequent implementation. These topics will be discussed in the following section.

Barriers to Implementation

To better understand KP's experiences in implementing the GPC, interviewees were asked to describe its trajectory, barriers, successes, or lessons learned from implementation, and to assess its effectiveness. Interviewees reported confronting these barriers to implementing the GPC: (a) difficulty acquiring product information; (b) difficulty reducing chemicals and chemicals of concern in the supply chain due to various factors, such as lack of available alternatives; (c) limited organizational resources to pursue or verify product information or create new products; (d) difficulty addressing the large and complex range of products that enter KP's supply chain; and (e) difficulty surmounting barriers posed by existing regulations on chemicals.

Priority Chemicals and Reduction Efforts

Reducing or eliminating a single chemical or class of chemicals is a complex challenge. KP's ES director offered insight into the company's intensive efforts to do just that for such products as gloves, flooring, and those containing

mercury. With regard to that latter,[42] KP can now claim that the organization is 98% mercury free. According to the ES officer:

> We haven't completely gotten rid of [mercury] because it can't be gotten rid of. Because it's still in lights or in some vaccinations and that's the state of the practice and that's what it is….and we're not going to dictate going without vaccines, right?" [I1]

Further, although KP may be able to verify certain chemical ingredients, verifying the presence of chemicals or classes of chemicals of concern is extremely difficult. For example, an ES officer explained that it has become increasingly easier to verify the presence of latex, mercury, and phthalates. Although KP can assert with authority that it knows the chemical composition of certain products like carpeting, it concedes that the chemical composition for a wide range of products remains largely unknown. For certain chemicals listed in the GPC, the ES officer contended that follow-up is relatively straight-forward.

> For others, like PBTs or carcinogens, mutagens, reproductive toxins-well, those are huge categories. So does some product have a carcinogen? Does it or does in not have one of these, you know, five thousand things in it or not? Well, that's a much different story from latex or mercury. This is where we've had to really have to rely on outside information-on suppliers disclosing it. [I1]

Information Verification and Resource Limitations

KP faced significant barriers in its attempts to acquire and verify product information and to pursue reduction efforts. With regard to information acquisition, the suppliers' legal right to protect trade secrets and confidential business information

[42] Demonstrating considerable organizational effort, a KP ES staff member spent several months performing site visits to verify elimination of mercury products.

often stymied attempts for disclosure of product chemistry. Furthermore, the information that suppliers provided KP staff was largely confusing or difficult to understand or interpret. Furthermore, KP had no mechanism to verify information.that was provided. The ES officer offered a case in point:

> For instance, a supplier says "Our carpet has no carcinogens." Well, isn't that interesting? Because almost all carpet does. But if you're not in a position to go out and independently test every single product, that makes it really difficult to verify the information. [I1]

Describing the challenges of nondisclosure under confidential business information law, the ES officer explained:

> Many suppliers don't want to tell you what's in their product so they claim trade secrets or in some other way proprietary information that means that they do not disclose to us in all situations what we want to know.

Although KP interviewees indicated that the company has now adopted a more targeted approach to supplier disclosure, its initial attempts to verify chemicals of concern through the supplier disclosure process were a "broad-brush" effort in which the same disclosure form was used for all products.[43] KP's initial efforts, however, were essential to its later successes because it was educating suppliers that product chemistry was highly important to the organization. However, the effectiveness of its efforts was hampered by the suppliers' reluctance to divulge product chemistry citing legal protections and KP's limited organizational expertise and resources to understand or verify the information that was obtained. The ES officer added:

[43] Moreover, suppliers could be asked for the presence of priority GPC chemicals in a single form for hundreds of products rather than on a line-by-line or product-by-product basis. KP is currently refining this process to move toward greater specificity.

> So, yes, we had these supplier disclosure forms. Yes we had a list of priority chemicals we were targeting. Yes, we had all these wants and desires, but we didn't have the subsequent operational means to follow up on them." [I1]

Speaking to KP's ability to verify information provided by a carpet manufacturer, the interviewee in charge of facilities design and planning explained, "There was no way to verify it, really. We just required them to disclose it and had to figure that they would be telling us the truth."According to an environmental stewardship officer:

> They're signing a contract. If they sign a contract that says 'We've disclosed we have no carcinogens,' yet their product does, that's a liability for them and a compliance violation. So, we hope they don't take it lightly. [I1]

Balance of Organizational Priorities

Implementation of the GPC also confronted the complex challenges presented by the sheer number of products KP purchased and its limited resources to screen them in any comprehensive manner. For example, the environmental supply chain manager indicated that she is a staff of one compared with 600 other departmental employees with a work load of 80,000 contracts. In light of various organizational considerations and time constraints to pursue information on product chemistry, KP has limited capacity to accomplish this task comprehensively or systematically for all products:

> So to get to this chemicals work, I do this opportunistically.The sourcing process moves at a specific rate and [the sourcing teams] have lots of other issues to consider: quality, performance, price, supplier diversity. They have maintenance and operations issues to consider, and they have lots of different players. So if I start asking these questions, I could hold up the process of by many, many months while suppliers scramble to find out what is in their products. Now, I'm not personally opposed to doing that,

> because I want to see them scramble and get me the information. But at the same time, I have to work within an organization.[44] [I2]

Speaking to the difficulties of managing the acquisition of product information for construction materials, which are purchased at an incredible pace, a facilities construction executive explained that her department spends $2.5 billion a year and consists of 2,900 employees. "The program I manage is like a raging river. It is moving constantly. You know, there are decisions made by literally thousands of people every day. They're working at an incredible pace." [I5] And, according to the purchasing director who works with chiefs of surgery across KP, the sourcing department works with 35 major medical facilities to evaluate surgical products. This division of the sourcing department alone spends approximately $300 million a year on surgical products and is responsible to evaluate products in terms of their quality, clinical outcomes, and service cost. [I3]

Describing the challenges of evaluating the environmental performance of a multitude of diverse products, from da Vinci robot systems to surgical masks, the purchasing director observed:

> It's just an incredible range. One dynamic of health care is that there the literally hundreds of thousands of different products that come into a healthcare industry. If you look at any other industry-you look at a car manufacturing plant-they have very specific materials that come in to assemble and manufacture a car. I mean, they have nothing like the complexity in terms of SKUs[45] of different products that come into a health care system. [I4]

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[44] KP's hiring of an environmental supply chain manager, whose role includes evaluation of products and overall management the environmentally preferable purchasing (EPP) program is quite unique. At the time of the interview, interviewees were not aware of another like position in the health care industry.

[45] SKUs refer to "stock keeping units,"a unique identifier for each distinct product.

In light of these complexities, the purchasing director acknowledged that KP is unable to evaluate all products of concern to its satisfaction because a myriad of environmental effects must be considered for any given product:

> We're not looking for the perfect solution, we're looking for something that's just preferable, that's just a step better than what we've been using, right? Or whatever we can, whatever's available or we can push to make available in the market. So each time you select a product you're just eating into this overall story with one product. But it's just a massive--it's just a massive task. [I4.

Contextual and Regulatory Barriers

Several policy-related limitations or challenges were described by a number of interviewees. Interviewees stated that regulations that currently govern chemical products have created or exacerbated these limitations. Examples include differences in perception between supplier and purchaser regarding responsibility for products at the end their useful life. And interviewees reported that the current chemicals framework has placed significant burden upon downstream users of products such as KP who are trying to understand and manage chemicals of concern in their supply chain. A discussion of these issues follows.

Responsibility for environmental impact. Some of the contextual policy issues regarding perceived responsibility for used products can be seen in KP's early effort to implement supplier disclosure during contract negotiations with a national carpeting firm. According to the director of the green buildings program, it was during the contracting process in 1993 (a decade before the initiative for PVC-free carpet) that a questionnaire was developed as part of a request for proposal that required the company to furnish information not only on carpet

performance and pricing but also on its efforts to reduce carpet in landfills. Aware that carpeting accounted for 2% to 3% of landfill space at that time, KP felt obligated to raise the issue of responsibility, What happens to products at the end of their useful life? and Who is responsible for them? And wanted to "shift that burden onto the manufacturer." Nineteen carpet mills responded to KP's request for proposal. As the director of the green buildings program recounted:

> Of those, only one responded to the question regarding landfill. When we interviewed the finalists, part of the interview question was "You left out a response to this question." The most common response was either "We don't understand what the question means. Why are you asking *us* about what we're doing to reduce landfill?" and the second one was "Why is *that* important to Kaiser?" When we would explain that we thought this was part of their responsibility, most of them still just said "We're selling product. We don't feel we have a responsibility to what happens to it." [I3]

Disparity of opinion on corporate responsibility was echoed again in 2002 when KP pursued the development of a PVC-free carpet backing. The company chosen for the previous contract had discovered that its could recycle discarded carpet by "downcycling" it into other products. However, KP had now initiated a campaign for a PVC-free alternative. The green building director recalled the company's response to KP's requirement:

> Their response was, "Well, we have a responsibility to the all the carpet that's out there, and so we think what we're doing is responsible by recycling vinyl backed carpeting." And this was a very interesting argument. And [the ES director] really provided great leadership on this because the position we took was essentially "That's not our problem." Our issue is that there is too much PVC-and all the issues associated with PVC-that are in the marketplace. And we have to draw the line. So, we don't even want recycled-content PVC. We want to drive the market to something else. Their response was, "We don't agree. [46] [I3]

[46] Of note, this company later partnered with KP to create the PVC-free carpet product that is currently being used in all KP facilities.

Manufacturer-supplier disconnect. Complicating the divergent views on corporate responsibility for the effect of products on humans and the environment, interviewees recounted several instances in which producers or suppliers seemed to be unclear about the product chemistry or environmental impact of their goods. In recalling how difficult it was to obtain information from a furniture supplier about product chemistry, the director of the green building program said, "In short, disclosure continues to be a challenge because a lot of companies simply don't even know what's in their products." This sentiment was echoed by an executive of the facilities department:

> When we went out to the companies that produced fabrics and said "Here are these specific chemicals that we want to know if they are by-products of your manufacturing process and we want to know if they persist in your fabric once it has been manufactured," many of them didn't know. And many simply refused to answer. [I5]

The environmental supply chain manager had a similar experience with the electronic equipment disclosure. In the course of working on a supplier disclosure form in partnership with the Center for Environmental Health and Clean Production Action, an Internet tool was created that enabled companies to enter answers online to supplier disclosure questions on specific products. The questionnaire, based on the Electronic Product Environmental Aassessment Tool,[47] asked specifically about computers and servers. The environmental supply manager reported that the electronics disclosure questions were put to KP's three existing suppliers.

