VALUE CHAIN ANALYSIS IN THE CONTEXT OF FUNERAL SERVICE: A RESEARCH NOTE

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ABSTRACT

This research note focuses on an issue that is not often addressed in value chain management: the cremation vs. burial alternative after the death of an individual. Any funeral service is indeed based on a set of material and human elements deployed to design, create and develop the service that a company or organization wishes to offer on the market, according to a level of cost and quality chosen by the client (here, most often, the family). For several years now, work has been done on an ecological approach to the cremation vs. burial alternative, emphasizing the importance of calculating the ecological footprint of each of the two options. The main finding of the research note is to propose elements of reflection to contribute to the debate on the desirable future of the value chains associated with funeral service.

KEYWORDS

Burial, Cremation, Death, Ecological footprint, Funeral service, Sustainability, Value chain

1. INTRODUCTION

Although death is still a largely taboo topic, it is now of interest to management researchers as soon as the question of the differentiated ecological footprint associated with different funeral rites arises. The two main options in different countries, including France, are burial and cremation. However, their environmental impacts are not comparable, and a debate is needed on the funeral service that human societies wish to implement for the coming decades. As more and more people stress how essential it is to preserve the well-being of future generations, without letting them bear the burden of today's industrial and logistical choices, the issue of the funeral service cannot be ignored in terms of its ecological implications. With the exception of wars, genocides and large-scale humanitarian catastrophes, the funeral service means the activities related to the preparation of the dead for burial or cremation, and any observance or ceremony in connection with the final disposition, memorialization, interment, entombment, or dispersal of human remains.

It is true that the issue of death has been at the heart of marketing research for at least the last twenty years, focusing in particular on the anxiety experienced or not by individuals confronted with death and the impact this has on their purchasing behavior [9]; other research looks at how the choice of body-disposal practices is considered in relation to the deceased's own values [14]. On the other hand, the analysis of the actors in the "death business", the diversity of which has been perfectly highlighted by Bensebaa and Eymas [3], has long remained shy, probably because it is often inappropriate to describe the "value chain" associated with the legal, commercial and logistical operations generated by the death of a loved one, prior to his or her burial or cremation: packaging, transport, facility management, etc. Yet, there are major issues, not the least of which is the growing environmental concern of funeral service customers, as they are for the purchase of traditional products and services [15].

Much research indicates that traditional burial encompasses a wide variety of invasive and expensive services and products, such as embalming, headstones, lacquered caskets and other elaborate funeral service [29]. Fortunately, green, environmentally friendly alternatives have been available to grieving families for several years [30][31]). Natural burials, home funerals and organic and fairtrade flower retailers, to name a few, are gaining in popularity. Cremation, on the other hand, although imperfect –due to the dioxin and gas emissions that accompany it– is a relatively inexpensive and low environmental impact device. Given these different technical aspects, the research note wishes to explore the challenges for the funeral service in seeking greater sustainability. The investigation must be deepened in order to bring argued answers, at the same time that the Humanity will have to manage 100 million deaths per year by 2060 [23].

The specific objective of the research note is to stimulate academic debate on the ecological stakes of the choices that individuals are led to make in the organization of funeral service. For a long time, the question of the parsimonious use of resources related to funeral rites has been neglected, voluntarily or involuntarily. The cultural and religious dimensions were considered essential, and it was important to analyze how different peoples proceeded with their dead. A new and very recent stream of research is developing to approach the funeral service from a different angle: the comparison between the two main value chains, cremation and burial. By *value chain*, we mean all the interdependent activities that are linked together to produce a good or service. Figure 1 provides a simplified representation of the two value chains discussed in the research note, and whose differentiated environmental impacts are to be assessed under the constraint of religious dimensions. The box devoted to the methodology specifies the key elements relating to data collection.