> So I asked these questions of an industry that I know is very much under the microscope for environmental concerns, and I'm working with them to

[47] Electronic Product Environmental Assessment Tool (EPEAT) is a system that helps purchasers evaluate, compare, and select electronic products based on their environmental attributes.

> build out more information in areas where, for example, they're using flame retardants--brominated flame retardants—knowing that the industry is moving away from this practice. So, how can they adopt new engineering practices faster? What are their barriers? [I2]

Reiterating the scope of KP's purchasing leverage, the interviewee explained that KP buys almost $130 million worth of products from each supplier every year. KP's effort to elicit environmental performance information from them was intended to goad their upper management to adopt new practices more expediently. Given the similarities of environmental considerations for electronics, the same processes were adopted for subsequent TV/DVD player RFPs. The environmental supply chain manager explained that, despite European standards (Restriction of Hazardous Substances [RoHs[48]] and Waste Electrical and Electronic Equipment [WEEE] Directive for these electronic categories, medical electronic equipment is exempt from these types of international standards:

> For example: your diagnostics. You go into surgery and you get these endoscopes - there's this whole electronic tower that's getting all this data and images and projecting it. Well, all of those products have the same issues a computer has. It's still a circuit board. It still has plastic casing. It's still wiring. You know, it's really all the same, but they're exempt. So, it's this whole body of products, your IV pumps-it's all the same…So, I asked some of these same questions to a medical electronics manufacturer for a product that they use for eye exams or eye surgery and they hadn't even known any of these things. They were amenable to answering some of the questions but they were just like, "Thank you for telling us, we hadn't even heard this stuff." And they're totally RoHS exempt? Blah, blah, blah, it's just crazy! [I2]

[48] Restriction of Hazardous Substances (RoHS) was adopted in February 2003 by the EU. The RoHS directive took effect on 1 July 2006, restricting the use of six hazardous materials in the manufacture of various types of electronic and electrical equipment. It is closely linked with the Waste Electrical and Electronic Equipment Directive (WEEE), which sets collection, recycling, and recovery targets for electrical goods and is part of a legislative initiative to mitigate problems associated with toxic e-waste.

Burden on downstream users and perceptions of effectiveness.

Interviewees also offered insight into KP's experience as a downstream user of chemicals in trying to understand, test, and innovate solutions to hazardous product chemistry and chemical hazards. Some interviewees believed that the burden of this responsibility should be borne by governmental agencies not private industry. The ES director added, "You know, short of having a different regulatory environment in this country, there's no way that we can be responsible for all the chemicals our supply chain." The director of the green building program expressed it this way:

> Companies like KP that are progressive and have a consciousness about the health issues and environmental impact on health, we're forced to do what we're doing because there's no federal regulation requiring companies to disclose what's in their products. Why are we doing that? Why isn't the government protecting consumers? [I3]

This interviewee also suggested that a body of regulation like Europe's Registration, Evaluation, Authorization, and Restriction of Chemical Substances (REACH)[49] initiative could help downstream purchasers like KP. Although KP has had the capability to evaluate certain products, the expectation that it could test all products was considered unfeasible and unreasonable for any one HCO. A frustrated interviewee offered this assessment:

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[49] REACH (Registration, Evaluation, Authorization and Restriction of Chemical Substances) is the EU's body of regulations governing chemicals. It went into effect in 2007 and aims to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances while enhancing the innovative capability and competitiveness of the EU chemicals industry. REACH gives greater responsibility to industry to manage the risks from chemicals and to provide safety information on the substances. Manufacturers and importers will be required to gather information on the properties of their chemical substances, which will allow their safe handling, and to register the information in a central database run by the European Chemicals Agency (ECHA). REACH also calls for the progressive substitution of the most dangerous chemicals when suitable alternatives have been identified. For more information, please visit http://ec.europa.eu/environment/chemicals/reach/reach_intro.htm

> It costs us a lot of money to do what we've been doing-and we don't want to be in this business of trying to figure out [product chemistry] because it costs us a lot of money. But KP's paying to do it because we understand that if our group doesn't investigate this, we don't know what types of exposures out patients, our staff are at risk to. So, I think it is the fact that so many chemicals in this country aren't regulated, let alone investigated, that we don't know what's happening. We don't know fully the health impacts of the chemicals that we are exposed to. We are finding out more and more about it-every week you read something new…so, we're exposed to a lot of potential and real risks that are costing Kaiser money. They're costing the country money. Eventually you have to deal with that. Now, this is a personal opinion-but this is a role that government should be playing to protect its citizens. We shouldn't have to do what we do. [I3]

Echoing this sentiment, an executive within KP's facilities construction division opined that manufacturers' evaluations of product safety are not trusted, public policy intervention is long overdue, and private industry initiatives, like KP's, would be of limited effectiveness if not addressed at the public policy level.

> There are many manufacturers who tell you 'Oh, this is totally safe. It's been on the market for years.' But I think there's a lot of obfuscation. I think that's probably one of the biggest challenges. Manufacturers just don't want to change anything and pitch to us that everything's fine. You know, don't worry. Just go back to work. And I understand that it's a heavy burden to place on the government, but I don't think we're going to get anywhere until policy steps in from of all of the rest of us who are trying to do this work. Until then, what we do—well, it's just a spit in the ocean. [I5]

In agreement with the observations above, the purchasing director emphasized that KP is but one small piece of the U.S. economy. Despite the organization's 8 million members and prestigious reputation as a health care system, federal regulation of chemical products is required for consumers to make informed choices and organizations such as KP to achieve meaningful outcomes:

> It's amazing the state of regulations in this country--I mean--there are no federal regulations against any of this. For mercury and other products which are very clearly harmful, there are no restrictions. It's all down to

> the individual consumer to make an informed and educated decision on these things. It's down to organizations like Kaiser Permanente to find the right policies, to find what's important, and implement them. [I4]

Citing REACH as a regulatory model that could help downstream users, the purchasing director stated that such product evaluation would be immensely useful and important to businesses like KP: "I mean, that's our biggest challenge, just knowing what's in the products. Just regulations so that the consumer can make a more informed decision, that would be enormous" [I6].

Conceding that the European Union has experienced some setbacks in administering the REACH initiative, KP's senior industrial hygienist contended that there is still a "great deal that could be learned." [I6] In particular, the interviewee noted that harmonized definitions of chemical classifications would be "incredibly useful." Furthermore, she suggested that manufacturers should be required to disclose product chemistry and to perform more rigorous and thorough testing of chemical mixtures; MSDSs, by contrast, make inferences about chemical mixtures based on chemical components. She added:

> We want real testing information on what they've got with, perhaps, some standardized test methods. Sometimes they'll report what they've done like in terms of genotoxicity or teratogenicity, but it's not standardized. I think we need better specificity about what we're asking for and then [manufacturers] need to be held accountable for actually doing the testing. [I6]

Inconsistent and unreliable product labels impose yet another burden on downstream users, the director of the green building program observed:

> We're a lot more sophisticated now with the disclosure process, and, there's a lot more resources out there now in the NGO community, but, there's a real serious problem in this country with green washing, and just relying on labels that manufacturing groups come up with that say their product is green or they put green in their name or something like that and

> it's very difficult for the public-meaning everybody-to navigate through that. And again, I think it goes back to government regulation. Just like there is disclosure on food packages of what's in it…that kind of an idea that you find out what's in a product that you're buying and pushing the market toward alternatives. [I3]

Organizational Barriers and Relationship to Model: Summary

In summary, evidence exists to support the proposition that the implementation and effectiveness of KP's GPC would be complicated by information asymmetries: the Data, Safety, and Innovation Gaps. Interviewees reported difficulty acquiring product information and experienced barriers imposed by legal protections under TSCA. KP has exerted considerable effort to fill the Data Gap for certain chemical products, in other words, acquire or develop information on product chemistry. Examples of such effort include clinical trials of intravenous products used in neonatal intensive care units, contributions to the Green Guide for Health Care, and creation of the RIPPLE database. However, interviewees conceded that product chemistry is largely unknown for the vast number of products that enter KP's supply chain.

Furthermore, although perfect solutions to products of concern were not always feasible (the Technology Gap), KP successfully negotiated some contractual agreements that spurred production of desired products, such as PVC-free carpet. In reference to barriers created by the Safety Gap, interviewees pointed out that chemicals of concern continue to circulate in supply chain and that responsibility for or authority over their testing and management rests with government agencies at the policy level. Moreover, interviewees acknowledged their efforts would be of limited effectiveness without public policy action.

Accurate product labeling, an important contextual factor, would facilitate the effectiveness of KP's work with chemicals.

Although directionality was not predicted in the model, it was assumed that KP's GPC and attendant supplier disclosure process had undergone various clarifications, redefinitions, periods of restructuring, and routinizing. Evidence for these assumptions was supported by KP's redefinition of chemicals outlined in the GPC and creation of category-specific disclosures, which will be described in more detail later. However, the complexity and sheer number of products that enter KP's supply chain created barriers to systematic efforts and overwhelmed available resources. Specific successes or positive drivers of implementation were largely unknown before this study. Thus, successes as drivers were not proposed. Organizational successes and perceived benefits of leadership in purchasing chemicals will be discussed later. Discussion of model assumptions, however, concludes with this section. The remainder of this chapter reports on additional findings.

Organizational Successes and Benefits

In its commitment to reduce chemicals of concern in the supply chain, KP has achieved many unique successes: the elimination of millions of vinyl gloves and driving down the price of alternatives by switching to latex-free nitrile gloves in all KP facilities; the phasing out of medical devices containing DEHP in neonatal intensive care units; an innovative contractual agreement with a carpet manufacturer to produce a PVC-free product whose backing contained 95%

postconsumer recycled plastic — at no additional cost; and the purchase of PVC-free resilient flooring for all new construction projects.

In addition to these accomplishments, KP has become more sophisticated in evaluating total organizational costs and leveraging its purchasing power in negotiations with suppliers to achieve optimal pricing. It has also disseminated the information its staff have discovered to other HCO actors to advance the entire industry's environmental performance. Furthermore, KP's visibility and continued involvement in state and federal discussions of public policy reform on chemical products may influence other downstream users to participate in these high-level discussions. KP's individual and collective successes and the interviewees' perceptions of lessons learned will be discussed in the next section.