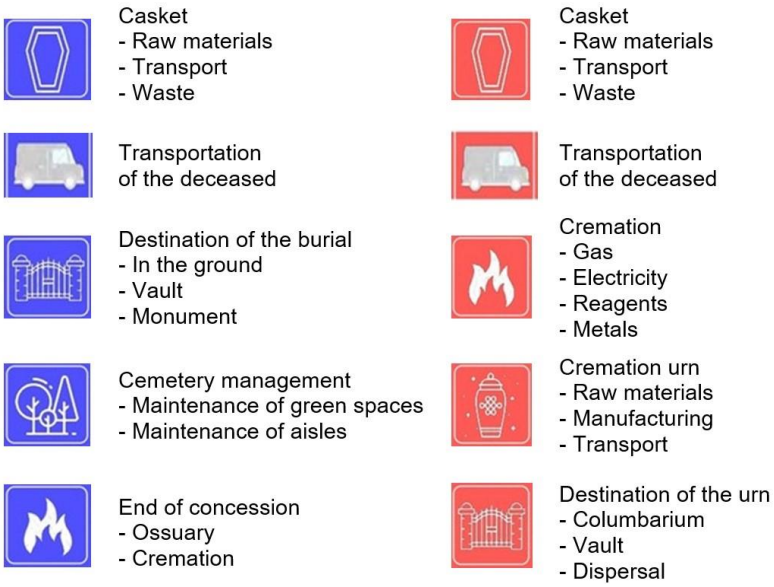

Figure 1. Cremation vs. burial funeral service: two value chains
Source: Adapted from Toutain Meusnier and Ho [28].

Methodology

Every human activity has an impact on the environment that can be measured by its ecological footprint, an indicator that calculates whether the actions taken are environmentally sustainable [22]. The ecological footprint analyzes the production and consumption patterns of a given society, taking into account the resources needed to achieve it and the waste generated. This

research note relies on secondary data collected in particular by Toutain Meusnier and Ho [28] who quantify the environmental impacts of the two options cremation vs. burial). These data allow us to propose a comparative analysis of the performance of the funeral service in terms of ecological footprint. Secondary data are completed by an analysis of academic works conducted on the funeral service by adopting a managerial vision.

The structure of the research note is as follows. In a first step, the essential characteristics of the two value chains are presented, insisting on the rapid progression of cremation funeral service in many countries; it is thus possible to compare the ecological footprint of the two supply chains, which shows a clear advantage to cremation at this level. In a second step, however, it is important to analyze the religious dimensions, which can be an important hindrance on the development of cremation, or on the contrary, a real accelerator of green practices. This allows us to identify in a third step the environmental challenges that the planet will have to face in the next years, taking into account the financial costs related to each of the value chains. The research note ends with a conclusion that highlights the essential elements to be retained for future debates in the management communities.

2. VALUE CHAIN FRAMEWORK

According to the French Cremation Federation, for the 670,000 deaths recorded in 2020 in France, 60% of the deceased were buried, and this figure is constantly decreasing (it was 92% in 1992, and still 75% in 2005), a symbol of a profound transformation of traditions [10][16]. What is the environmental impact of traditional burial? The environmental footprint of a "full" burial, including a casket, vault, headstone, and wreaths, is considerable. For example, the Center for Natural Burial in the United States estimates that a 40,000 m^2 cemetery contains an average of 1,000 tons of steel for the caskets themselves, 20,000 tons of concrete for the vaults, and enough wood from the buried caskets to build more than 40 houses. It also shows that the burial of a person implies a consumption of non-renewable energy similar to that of almost three cremations, and it implies CO_2 emissions equivalent to 3.6 cremations.

These figures vary depending on the type of burial. The least environmentally friendly method is the one that includes a wooden casket placed in a grave, with an ecological footprint that is worsened depending on the type of wood and linings. It must be recognized that there are very few caskets made from natural materials. Most of them contain synthetic varnish and glue, with particularly harmful effects. If carvings and other decorative elements are added, the impact can exceed that of five cremations. This is because cement and concrete are made by firing limestone and clay at over 1,450º C. The most environmentally friendly method of burial is undoubtedly that of placing the body directly into the ground. However, this method is still very rare, and even prohibited in many countries. This is the case in France, where funeral law prohibits burying a body without first placing it in a casket. Religious funerals whose rites require burial in the ground without a casket, notably Muslim funerals, cannot be celebrated in this way in France.