Organizational Successes

Total costs and cost neutrality. KP's purchasing strategy is to weigh total cost against total savings over time. For example, KP converted to energy-efficient laptops and computer monitors, based recommendations of the Electronic Product Environmental Assessment Tool. Although the purchasing project required substantial upfront cost, KP will realize $4 million a year in energy savings. Further, by reprocessing many single-use medical devices, KP saved $5.6 million in 2008 alone. In another example, KP has chosen a new supplier for an environmentally preferable product that is expected to decrease chemical use and save money over time. The purchasing director explained:

> We've moved to an entirely new supplier in the whole integration systems and rigid endoscopy field. It's massive. We're spending a $100 million on the contract over five years. We've moved completely away from our existing supplier to someone we've barely used before because they have

> an autoclavable product…We don't have to put it through the sterilization process. We can steam sterilize it so it's operationally quicker, and we're not using chemicals. And because this one device is converted, we can put everything through--so it's not just the impact on that one device. We can put the whole tray through. So big benefits. [I4]

Speaking to KP's ability to achieve price neutrality or quantify benefits of environmentally preferable products that indirectly bring down first costs, the director of the green building program offered this example:

> Part of what's so cool about our story is that things that we're doing are not costing more. The carpet-it's not costing us more money. The resilient flooring costs more money but we're getting our arms around how to quantify the benefits from injury reduction, but everything we're doing hasn't cost more…The strategies that we pursue may include some that have a high first cost, but that have a really good payback. The idea is that this actually going to save KP money in the long run. We've got 160,000 employees. So reducing sick days, reducing on-the-job injuries, that's a lot of cost. So part of this effort is to reduce their exposure to toxic chemicals. [I3]

KP's success in achieving cost neutrality is evidenced by 30 case studies of product acquisition, 29 of which were either cost neutral or return cost savings. Dispelling the perception that products with superior environmental performance are more expensive than others, the sourcing director explained:

> I mean, the myth that's out there is that a supplier brings out a new product which is an environmentally preferable product and it's a 30% premium. But I'm sorry, any medical supplier that brings out a new device and a new technology and presents it to our organization, it's like slap, bam, look at it. It's a 30% premium. Why? Because it's the next generation product or whatever. And, you know, it's Sourcing's obligation to challenge that. That's our job and that's what we do. And of course they're going to try and charge a 30% premium if they recognize that it's an important feature to Kaiser. And, you know, they'll think we're prepared to pay a premium for it but we're not. And we don't. [I4]

Agreeing that new technologies or products should not necessarily cost more, a past HCWH staff member and KP partner recounted KP's ability to negotiate prices and refute premiums:

> You know, it's a standard opinion that doing anything new costs more. But I think that part of the lesson to learn from Kaiser Permanente is that you can combine a vision with people that really know how to negotiate price and who understand the difference between price and cost. You know, the idea that price is cost plus some fixed percentage, is completely delusional, right? I learned that from Kaiser Permanente. [I15]

Although KP's size and purchasing power irrefutably bolster the organization's ability to negotiate prices with suppliers, its organizational sophistication in purchasing remains instructive. For example, the HCWH interviewee told of situation when HCWH was initiating a campaign to dissuade HCOs from buying vinyl gloves because of their negative environmental impact. HCWH advocated nitrile gloves because they were the only alternative to latex gloves, which had been shown to produce allergic reactions in health care workers. However, because nitrile gloves were considered to be a specialty item, they reputedly cost 25% more than their vinyl counterparts. Consequently, HCWH did not feel that it could ask KP to partner with them on this initiative. Discussions with the nitryl glove manufacturer, however, revealed KP's clout in negotiating price neutral purchases, as the HCWH staff member recounted:

> So I was actually trying to figure out what it was about nitrile that made it more expensive. And I'm reading the technical information [the manufacturers] gave me and I'm looking at, you know, volume and all the things you try to look at. And then Kaiser Permanente calls me and says, "Who are you talking to in the industry?" And I give them the names and that's all I hear. And then I find out that they've placed an order for 9 million gloves and so I found out the story. And the story was they called and they got told exactly the same thing I was told, "Oh, it's very expensive to make them." Blah, blah, blah. They just said it's much more

> complicated to make the gloves. And so the process itself was intrinsically more expensive to come up with a much better quality product, okay? So they said all of that and then--they said the same thing they said to me they said to Kaiser--but then Kaiser responded, "We'll buy 9 million pair if you can give us the same price that we're being charged for latex." And all of a sudden all of the price difference disappeared. [I15]

Although not all HCOs possess the leverage of KP's purchasing power, understanding that stated premiums are mutable is an important lesson. The interviewee continued:

> You know, it was a real learning experience--a teachable moment for me--about how this is partly science but mostly art, you know, with the pricing. And so the people at Kaiser Permanente have really been able to drive home that message and often to eliminate the myth that anything new is more expensive. They've demanded products for the same price and the market shifted to give them what they demanded because they had such a big market share. [I15]

Organizational Benefits of Industry Leadership

Interviewees were asked to explain how KP benefits as an organization from its visible leadership on the issue of product chemistry. As discussed previously, it was not anticipated that KP would gain a competitive advantage from these efforts. However, several enlightening and complementary themes arose from this line of questioning. Visible leadership on product chemistry was perceived to serve several important functions. First, it was said to create an internal reinforcing logic that ES is important to the organization. Second, visible industry leadership and information sharing could educate and motivate other HCO actors to adopt similar practices. Third, visibility would diffuse KP's purchasing practices across the health care sector and would eventually drive down the price of EPP goods. Finally, visible leadership was perceived to benefit

KP by directly influencing manufacturers' product designs. These perceptions will be explicated in the following sections.

Internal benefits. Interviewees perceived that KP's visibility on product chemistry fostered internal awareness and motivation. Not only did visible leadership benefit KP's reputation it also educated executive staff, as the director of sourcing explained:

> Some of our executive staff are in the same position I was four years ago when I walked in and someone handed me The Lorax…but I assure you if I get them a speaking placement in front of a hundred people to come and talk about this program, they learn very quickly what we're doing and what it's about, right? But it's a way for them, it gives them a focus, it gets them educated very quickly on what this is about, helps them become fluent on what we're doing and what we need to be doing. It's also feel good for them because they can get out and sell a good story but more, it's a tool to get our executives up to speed and get them excited and mobilized around this. Because you can do that in an internal environment but if you get them in a speaking engagement, it forces them to focus on this and really think through what it is we're doing...The more people that can get engaged in this process and get talking about it, the more their abilities around it develop. [I4]

KP's leadership also furthered the expertise of its ES staff, as the director of community benefit programs recounted at the 2009 CleanMed[50] conference:

> Every executive in our organization has to have a community benefit--including sustainability--a community benefit objective as part of their incentive pay plan. And I administer that and I have the support of our Internal Audit Department to audit that every year to make sure that people actually have the objective stated. It's then reported to our Board of Directors the results of that audit. We also have a standing committee of our Board of Directors that concerns itself with community benefit and disparities and environment as well. So we have support at the highest level of governance and oversight and the incentive of people having to formulate a goal every year that fits with this agenda. I've found that to be enormously focusing. [D13]

[50] CleanMed is an international conference aimed at catalyzing environmental improvements in the health care sector.

A sourcing director concurred:

> We set [ES] goals for this year and our executive team within [purchasing] have fully bought in and signed off on these goals. And, you know, and it describes some key themes, the program, the specific goals, and where we're trying to get with them and state who's responsible. And so it's very clearly bought into at the executive level…within [purchasing] we have an environmental goal within our personal goals so it affects bonuses at the end of the year, where relevant [I4].

Along with documenting internal successes through communiqués and case reports, KP routinely recognizes environmental accomplishments by honoring staff with "greenie awards." Recognizing that making decisions about the environmental safety of products is a complex process, training sessions have also been offered to key purchasing personnel. This description of a training session was particularly illustrative:

> We had six different medical products. We had, for instance, a catheter and a hearing aid and a piece of material, upholstery material. And we gave them just a simple sheet of paper broken down into four sections, with toxic materials, waste, natural resources and energy--with some criteria that got them to basically identify what they thought the issues with that particular product were and score it high, medium, low. And of course the interesting process of getting to do that exercise is, you know, they're looking at a catheter or the hearing aid that has a battery in it so, you know, there's chemicals issues in those. And I think the interesting process or exercise that they come out of it and it's just like it's covered with highs and mediums all over it, all over it, like in every section, just a simple little product. And I think they suddenly realized wow, that there are so many environmental issues with every product. Suddenly they realize quite how far there is to go. Even if you drive a success, there's still so much more to work on. And it helped them I think because sometimes people don't see quite the complexities so it was a successful, useful exercise just to go through to see the breadth and the depth of what area need to be focused on. [I4]

ES leadership may pave the way for unforeseen organizational benefits in the future. Envisioning ES efforts as reportable activities for an organization's

compliance as a tax-exempt organization, the director of KP's community benefits programs suggested:

> We need to move beyond [current models of community benefit reportables] to thinking about what kind of impacts are attributable to the organization in the health of the community around you. And that is hard. Some of us made a push last year for the IRS's new reporting standards to include environmental stewardship and sustainability activities as a reportable category and did not succeed in that. We're determined to tell the story, regardless. Frankly, in some cases we're saving money by doing these things so we don't have any dollars to report anyway. My own view on this is that being an active environmental steward ought to be an expectation of any nonprofit organization operating in the United States. If we truly believe that we are mission-driven organizations, that ought to be part of that mission. If we're health-driven organizations, then I think it ought to be an expectation that we're all demonstrating activity in that area. I think this is going to unfold over several years now, but I actually have some hope that over time that's going to be seen as a reportable category. [D13]

External education and influence. The perceived benefits of KP's visible leadership also includes influence upon other actors. For example, KP openly shares information and "lessons learned" with other HCOs. The RIPPLE database exemplifies this effort. In partnership with the Center for Health Design, the Global Health and Safety Initiative, and Robert Wood Johnson Foundation, KP created the RIPPLE database (a) to provide an open-source, searchable database containing KP's best-practice design strategies to achieve desired outcomes in the Three Safeties, (b) to provide literature reviews and link existing research to the design strategies, (c) to document KP metrics, when available, before and after construction to illustrate changes in outcomes and cost savings, and (d) to share case studies, lessons learned, and white papers to assist others in learning how to apply the standards and achieve the outcomes (the database has the capability and capacity to allow for updates from KP and other HCOs). The

case studies include background, challenges, approach taken, and outcomes on a variety of topics, most of which are KP based.

In describing KP's organizational effort to create building standards and post them on the Center for Health Care Design's RIPPLE database, an executive overseeing facilities construction explained that these efforts are part of the facilities department's commitment to the "Safe Workplace" component of the Three Safeties. In tandem with the Strategic Planning and Design group, a team of 40 architects in the facilities department works with front-line personnel, such as clinicians, environmental health and safety staff, workplace safety staff, and others evaluating and innovating new designs. In the process of such intensive work, KP has created thousands of building standards for "high-performance" buildings. KP also has content expert panels who work at a mock facility where:

> They actually test real configurations, equipment configurations, and so on. They come up with their best ideas, they incorporate that into the space and then we write a standard…We start with a literature search, we come up with underlying hypotheses, then we do ideation sessions, then we go back and we document it all. [I5]

Approximately 150 of KP's new building standards include "Triple Safety Recommendations." Based on the principles of the Three Safeties, these safety measures indicate the design benefits for workers, the workplace, patient safety, or some combination thereof. Amplifying this point, the executive overseeing facilities added:

> The other thing that we've done is we've linked [RIPPLE] to the entire evidence-based design literature. So there are about 1,200 articles in the evidence-based design at this point. But for each recommendation, you know whether or not there's 100 articles behind this or five or two or one? Did it come up from a content expert panel, which was a Kaiser-only

> process or was there something even more impressive like a real study that's been done on the topic. So we have published those to the web. [I5]

Diffusion of best practice. According to the interviewee just quoted, the intent of the RIPPLE database is analogous to the diffusion of best practice in clinical settings. For example, advances in clinical practice, published in professional journals like the *New England Journal of Medicine,* are intended to report research and influence the practice of health care practitioners. Similarly, the RIPPLE database is intended to influence best practice by HCO designers and builders. Further, the database is meant to influence how HCO decision makers calculate cost analysis by broadening and strengthening the case for EPP products that address patient and worker safety. Confirming KP's commitment to information sharing, and suggesting yet another motivation, the director of the green building program explained:

> The bottom line is, we share information with lots of folks because we want them to adopt the same approach we have. For example, the problem we have with installation and rubber flooring is due to the contractors who are not familiar with it, so the costs go up. So, the more people that do it-well, it changes the industry. And drives our costs down. We won't see that premium for the installation that we see now. [I3]

Sharing information was also regarded as an important way to educate and motivate external HCO actors about environmental performance. Recognizing that many individuals work in the health care industry because they want to make a positive contribution to society, an interviewee made this observation about information sharing:

> It's important for others in healthcare to understand our environmental work…I think none of us want to work for an organization that actually harms human and environmental health and so that connection is just not in our minds. And it's not that it's subconscious or that we're repressing it.

> It's just never been made clear to us…I'm not bragging, but I think I'm a really good healthcare administrator. I spent my entire career in healthcare administration. And I am knowledgeable in a broad range of topics. I've read and studied and developed my entire career. So why didn't I know about this? And that's what I find for my colleagues, too-why don't they know about this? And they don't know about this because it's not taught, or because people don't think it's a priority, or really because it's totally behind the velvet curtain. But we [at KP] are trying to provide that direction. [I5]

Speaking to KP's visibility, impact, and effectiveness, a research scientist with a partnering organization that advocates for the safety of building products stated:

> I think Kaiser has had a significant impact. The thing that Kaiser does in addition to a kind of real hands-on engagement with industry is that they then go and talk about it. You know, they put their mouth back where their money is too, not just money where their mouth is. And they spend a lot of time going to conferences that aren't going to gain them any new [health plan] members. Kaiser talks. And people follow them. [I14]

As an example of KP's ability to influence manufacturers and other HCO actors, the research scientist referred back to the carpet story, explaining that the carpet company produced the PVC-free product at KP's urging for two reasons: KP was willing to partner with them, and the company understood that there would be a market for the product beyond KP:

> They did it because Kaiser's big and a customer that they did not want to lose. I was able to see firsthand what they went through to not lose Kaiser as a customer, big customer as they are, and a customer who talks and has influence on other customers. But they also knew that to make a product just for a customer that isn't going to go anywhere else is not a good enough business model. And so I think they had to have some sense that there would be larger market interest in a PVC-free product. [I14]

According to the research scientist, the carpet manufacturer monitored KP's involvement with Green Guide for Health Care™ to anticipate when the guide would be released and with what recommendations. For instance, would the

guide support the avoidance of flame retardants and PVC in products? “They wanted to make sure that this stuff was on track. That this was going to be another market signaler to reinforce and drive more people to buy what they were producing for Kaiser.”Adding another perspective on the effectiveness of KP’s efforts, the interviewee detailed the ripple effect of such a large purchasing initiative:

> So to my mind, the most effective market drivers is when you have buyers who are exercising a big leverage point-such as the Kaiser contract-combined with other signaling in the marketplace—such as the Green Guide for Health Care and Kaiser’s talks at industry conferences—that are guiding a lot of smaller players to follow suit. Or other big players who haven’t yet gotten engaged. So when the sales rep who works with Kaiser carries this message back to the company saying that this customer is demanding an environmental attribute, other reps can say, “Yeah, we’re hearing that too,” and they can see that this is going to sell. So, ultimately the R&D gets driven by that single purchaser demand for the environmental attribute when they see they’re likely to have a broader market interest in it. [I15]

A research director for an NGO that advocates for green chemicals, sustainable materials, and environmentally preferable products reflected on Kaiser’s influence on other actors and within the policy setting:

> I see Kaiser as an influence leader. They’re more than just thought leaders, they're action leaders. They create the space for other organizations, other businesses to be more actively engaged in policy initiative. It’s the snowball effect. You need a couple of organizations that are willing to step out there, to be willing to speak publically, which then creates the space and the comfort level for others. But innovators like Kaiser must lead so that other adopters can come in behind them. [I17]

The research director elaborated that KP’s involvement in state and federal policy discussions on reforming regulations for chemical products is critically important for two reasons: documenting the experience of a downstream user of chemicals and chemical-containing products and creating the opportunity for

other users to express the need for better information about chemicals in their supply chain. In elucidating the depth of KP's commitment to address chemicals of concern in its supply chain and the company's significant impact on reforming public policies governing chemicals, the interviewee offered this assessment:

> When [the ES director] testified in front of the Senate last month, there was a Senator from Rhode Island who asked her 'Should we be using Kaiser's model for addressing chemicals of concern?' I think this demonstrates that there is a now a different way to think about the experience of the downstream user. Now, these are subtle nuances in the policy debate, but they provide leverage for other downstream users of chemical products to get involved. The [chemicals reform] debate often gets starkly contrasted between the chemical industry and the environmental community when it's much more complex than that. We have this whole set of downstream users who are not the chemical industry, who are not NGOs, who want more data and want less hazardous chemicals in their products. But they tend not to play in these debates because they're like 'where's my dog in this fight,' right? This is the chemical industry. Why should we be engaged?
>
> But Kaiser is an innovator. They're not just talking about it. They're reporting on what they're actually doing—and taking that step in the political context, in the public sphere, is very unique. I spend a lot of time trying to get other organizations to be willing to do this, but chemicals work is tough because the opposition is so strident. For example, you get the vinyl industry knocking at your door—well, you'll need a lot of organizational support to continue on. [I17]

Organizational Successes and Benefits: Summary

KP's considerable effort to minimize or eliminate chemicals of concern has been rewarded by several key successes. Over time, KP has become increasingly sophisticated in targeting and evaluating chemicals or chemical classes of concern, in building an internal capacity to more effectively advance its work with chemicals, and in leveraging its purchasing power to influence the manufacturers and suppliers and achieve cost neutrality. KP has also bolstered its ES leadership by instituting an incentive structure for executives, providing

training for relevant personnel, and documenting successes through case study reports.

Externally, KP was thought to potentially exert important influence over other HCO actors by open-source sharing of information, standards, and experiences, all of which are educating the health care industry and and diffusing best practices, thereby decreasing the price of goods and services. Although negotiating the manufacture of a PVC-free carpet speaks to but one product in KP's vast supply chain, its ability to influence the manufacture of this product was thought to be a powerful demonstration of market signaling by a downstream user. Finally, as a downstream user willing to discuss its experiences with chemicals of concern in its supply chain, KP was viewed as a vital contributor to public policy discussions on reforming regulations on chemical products.

CHAPTER 5

DISCUSSION

The interpretation and significance of findings from this exploratory, in-depth, single case study of KP's purchasing practices of chemicals and chemical-containing products is presented in this chapter. How accurately KP's adoption and implementation of a GPC corresponds with the conceptual framework in Figure 1 will be addressed, and key propositions will be discussed. A revised framework will be proposed. The significance of this study, its strengths, limitations, and implications will be discussed, and suggestions for future research will be offered.