The "green" alternative to burial is cremation [11], which is becoming increasingly popular in France, but more widely, in Europe. Figure 2 provides the percentage of deaths treated by cremation in either 2016 (black) or 2015 (green) for different European countries. Cremation is a funeral technique that aims to burn the body of a deceased person. This method of cremation is very popular in many countries, such as Japan, and is constantly increasing in recent years in the rest of the world. In a crematorium, the bones of the body are reduced to ashes at a temperature of more than 1,000° C for about an hour and a half. The rest disappears as dust and gas. In France, cremation accounts for 3% of annual CO_2 emissions, mainly due to the gases used, mercury from

dental fillings and dioxins released during cremation. Although less energy consuming than burial, cremation remains relatively polluting, especially since it also requires the use of a casket. However, it is quite common to read that this is a much more environmentally friendly option, and its major advantage is that it avoids the use of space that could be put to more effective use for living things [2]. A more nuanced judgment is therefore in order. The study by Toutain Meusnier and Ho [28] indicates that gas emissions from crematoria are a significant source of air pollution, not to mention that the burning of bodies also generates waste that can be harmful. The authors note that on average, a standard cremation uses about 42 m^3 of gas. It should be noted, however, that in recent years technological improvements have been made to crematoria to facilitate the filtering of particles, so that they emit only carbon dioxide and water vapor.

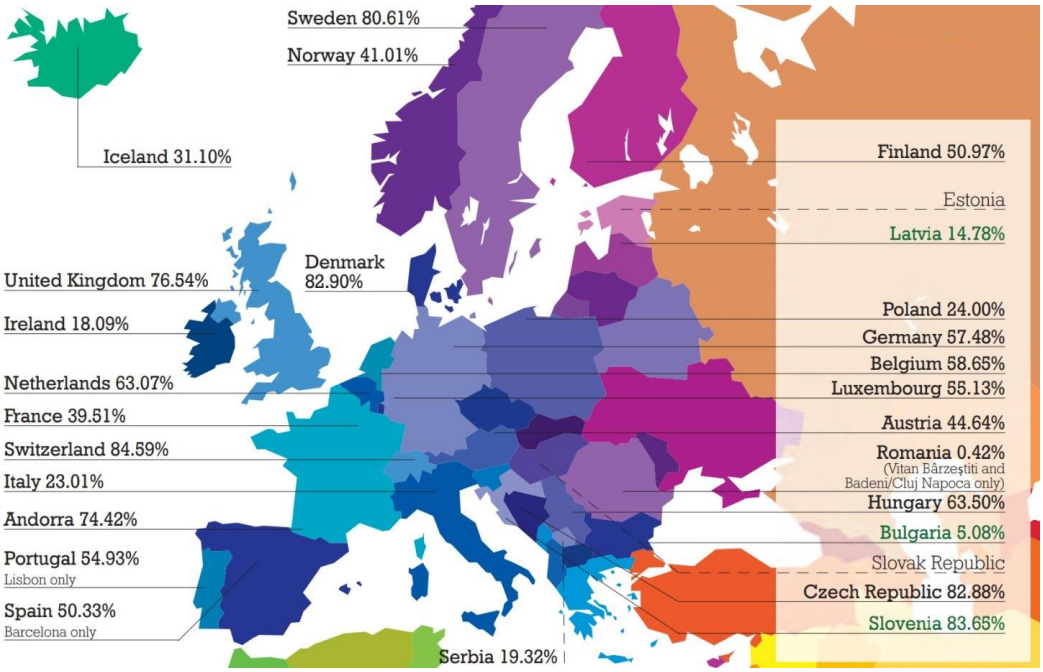

Figure 2. Percentages of cremation in Europe by country (2015-2016)
Source: The Cremation Society.

The calculation of the ecological footprint of cremation must at the same time take into account the construction of the oven infrastructure and its maintenance, which absorb materials, some of which are scarce, and which many works emphasize will be a major challenge for our planet in the next thirty years, independently of the purely moral issues being linked to the cremation rite [18]. These materials are contained in minerals whose scarcity is fixed above the level of fossil energy resources. Finally, while some logistical operations are comparable, for example in the transportation of the deceased, other logistical operations generate differentiated energy expenditures. Table 1, taken from the study by Toutain Meusnier and Ho [28], proposes an environmental impact of each step of the value chain (in kg CO_2). It shows a clear advantage for cremation, with a consumption almost four times lower than burial.

Table 1. Environmental impact of each step of the value chain (in kg CO_2)

Cremation	Materials Manufacturing Transportation Waste	Transportation	Gas Metals Reagents Pollutants	Materials Manufacturing Transportation	Columbarium Niche Dispersal	**Total**
	27,8	–	202,4	2,5	–	**232.7**
	Casket	*Transfer*	*Cremation*	*Urn*	*Destination*	
Burial	Materials Manufacturing Transportation Waste	Transportation	Underground Niche Pantheon	Maintenance	Ossuary Cremation	
	30	14	730	–	57	**831**
	Casket	*Transfer*	*Destination*	*Cemetery*	*End of concession*	

Source: Adapted from Toutain Meusnier and Ho [28].

3. RELIGIOUS DIMENSIONS

However, it is impossible to understand the dynamics of the two value chains without referring to the religious dimensions that are associated with the passage from life to death. The subject, as much as the practices, have a long history, with many ethical and philosophical questions. Thus, at the end of the 19th century in France, at the time of the discussions concerning the freedom of choice of funerals (with the Act of November 15, 1887), the National Crematist Association was created; it was at the origin of the first crematorium in Paris, located in the famous Père-Lachaise cemetery. For its part, the French Cremation Federation dates back to 1930 and since then has been militating in favor of the free choice of funeral arrangements. Beyond the French case, all European countries will be concerned throughout the 20th century by the burial vs. cremation debate according to intimate beliefs and preferences, most of the time directly linked to religion, without a real consensus emerging [6].

While Lutherans and Calvinists have allowed cremation for over a century, the Catholic Church has only tolerated it since Vatican II (1962). In Northern Europe, where Protestant influence is strong, cremation now accounts for well over half of all deaths, as shown in Figure 2. If it is in the majority in Germany, the rates are highest in Switzerland where, in 2021, nearly 90% of individuals will choose to be cremated after their death (compared to 30% in the early 1980s). In France, it is in the more Protestant eastern region that cremation is most common. On the contrary, in Southern Europe, with a Catholic tradition, the practice, which had remained marginal for a long time, is growing. The development of cremation is naturally a function of the evolution of mentalities and ideas, but also of the presence of retirees from other countries who have come to live there. If we leave Europe, in Japan, thus in a completely different historical and religious environment, almost the entire population is cremated (the practice is compulsory in cities) [17].

Religious dimensions must therefore be integrated into a value chain analysis to understand the issues at stake. In a survey conducted in France by Salmon Legagneur [25] among people aged 40 and over, 76% of atheists prefer cremation, but 40% of Catholics and nearly 90% of Muslims prefer burial. The decline of the Catholic religion and the affirmation of Islam, in view of the strong opinions on funeral rites, will necessarily feed concrete reflections on what will become of the cemeteries. More broadly, it is likely that community aspirations will gradually become stronger, highlighting an increased fragmentation of uses and populations according to religions, but also according to the values to which individuals are attached. Salmon Legagneur's survey [25] thus indicates that the choice of cremation is very present among those who are very aware

of ecological arguments, and who are aware of the lack of space in cemeteries. Will environmental issues be at the center of the value chain analysis of funeral service in the coming years?