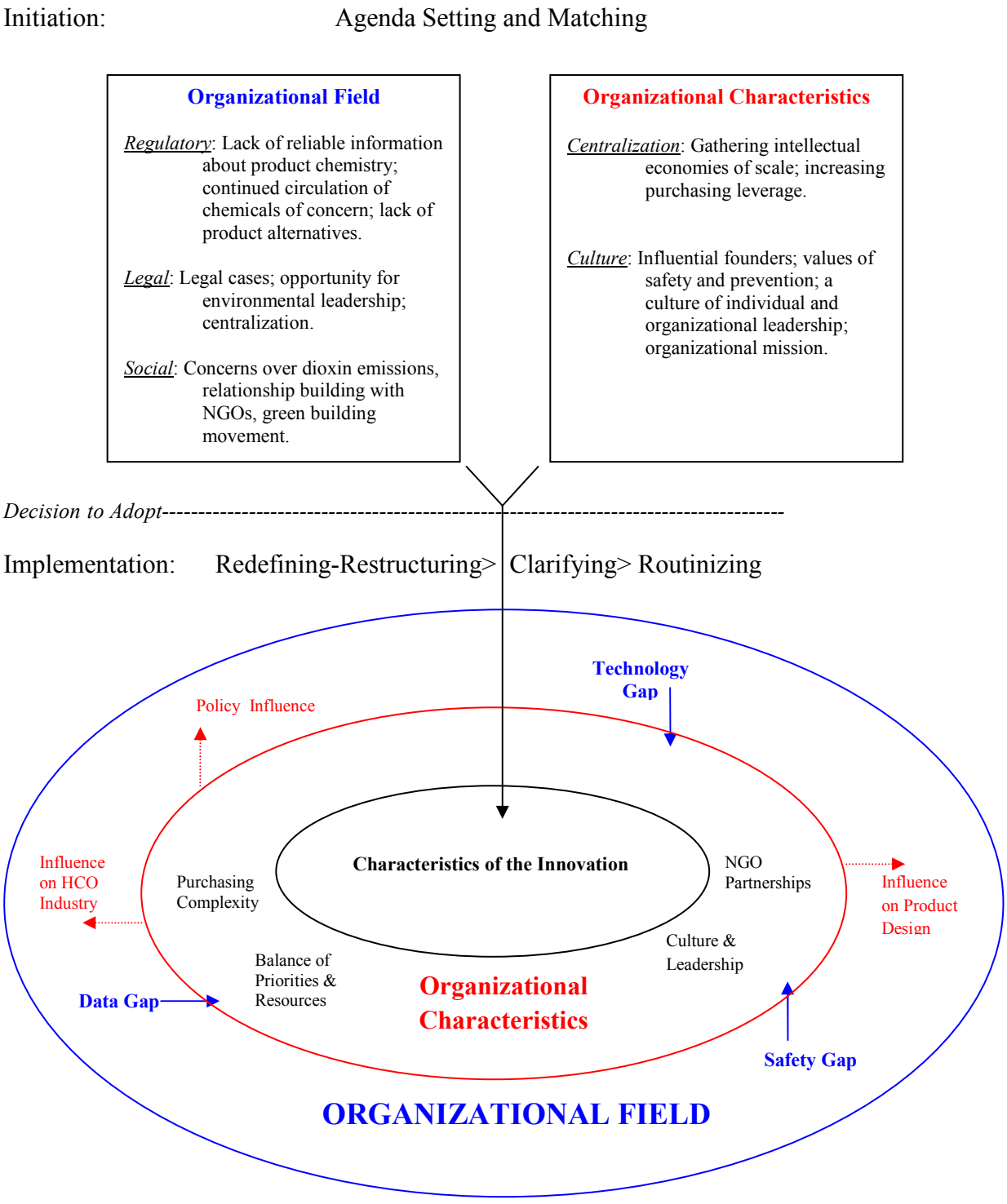
Conceptual Model and Key Propositions: Summary

This study proposed a conceptual framework for industry leadership and an innovation in how chemicals and chemical-containing products are purchased (see Figure 1). Although KP's adoption and implementation of a GPC did not mirror the progression of the anticipated factors in Figure 1, change occurred nonetheless through an iterative process during which many of the component parts of the conceptual framework were supported. A revised conceptual framework based on the research findings is presented in Figure 2.

The following discussion compares the study's three propositions in light of its findings.

> Proposition 1: Kaiser Permanente's adoption of a guideline for purchasing chemicals and chemical-containing products was driven by a lack of sufficient information about them in its supply chain.

Figure 2. Foushee Model of Factors Influencing Chemicals Purchasing at KP



Support for Proposition 1 is evidenced by interviewee reports and collected documents. The interviewees reportedly viewed MSDSs to be inaccurate, unreliable, or ineffective in providing chemical information, a component part of the Data Gap presented by Wilson & Schwarzman (2009). In some instances, interviewees reported barriers to desired information on product chemistry due to trade secrets or confidential business information allowances under the TSCA, an aspect of the Data Gap that has been characterized as information asymmetry by Guth et al., (2005). Evidence exists that KP surmounted information asymmetries in a limited number of sustained, targeted efforts. In these cases, interviewees indicated that information was obtained through its disclosure process, direct dialogue, and contractual agreements with suppliers and manufacturers and through strategic partnerships with NGOs. In light of the vast number of products entering KP's supply chain, however, these successes have been limited.

Proposition 2: Kaiser Permanente's adoption of a guideline for purchasing chemicals and chemical-containing products was driven by organizational culture and leadership.

Support for Proposition 2 was evidenced by reports of influential founders and a business model that valued the prevention of injury and illness. Company documents and interviews with its personnel support this proposition, explaining how Henry Kaiser and Dr. Sidney Garfield, KP's founders, and their innovative,,, preventative care, service model facilitated ES initiatives. Furthermore, KP's culture of safety was emphasized as a facilitator of ES leadership. Interviews and

documents also provided evidence of a culture of support for ES. KP took deliberate steps to institutionalize a culture of ES by training its purchasers and incentivizing ES leadership monetarily and through awards and recognition.

Interviewees reported that KP's ES officer and other committed leaders were integral in advancing ES principles and initiatives. Furthermore, KP's leaders have been committed not only to create information to fill the Data Gap (Wilson & Schwarzman, 2009) but also to share this information with other HCOs actors in an effort to diffuse purchasing innovations and ES practices across the industry. KP has honored its commitment by developing the RIPPLE database and by participating in information exchanges, forums, conferences, and Congressional testimony.

> Proposition 3: The implementation and effectiveness of Kaiser Permanente's guideline for purchasing chemicals and chemical-containing products would be constrained by the Data Gap, Safety Gap, and Technology Gap.

Challenges to information asymmetries and the Data Gap have been presented. Interviewees consistently expressed concerns about chemicals of concern in the supply chain, an aspect of the Safety Gap (Wilson & Schwarzman, 2009). Examples were cited: the continued presence of mercury in products for which there is no available alternative and the continued use of chemicals in medical equipment that are not regulated by the same standards as similar types of electronics. Unavailability of safer product alternatives, the Technology Gap (Wilson & Schwarzman, 2009), was consistently documented in this study.

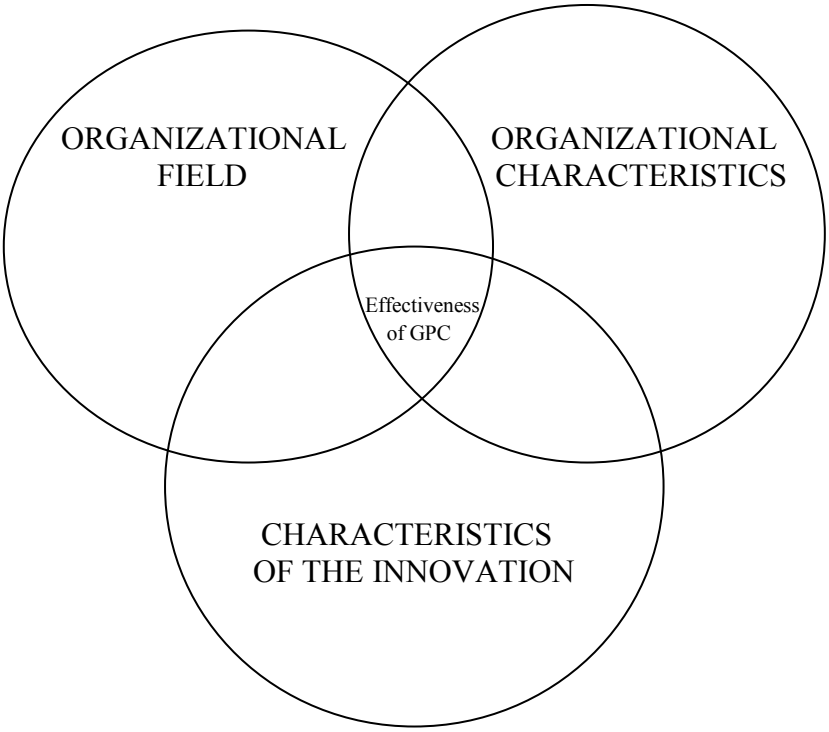
Effectiveness of Kaiser Permanente's Guideline

for Purchasing Chemicals

Figures 2 and 3 depict three common clusters of influence that correlate with the rate or spread of change in all industries: (a) contextual factors (organizational field), (b) characteristics of the people who adopt the innovation (organizational characteristics), and (c) characteristics of the innovation itself (Berwick, 2008). The overlap of these clusters represents the overall effectiveness of KP's GPC. The effectiveness of the GPC in addressing chemicals of concern in the supply chain now and in the future will be largely determined by either the stasis or change in contextual factors in the organizational field. The most important of those factors would be public policy reform that could lower barriers in the manufacturing sector to improve environmental performance and to remedy the Data, Safety, and Technology Gaps (Wilson & Schwarzman, 2009).

The GPC's effective implementation will be affected by KP's ability to fill these gaps through supplier disclosure processes, partnerships with NGOs, and dialogue and contractual negotiations with suppliers and manufacturers. It will also be be determined by KP's ability to influence other actors in the organizational field: HCOs in how they purchase products, manufacturers in how they design products, and public policy makers in how they regulate chemicals. However, interviewees expressed frustration with the limits of their current efforts given the universe of contextual issues and complexity of products purchased.

Figure 3.
Factors Influencing the Effectiveness of KP's GPC.



Next, characteristics of the people who adopt the innovation are included within the organizational characteristics. The organizational characteristics at KP that influence the effectiveness of the GPC include a culture of safety and prevention, a leadership culture promotes the principles of ES throughout the organization, and sustained commitment to providing incentives and training for and recognition of staff who advance ES. The effectiveness of the GPC, or the characteristics of innovation itself, is tied to KP's ability to surmount organizational and contextual challenges. For instance, although the GPC clearly states KP's intent and defines the chemicals of concern to be disclosed, the complexity and volume of products that are purchased and the barriers raised by contextual factors greatly challenge KP's organizational capability to address

chemicals systematically or comprehensively. Furthermore, although the GPC may identify chemicals of concern, alternatives without these chemicals may not be readily available (Technology Gap), information about these chemicals may be withheld under trade secret protections (Data Gap), and chemicals of concern may continue to circulate in the supply chain despite disclosure of their presence (Safety Gap).

In summary, KP's ability to effectively address chemicals of concern in a comprehensive and consistent manner in the future will be influenced not only by the organizational field in which it finds itself but also by its internal ability to influence the organizational field: the purchasing practices of other HCOs, the design of safer products by manufacturers and suppliers, and the public policies that govern chemical manufacturing and regulation in the United States.