4. ENVIRONMENTAL ISSUES

In a surprising article, Decker Jr. *et al.* [8] contribute to the death business by introducing a new service concept: that of the "mobile crematorium". The authors' bias is clearly stated, namely cremation as the ultimate form of passage from life to death. The mobile crematorium, available 24 hours a day, can provide any cremation in a given territory by transporting the equipment in a truck to the location specified by the client. At the site itself, crematorium staff perform the entire funeral service (regulatory procedures, transport of the casket to the crematorium, and placement of the cremated remains in a sealed urn). In order to maintain the safety of the whole process, the maintenance of the truck and the cremation equipment is carried out according to strict specifications during the entire value chain process.

Such an example of a mobile crematorium is certainly suggested in a singular context, that of Brazil, which is known to have experienced a veritable "funeral chaos" at the height of the Covid-19 pandemic [4]. During the war in Ukraine, several mass media have also reported that the Russian army used mobile crematoria to leave no trace of the dead on the battlefield [12], but it is not possible to confirm this. Nevertheless, it bears witness to a vision that is relatively shared by many observers: burial cannot be seen as a way forward, given its ecological footprint. While it is not certain that mobile cremation is a truly sustainable option, insofar as it generates transport that is not necessarily optimized, for example in terms of delivery rounds, the notion itself confirms the validity of Bensebaa and Eymas's [3:39] statement that "if we compare the two modalities from a strictly ecological point of view, that is, putting aside the economic, personal or religious dimensions, cremation clearly outweighs burial".

Despite appearances, however, if we project ourselves to 2060, as Rugg [23] invites us to do, nothing seems clear-cut. Recent research conducted on the effects of cremations globally notes that cremations have increased more than expected, threatening to make it impossible to achieve the COP 21 Paris (2015) goals of carbon neutrality by 2050 [13]. The authors collated the annual number of deaths over a long period of time and, by calculating the average carbon emissions per death, derived projections of the annual amount of carbon dioxide emitted. The results show that cremation, which mobilizes significant carbon emitters such as embalming or caskets, causes significant environmental damage, especially in the presence of zinc foil, which can severely damage the atmosphere if the oven's filtering system fails. In brief, cremation is not automatically a source of sustainable competitive advantage in the sense of Sultan and Saurabh [27], even though its overall cost is less than burial by more than 25% (see Figure 3).