Significance

Kaiser et al., (2001) have posited that hospitals can leverage their purchasing power to influence manufacturers to design and produce safer chemicals and chemical products by specifying their preferences for products and services that minimize negative environmental and human health impacts. This unique, exploratory, in-depth single case study of chemicals purchasing practices at KP begins to address this assertion as KP the largest not-for-profit health system in the United States with considerable purchasing power.. Because KP is a visible industry leader and employer whose mission is to improve the health of the communities it serves, its efforts to reduce chemicals of concern in the supply

chain may have far-reaching effects on the purchasing practices of other HCO actors, industries, suppliers and manufacturers, and public policy makers.

This study is significant because, for the first time, it documents the complex factors that influenced innovation in the purchase of chemicals and chemical-containing products at a major U.S. nonprofit organization and large downstream user of chemicals and chemicals products. The findings indicate that the significant barriers KP experienced are congruent with the weaknesses of regulations governing chemical products, as outlined by Wilson & Schwarzman (2006). This research also characterizes the sustained efforts of an industry leader to overcome significant barriers to innovating and implementing a chemicals purchasing program. The findings illustrate the innovative efforts and successes KP has achieved in establishing a more sustainable base of operations, despite the current regulatory framework, and highlight the importance of contextual barriers in determining the effectiveness of KP's efforts. This study further illustrates the importance of KP's efforts to create and share product information. It also demonstrates an exceptional level of commitment in pursuing high-level strategies to influence the safer design of chemicals and chemical products. Although not quantifiable by this study's findings alone, KP's actions may suggest that industry leadership could spur action by a larger group of companies that may be interested in change but are not willing to commit resource to the extent KP has.

Strengths

The opportunity for a university researcher, not affiliated with KP, to conduct an exploratory study of its innovative GPC is unique. This study's strengths include access to high-level KP leaders, from multiple disciplines with varying job titles, and external documentation from KP's NGO partners. Information was shared willingly and honestly about successes, struggles, failures, and future directions. Because one of KP's corporate aims is to drive practice across the health care industry through education and information sharing, this study may well document an emerging field for the purchase of chemicals and chemical-containing products in HCOs and the emergence of organizational leaders in other sectors. The study's foundational work ─ and strength ─ will become more evident as this field matures.

Limitations

Case study methodology was chosen for this study because it was exploratory in design. This was a single case study of an extraordinary set of events that may not be generalizable to HCOs in all settings. However, many HCOs purchase operational and construction materials similar to KP and are embedded in similar organizational fields. Thus, this in-depth case study, its guiding principles, historical accounts, and organizational strategies may be useful to HCOs who wish to examine or modify their purchasing practices for chemical products.

Some potential participants declined to participate in the study, but their number was small. If these individuals would have contributed critical elements to

the findings or if their accounts would have conflicted with others is unknown. However, because saturation of themes was achieved from existing interviews, the likelihood of of overlooking critical data is less likely. Finally, the study's findings are limited by lack of manufacturer and supplier perspectives. To add depth and breadth to some of the study's content areas, future research should incorporate their views to better understand the manufacturer-supplier role in decreasing chemicals of concern in the supply chain

Implications

This study has implications for several groups: health care workers, occupational and environmental health nurses (OEHNs), HCOs, manufacturers and suppliers, and public policy makers.

*Health care workers.*This study has important implications for health care worker and OEHNs. Health care comprises the largest U.S. industry, providing 14 million jobs, 40% of which are in hospitals (U.S. Bureau of Labor Statistics, 2007). Seven of the 20 fastest growing occupations are related to health care, which is expected to generate 3 million new wage and salaried jobs by 2016, more than any other industry. Hence, health care workers represent a significant population at potential risk of harm from chemical hazards in the workplace (McDiarmid, 2006). Although chemical hazards in the health care workplace have not been fully characterized, they include exposure to anesthetic gases, disinfectants, germidcidals, gluteraldehyde, laboratory reagents, pharmaceuticals[51], and sterilants.

[51] Pharmaceuticals are not regulated by TSCA

Occupational asthma and other respiratory illnesses that may be linked with chemical exposures are of particular interest to those who work in the health care environment. The health care sector alone accounted for 36% of respiratory illness in the United States in 2006 (U.S. Bureau of Labor Statistics, 2007). The rate at which respiratory illness occurred in this sector was nearly three times that of private industry: 5.5 versus 1.9 cases per 10,000 workers. More than half of the respiratory illnesses were reported in hospitals where the number of reported respiratory illness rose nearly 20% and whose rate increased from 8.0 to 9.6 cases per 10,000 full time workers over a 1-year period (U.S. Bureau of Labor Statistics, 2007). Industrial chemicals commonly used in hospitals may contribute to poor air quality and have been implicated in an increase of respiratory ailments, such as occupational asthma and reactive airway disease, in workers.

From 1993 to 1998, the Massachusetts Department of Public Health reported that nurses had the highest number of reported cases of work-related asthma as a group, while the health care industry had the highest number of reported cases of work-related asthma across all industries. These findings have been duplicated by Kogevinas, Zock, and Jarvis (2007) in an international prospective population-based study (N = 6,837 participants in 13 European countries) that found nurses to be roughly twice as likely as people in other jobs to develop asthma [RR 2.2, 95% CI: 1.3 - 4.0]. Cleaners had the second highest relative risk [RR 1.71, 95% CI: 0.92 - 3.17]. Although work-related asthma in nurses represents but one occupational health problem that may be linked to chemical exposures, this serious chronic disease is recognized as critical public

health problem in the United States (Pechter et al., 2005) that can prove costly to businesses and workers' compensation systems. Direct and indirect costs attributable to work-related asthma in the United States were estimated at $1.6 billion per year according (Leigh et al., 2002). These and other conditions that affect occupational health and workers compensation systems are important to OEHNs in the health care setting.

Occupational and environmental health nurses. OEHNs typically deliver care to large numbers of employees in HCOs and have in-depth knowledge of chemical exposures and associated pathological conditions. They not only may identify potential hazards and risks for patients, staff, and communities but also may lend expertise in understanding and navigating hazard communication channels. This diagnostic and technical expertise could aid decision making in HCO purchasing groups. Additionally, OEHNs could formulate decision-making tools for purchasing groups that incorporate occupational and environmental endpoints. OEHNs could also be involved in monitoring the use of new chemicals or green chemicals that are introduced into the health care environment: They may be the first health care workers in an HCO to identify sentinel events related to chemical exposures and to implement the hierarchy of controls to address them.[52]

Because OEHNs also assure a safe work environment, they could effectively educate employers, employees, and labor groups about new or existing chemical products and management in their facility or at the local level and

[52] Chemical substitutions are not always safer. This problem of chemical substitutions for a chemical of unknown effect is yet another troubling aspect of the Data Gap (Wilson et al., 2006).

advocate for more protective chemical regulations at the state and federal levels. Furthermore, OEHNs could participate in the design and implementation of evidence-based design research studies, while lending their expertise to the measurement of occupational and environmental health outcomes. Using work-related asthma as an example, OEHNs could participate in evidence-based design research that compares rates of work-related asthma in hospitals that have used green cleaners or other chemical substitutes with those that have not.

Health care organizations. This study has a number of implications for HCOs. Although KP has expended extraordinary effort to address chemicals of concern in its supply chain, the company's practices were transformed by several factors over many years. For KP, becoming a leader in its field was the result of several key external and internal events and a chain of deliberate decisions. However, HCOs in the organizational field who may have concerns about chemical purchasing and management in their institutions need not follow the steps of the originators. As replicators, HCOs can benefit from information that has been created and shared by KP. And, HCOs can benefit from partnership with NGOs who have expert knowledge and experience in purchasing initiatives.

Establishing an EPP program and implementing the GPC at KP exemplifies leadership above and beyond the management of chemicals required by regulatory agencies. As an aside, leadership in this area did not cost KP more. Although KP is the largest not-for-profit health system in the United States with considerable purchasing leverage, many HCOs purchase exceptionally large quantities of durable and nondurable medical equipment and construction

materials. Thus, HCOs may have greater leverage in negotiating the price of EPP products than they currently realize.

The health care industry is well-suited to influence the safer design of chemicals in the marketplace for several reasons. First, this sector's scale of services, which accounted for 16% of the gross domestic product of the United States (Borger et al., 2006) positions the health care industry as a leading economic sector with considerable purchasing power. As an industry, the health care sector has grown at twice the rate of the overall economy (Pechter et al., 2005). Mindful of this expansion, future health care procurement policies may have the potential to drive the design of safer chemical products in commerce.

As a sector, the health care industry is the largest purchaser of industrial chemicals in the United States, spending $106.1 billion in 2001 (American Chemistry Council, 2003). Although this dependence on industrial chemical products may pose a significant barrier to modifying manufacturers' design of chemical products, the health care industry's contribution to the chemical economy may, more importantly, create procurement opportunities that catalyze innovation in safer chemical products. Thus, the health care sector may be in a unique, influential position to either mitigate or exacerbate the magnitude of negative environmental and human health effects linked with purchasing practices.

Manufacturers and suppliers. This study also has implications for manufacturers and suppliers because it characterizes a large purchaser's efforts to influence the disclosure and design of chemicals and chemical products in its

organizational supply chain. Increased demand for EPP products may spur innovation and design of environmentally benign products and processes in the marketplace, and manufacturers and suppliers who respond to these demands may gain a competitive advantage by meeting this demand.

Public policy makers. Finally, this study has implications for public policy makers because it characterizes the experience of a large downstream user that wants better information about products in its supply chain and who would use this information to make more informed purchasing decisions. Although KP has succeeded in influencing the design of several chemical products, interviewees articulated their inability to comprehensively or systematically address the "raging river" of products in the organizational supply chain. KP's purchasing strategy to decrease chemicals of concern in its supply chain was executed opportunistically and had to be managed in tandem with a myriad of other organizational concerns. These findings demonstrate the real limitations experienced by an industry leader and purchaser of a complex set of products who has operated with limited knowledge of product chemistry or the environmental and human health impacts of these products. KP has limited resources to independently test products or pursue information about product chemistry while balancing other organizational objectives. Moreover, the responsibility for conducting such tests and pursuing chemical product information has created additional operational burdens and costs.

These key aspects of the KP story are germane to current policy reform debates about chemical information and management because they demonstrate

the limited effectiveness of "end-of-pipe" efforts to control chemicals of concern. These findings are also important for public policy makers because KP interviewees expressed frustration with the current regulatory framework and articulated a desire for better testing and regulation of chemicals, as exemplified by the REACH initiative in Europe. This demonstrates support for a different model of chemicals regulation in the United States that accounts for human and environmental health outcomes, demands information transparency about product chemistry, and places the burden of proof on manufacturers rather than downstream users.

Future Research

To fully understand the effectiveness of KP's purchasing practices for chemicals and chemical products requires research beyond the scope of this study. Although examples of KP's ability to innovate new processes and even new products are presented here, the cumulative effect of these actions on other HCOs, manufacturers and suppliers, other industries, or public policy makers is not fully known. In focusing on KP, it is assumed that these groups will benefit from understanding the experience of an industry leader and downstream user of chemicals products. However, study of many other industry leaders who are addressing chemicals of concern in their supply chain is required to assure consistency in capturing those factors that influence successful adoption and implementation of purchasing innovations and those that inhibit or limit the ability of these industries to implement processes effectively. Future studies could

investigate the ability or inability of manufacturers and suppliers to respond to the problems and preferences of downstream users.

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Appendix A

Interview Themes by Research Question

Research Question #1: What were the internal and external factors that influenced the adoption of the CPG at KP?	***Supporting Interviews[53]***	***Supporting Documents[54]***
<u>*External Factors*</u>*:*		
Opportunities & Threats Posed by Legal Exposure	7,8,9	
Need for/ Opportunity created by Centralization of Services	1,3,4,5,7,9 7,8,9,11	
Recruitment of Experts/Visionaries from External Environment	1,3,14, 15, 1,3,14	13
Dioxin Report/ HCWH and Coalition Relationships as Impetus		
Collaboration with Green Building Community	1,3,12,13 1,2,3,5,11	20,22 16
<u>*Internal Factors*</u>*:*	1,2,4,5,6,11,12,	
Influential Founders & KP Mission		
Organizational Culture/Culture of Safety/Prevention		
Influence of Leaders		
Research Question #2: How were chemicals of concern listed on the CPG prioritized, understood, or targeted?	***Supporting Interviews***	***Supporting Documents***
MSDS not Reliable nor Consistent	1,2,3,6,14	
Evolution of CPG/Supplier Disclosure as Chemicals of Concern became Known/Targeted Efforts by	1,2,3,4,5,6	1,2,3,4,5,6
Chemical/Chemical Product	1,2,3,4,5,6,14,15,17,18	15,16,17
Garnering information through NGO/External Partnerships	1,2,3,4,14,18	1,2,3,4,5,6 1,2,3,4
Garnering information through Supplier Disclosure	1,2,3,14,15	
Garnering information/innovating through Direct Dialogue with Manufacturers & Suppliers		
Research Question #3: What were the barriers to, successes of, and lessons learned from implementing the CPG?	***Supporting Interviews***	***Supporting Documents***
<u>*Barriers:*</u>		
Lack of Product Alternatives/Technology Gap	1,2,3,4,5,15	
Lack of Information/Data Gap	1,2,3,4,6,14,17,18	
Confidential Business Information Protections for Manufacturers	1,2,3,14,17 1,4	
Inability to Verify Information Provided by Suppliers	1,2,3,4,5	
Limited Resources by which to Manage/Balance of Organizational Responsibilities	1,2,3,4,5 1,3,5	
Breadth/Complexity of Products Purchased	1,2,3,5	
Differing Views of Responsibility for Environmental	1,2,3,4,5,6	18

[53] See Interview Table in Appendix B
[54] See Document Table in Appendix D

Impact	1,2,3,4,5,6	18
Supplier/Manufacturer Disconnect		
Downstream User Burden		
Limited Effectiveness without Regulatory Reform	1,3,4,14,15	
	1,2,3,5,14,17,18	15,16,17,18
Organizational Successes/Lessons Learned	1,2,3,5,14,17,18	,19
Achieving Cost Neutrality	1,3,5,7,14,17	
Industry Education & Influence		15,16,17,18
Information/Best Practice Creation & Dissemination		,19
Policy Visibility & Leadership	***Supporting Interviews***	
		Supporting Documents
Research Question #4: Did/how did information asymmetry, the Data, Safety, and/or Innovation Gap motivate adoption or create barriers to implementation of the CPG?		
Adoption:		
MSDS not Reliable nor Consistent	1,2,3,6,14	
Insufficient Information About Chemicals in the Supply Chain	1,2,3,5,6,14,15,17,18	1,2,18
Implementation:	1,2,3,4,5,15	
Lack of Product Alternatives/Technology Gap	1,2,3,4,6,14,17,18	1,2,3,4,5,6,
Lack of Information/Data Gap	1,2,3,14,17	18
Confidential Business Information Protections for	1,4	
Manufacturers	1,3,5	
Inability to Verify Information Provided by Suppliers	1,2,3,5	1,2,18
Differing Views of Responsibility for Environmental	1,2,3,4,5,6	18
Impact	1,2,3,4,5,6	18
Supplier/Manufacturer Disconnect		18
Downstream User Burden		
Limited Effectiveness without Regulatory Reform		

Appendix B

Interview Participants and Role Description

Kaiser Permanente National Headquarters Interviewees

Interviewee #1: Interviewee responsible for directing Environmental Stewardship and Environmental Health & Safety. Primary KP contact, key member of early ES efforts and developments over time. At KP for >5 years.

Interviewee #2: Interviewee responsible for management of environmental supply chain initiatives, a relatively new role at KP. Central involvement in purchasing group decision-making. At KP for < 5 years.

Interviewee #3: Interview responsible for direction of green buildings program and program lead for design and construction standards. Involved in early efforts to address PVC in carpeting and chemicals of concern in building materials. At KP , 5 years.

Interviewee #4: Interviewee responsible for directing purchasing department and contract negotiations. Credited with advancing KP's sophistication in negotiating contracts with suppliers. At KP < 5 years.

Interviewee #5: Interviewee responsible for executive leadership of facilities division and strategy development for facilities construction. At KP < 5 years.

Interviewee #6: Interviewee responsible for industrial hygiene at KP and is a member of the high-performance building committee at KP. At KP > 5 years.

Interviewee #7: Interviewee a past senior official of KP who led safety, affordability, and quality initiatives at KP. At KP for >5 years.

Interviewee #8: Interviewee a past Board Member, legal consultant who worked with KP on environmental cases, influential in environmental performance strategy.

Interviewee #9: Interviewee an executive legal counsel member of KP. Initial collaboration with KP around environmental legal cases. Hired internally. At KP for > 5 years.

Interviewee #10: Past member of environmental stewardship team and early member implementing disclosure process.

Interviewee #11: Interviewee a safety executive responsible for environmental health and safety, patient safety, and clinical risk management. At KP > 5 years.

Interviewee #12: Interviewee responsible for direction of public affairs of facilities projects. At KP > 5 years.

Interviewee #13: Interviewee responsible for public affairs for community benefit and other KP initiatives. At KP < 5 years.

External Partners/NGO Interviewees

Interviewee # 14: Interviewee a policy director and research scientist with an NGO that aims to transform the market for building materials. Also a founding member of an early healthcare advocacy group.

Interviewee #15: Interviewee an early founding member of an early healthcare advocacy group. Partnered with KP on early initiatives to decrease chemicals of concern in the supply chain.

Interviewee #16: Interviewee a healthcare project director for NGO that aims to transform the market for building materials. Continues to partner with KP on building initiatives.

Interviewee #17: Interviewee a research director and partner for an advocacy organization that designs and delivers strategic solutions for green chemicals. Leads research efforts to identify and develop new tools and strategies that advance green chemistry and sustainable materials. Ongoing partner with KP.

Interviewee #18: Interviewee a supply chain expert with an NGO that aims to transform the way that healthcare designs, builds and operates its facilities as well as the products healthcare uses within those facilities. Past partner of KP in supply chain management.

Interviewee #19: Interviewee a policy specialist with an NGO that advocates for environmental health in the built environment. Early member of HCWH and partner of KP's on public policy initiatives.

Appendix C

Interview Guide for Representatives of Nongovernmental Organizations

Organizational Role:

Please describe your relationship with Kaiser Permanente and role in relation to chemicals purchasing efforts.

Factors Influencing Adoption:

1) What is your understanding of when and why KP became interested in product chemistry?

2) What were the precipitating factors or events that lead KP to develop a chemicals purchasing guideline?

Decision-Making:

3) How were chemicals and chemical products of concern to KP understood or prioritized?

4) How was information regarding product chemistry gathered or interpreted?

5) What was the course of action taken to address chemicals of concern?

Implementation

6) What happened over the course of implementation?

7) What have been some of the successes, barriers, or lessons learned?

8) What are your impressions of the effectiveness of purchasing efforts?

Additional Questions

9) Is there evidence to support that KP has influenced the design of safer products?

10) How does KP benefit from visibility and leadership on the issue of product chemistry?