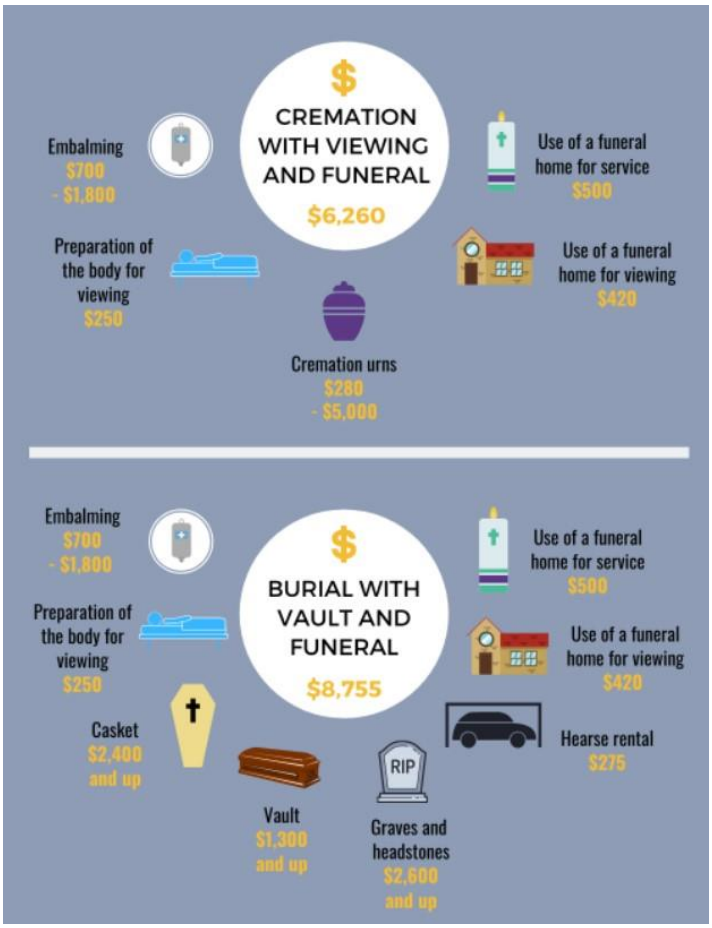

Figure 3. Comparative cost of burial and cremation (in US dollars)
Source: Lincoln Heritage Funeral Advantage.

The fact that cremation has a non-negligible environmental impact is leading to imagine new funeral value chain solution, particularly in Anglo-Saxon countries, where death is more integrated as a natural moment of life [24]. Among the options considered for a more sustainable funeral service [1], three seem to have significant potential for development. The first option is aquamation, promession, composting of the body, or the sanitization of flesh by fungi, in other words, the implementation of processes that neutralize the pollution generated by corpses. The second solution is the use of cardboard caskets, organic urns, biodegradable capsules and shrouds, which allow the body to gradually melt into the humus and return to the cycle of nature. Finally, the third solution is to melt the mortuary places in the vegetation. Organic cemeteries, similar to parks or forests, are developing in the United Kingdom, while in the United States, memorial reefs are favored, where the ashes become coral reefs to ensure the preservation of the marine environment. These three solutions correspond to the search for a green supply chain management, as shown in the literature review by Seman *et al.* [26].

5. CONCLUSION

Each of us is confronted one day with the death of a parent, a relative, a friend or a work colleague. This is an emotionally painful moment, but the economic dimension remains essential, as it results in the obligation to manage value chain of a funeral service that is highly formatted and, most often, extremely regulated [3]. Such a subject has not attracted the attention of

management research until recently, leaving the analysis of "funeral issues" to other fields of the social sciences, whether anthropology, sociology or theology. However, in a finite world with scarce resources, it is not possible to pretend that death has no managerial impact, especially in terms of ecological footprint. As Riemann [20] underlines, a continuous process optimization always requires a thorough analysis of the key elements of a value chain and related processes; funeral service is no exception. This research note highlighted the importance of environmental issues around the choice of burial vs. cremation, showing a relative ecological advantage to cremation.

However, whatever funeral service is chosen, it is often painful for the families and friends: whether a body decomposes slowly in a casket, is dissolved in compost, is burned at 1,000° C in an oven, is involved in a "resomation" (alkaline hydrolysis to accelerate the natural processes associated with decomposition) [21], is freeze-dried, this does not change the fate of each human being. For thousands of years, many religious funeral rites have sublimated this material transition by opening the door to a hope of eternity, whether it is the resurrection for monotheistic religions, reincarnation for oriental religions, or the ultimate fusion with the nourishing Earth for animists [7]. Even non-believers have formalized civil ceremonies to engrave the memory of the deceased in the memory and the great cycle of nature, including by assimilating cremation to a "purifying flame" [19].

It may be surprising that value chain management research is interested in the question of the physical fate of a corpse. However, despite the discomfort that this question may arouse, it must be addressed in the face of the climate emergency that is now present [5]. Death business leads to sometimes aberrant behavior, particularly in terms of logistics, which must be denounced. For example, the fact that blocks of granite are extracted from quarries in France, then transported by container ship to China to be shaped, before returning again by container ship to Paris or Marseilles in the form of low-cost funeral monuments, is a real environmental scandal. Somewhat provocatively, in the same way that the circular economy, through closed loop supply chains, is concerned with the environmental management of products at the end of their life, the consideration of future generations requires a comparable reasoning with the death.

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