Appendix D

Kaiser Permanente's Supporting Documents on Purchasing Chemicals

Purchasing Guidelines & Supplier Disclosure Documents

Document #1: Kaiser Permanente Environmentally Preferable Purchasing Policy This document was a an EPP that was used prior to the EPP used in number 2 below (last updated in July 2008). This document states of support for EPP as part of KP's mission to improve the health of their members and the communities they serve. Purchasing guidelines are stated (including preference for chemicals that are inherently less hazardous and release no toxic by-products across their life cycle) as is KP's stance of taking precautionary approach to product and service selection. Acknowledging that federal and state regulations and standards do not always address critical issues concerning public and environmental health, KP is working to avoid products containing PBTs, Bisphenol A, carcinogens, mutagens, reproductive toxins, halogenated flame retardants, and chlorine-containing flame retardants, latex, mercury, phthalates (e.g. DEHP), PVC, VOCs, and semi-VOCs (the GPC component of the EPP). Specific design preferences (such as take-back provisions) are also specified. Implications for Manufacturers and Suppliers are also defined stating: "We count on suppliers to heed this policy and see it as encouragement to innovate to meet and exceed our expectations. We also expect our suppliers to complete our supplier disclosure process by providing KP with honest and complete information on corporate social responsibility and product performance as it pertains to environmental and public health.
Document #2: Kaiser Permanente Environmentally Preferable Purchasing Policy. This document was the most recently used EPP during the study period. Though the EPP statement of support for EPP remained largely unchanged, purchasing principles were added stating that EPP principles are incorporated into deliberations regarding the purchase of commonly used products, especially where environmentally preferable products are available. Environmental considerations are weighed with quality, service, and total cost. And though not the sole factor in product selection, a statement on the outcome of environmental deliberations must be included in all product recommendations.
Document #3: Supplier Disclosure Form for Resilient Flooring This supplier disclosure instructs suppliers to detail material feedstocks, manufacturing processes, packaging, transportation, installation, use and performance, maintenance, emissions after installation, verifications and guarantees, end of service life, and corporate environmental policies. For example, suppliers are asked to disclose all materials in the product, asking specifically if material contains PBTs such as PBDE (or isocyanates that result in the PBTs), BPA, urea, phenol or other formaldehydes, any materials listed in the National Toxicology Report on Carcinogens, any substances release during the manufacturing process that are listed on the EPA Toxics Release Inventory (TRI).
Document #4: Supplier Disclosure for Electronics This supplier disclosure form request supplier information regarding packaging, chemical tracking, a program in place to identify and reduce the use of chemical components that contain chemicals of concern such as PBTs, carcinogens, mutagens, reproductive or developmental toxicants, endocrine disruptors, and heavy metals such as beryllium, antimony, and arsenic. Further, suppliers asked if they are RoHS compliant (and if not to list if mercury, lead, cadmium, hexavalent chromium, polybrominated biphenyls or PBDEs are in the product. Suppliers are also asked to disclose the presence of BFRs, PVC, phthalates, or Prop 65 chemicals.
Document #5: Current Supplier Environmental and Social Issues Disclosure. This supplier disclosure form lists each of the chemicals of concern listed in the KP EPP policy, provides definitions of chemical classes (e.g. California Proposition 65 chemicals[55]), and requires suppliers to state that their product either does not contain the chemical of concern, does contain the chemical of concern. If the chemical of concern is present, suppliers must specify the amount and indicate if a feasible alternative is available, and must specify the alternative component replacing

[55] Proposition 65, formally titled "The Safe Drinking Water and Toxic Enforcement Act of 1986," is a California law that has been in effect since 1986 to promote clean drinking water and reduction or elimination of toxic substances that cause cancer and birth defects in consumer products.

the chemical of concern.
Document #6: Past Product Disclosure. This supplier disclosure form lists chemicals of concern and listed in KP's EPP and provides spaces for suppliers to indicate the presence of these chemicals in a check-box format.

Internal Strategy & Training

Document #7: KP Environmental Stewardship Proof Points. This document provides a brief overview of KP's sustainable operations efforts including green procurement, high-performance buildings, green computing, green operations, and sustainable agriculture. According to this document, KP has eliminated the purchase and disposal of 40 tons of hazardous chemicals, has created PVC-free carpet, has purged more than 1,400 pounds of mercury from its facilities, and is using DEHP-free IV products whenever possible.
Document #8: KP Environmental Stewardship Executive Summary. This document is an Environmental Stewardship (ES) Executive Summary of the principles, strategies, and guidelines which are supported by the Regional Presidents Group, the National Leadership Team, the Executive Medical Directors, the KP Partnership Group, and the Community Benefit Committee of the KFHP/KFH Board of Directors. Overarching Principles of ES involve a (a) preventative focus, (b) protection of the biosphere, (c) sustainable use of natural resources, (d) reduction and disposal of wastes, (e) energy conservation, (f) risk reduction, (g) transparency, (h) commitment to social equality, (i) safe products and services, (j) environmental restoration, (k) engagement of the public, (l) leadership commitment, (m) audits and reports/annual evaluations. The organizational guidelines delineate KP's three primary areas of focus: (a) chemicals, (b) climate, and (c) food.
Document #9: KP Environmental Stewardship Member and Marketing Communication This document outlines KP's commitment (a) to linking the environment to the health of communities, (b) supporting sustainable communities,(c) greening the organization and the healthcare sector, and (d) spreading the principles of environmental stewardship.
Document #10: KP Talking Points This document provides KP initiatives in a bullet format under subheadings of (a) Community Benefit and Environmental Stewardship, (b) Supporting Sustainable Communities, (c) Promoting Access to Local Food, (d) Encouraging Employee Engagement, (e) Constructing Sustainable, High Performance Buildings, (e) Promoting Green Purchasing, and (f) Spreading Environmental Stewardship
Document # 11: KP Environmental Stewardship Frequently Asked Questions (FAQs) This document addresses why environmental health is critical to individual health and wellness, why KP is making operations more sustainable, why ES is important, what KP is doing to support the environment, KP's main areas of focus (access to local food, staff engagement, green building and purchasing, implementation of guidelines for the production and use of chemicals, and guidelines for climate and clean energy initiatives), and KP's support of social equity, KP's support of sustainable communities, agriculture, employee efforts, and sustainable building projects.
Document #12: Environmental Stewardship Strategies, Principles and Guidelines This document is power point presentation that covers KP's ES leadership, operations, accomplishments, progress and potential, two year strategies, overarching principles, and guidelines for climate, food and chemicals.

Green Building Documents

Document #13: KP Eco Tool Kit This document outlines KP's environmentally responsible design and construction practices and is a publication of KP's National Facilities Services (July, 2002). This tool was created prior to the current day Green Guide for Health Care. Areas covered by the document include (a) integrated design, (b) site design, (c) water, (d) energy, (e) indoor environmental quality, (f) materials and products, (g) construction practices, (h) commissioning, (i) operations and maintenance, and (j) innovation.
Document #14: San Francisco Chronicle Newspaper Article This article discusses future building of hospitals due to seismic regulations in California. In this article, a senior KP representatives describes KP's experience with PVC flooring products.
Document #15: Green Guide for Healthcare The Green Guide for Healthcare is the healthcare sector's first quantifiable sustainable design toolkit integrating enhanced environmental and health principles and practices into the planning, design, construction, operations and maintenance of healthcare facilities.
Document #16: RIPPLE Database The RIPPLE database is an open source, searchable database containing useable and relevant information for evidence-based design. Users can compare design decisions made by multiple health systems and see the results of those decisions. In addition, users interact with colleagues to discuss ways to use this information and leverage current and anticipated exemplary practices in hospital design. More information can be found at ripple.healthdesign.org

Industry Leadership

Document #17: KP 2009 Clean Med Presentation, Senior VP of Community Benefit, Research & Health Policy This document is a presentation of KP Community Benefit program from the 2009 Clean Med conference. It is entitled "Creating Health in the Social, Physical & Natural Environment."
Document #18: Congressional Testimony of KP's Director of Environmental Stewardship This document is the congressional testimony of KP's Director of ES to the House Committee on Energy and Commerce, Subcommittee on Commerce, Trade and Consumer Protection. States KP's commitment to (a) understanding product chemistry, (b) assessing and avoiding hazards, (c) committing to continuous improvement, (d) supporting industry standards, that in KP's opinion, eliminate or reduce known hazards and support a greener economy. Stated experiences and challenges with product disclosure include that (a) many of the ingredients on the disclosure document are not listed on MSDSs due to trade secrets caveats, (b) difficulty getting the requested information, (c) vendor information that is supplied is often useless.
Document #19: Climate Action Strategies at Kaiser Permanente This document is a presentation from the 2009 Clean Med conference given by national-level KP facilities and construction representatives. The presentation outlines why KP and other HCOs have global warming concerns, healthcare's climate footprint, and KP's climate action plan.

Web Resources

Document # 20: KP History: 'More than 60 Years of Quality" This webpage describes KP's history, founder, and business model. More information can be found at xnet.kp.org/newscenter/aboutkp/historyofkp.html
Document #21: Buying Green: KP's Green Procurement and Supply This webpage describes KP's environmental purchasing policy and provides an overview of

environmental purchasing successes to date. This webpage can be found at xnet.org/newscenter/aboutkp/green/factsheets/buyinggreen.html
Document #22: KP's Green Timeline This webpage provides an overview of KP's Environmental Stewardship efforts for over 50 years. This webpage can be found at xnet.kp.org/newscenter/aboutkp/green/timeline.html

Appendix E

The History of Kaiser Permanente

The organization that is now Kaiser Permanente began at the height of the Great Depression and evolved from a partnership between industrialist Henry Kaiser and physician Sidney Garfield. Dr. Sidney Garfield established Contractor's Hospital, a 12-bed hospital in the Mojave Desert in 1933. Here, Dr. Garfield identified an opportunity to treat thousands of Los Angeles Aqueduct workers (Debley, 2009; Kaiser Permanente, 2009). However, the fee-for-service structure of Contractor's hospital created revenue problems for Garfield, both due to reimbursement problems from insurance companies and due to lack of any form of insurance for many aqueduct workers. Nearing bankruptcy, Dr. Garfield discovered the prepayment system, a model burrowed from Ross-Loos Clinic in Los Angeles County that was rooted in the late 19th century traditions of "industrial medicine." Collecting about a nickel a day from approximately 5,000 aqueduct workers, the hospital prospered under the prepayment financial structure. It was during this transition to a prepayment system at the aqueduct project that Dr. Garfield realized the potential for the transformation of care made possible when wellness (rather than illness) became the stabilizing revenue source. The successes of the prepayment plan led Dr. Garfield to focus on preventative medicine, health promotion, safety engineering, and health education (Debley,2009).

Though Dr. Garfield had intended to re-enter private practice upon the completion of the aqueduct project, he was approached by Henry Kaiser to

provide care via the newly established prepaid service model for 6,500 workers and their families on the largest construction site in history, the Grand Coulee Dam project located on the Columbia River in central Washington (Kaiser Permanente, 2009). Though the Coulee Dam project was completed in 1941, America's entry into World War II would bring tens of thousands of workers to the Kaiser Shipyards in Richmond, California in order to meet construction goals of the U.S. Maritime Commission for merchant shipping. Henry Kaiser again enlisted Dr. Garfield's assistance in providing prepaid care for the initial workforce of 30,000 (later to become a workforce of over 90,000). After the end of World War II, the shipyard workforce declined rapidly within months. However, Henry Kaiser and Dr. Garfield continued their commitment to sustain and develop this novel form of healthcare delivery opening the Permanente Health Plan to the public on October 31, 1945. Within ten years, enrollment surpassed 300,000 members in Northern California, a success that has been largely attributed to KP's union relationships and support.[56]

[56] The International Longshoremen's and Warehousemen's Union and the Retail Clerks Union were credited as the driving force behind entry of the Kaiser Health Plan into Los Angeles.

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