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Connecting the dots between workspace design and the triple bottom line

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ABSTRACT

Today several organizations around the world are encouraging and promoting standards for environmentally efficient buildings. Interest in these “green” buildings have increased immensely, but just like financial metrics do not provide a total view of the effectiveness and efficiency of the workspace, the environmental focus tends to be one dimensional. Work in today’s office environment is first and foremost a social activity. In order to fully understand how to support effectiveness and efficiency in the office workspace we must understand how financial, social and environmental issues are interdependent. Building on their user-centered research and understanding of social networks and their commitment to the environment, Steelcase, a global office manufacturer, has developed an approach to engaging their clients in understanding their workspace in an integrated economic, social and environmental framework. A review of the state-of-the-art research and knowledge of the workspace and its effects was performed. The significant contributing factors were identified and their relation to a set of sustainability impact categories were determined and if possible quantified. The workspace is an asset that can be employed to support an organization’s strategic objectives by acting as social interfaces that affect behaviors and culture. In order to allow sustainability to be ‘sustained’ in companies it has to be integrated in the organization’s context and aligned with its strategic direction. Characteristic business drivers in companies were mapped and then linked with the appropriate sustainability impact categories. This approach to connecting the workspace with sustainability allows companies to assess their own performance in each of the sustainability dimensions relative to their own business context. This is expected to engage and empower companies to take action and make informed sustainable decisions in the design of their workspace.

Author Keywords

Workspace design, sustainable development, triple bottom line, financial capital, social capital, natural capital.

INTRODUCTION

It is now more than 20 years ago that the United Nations’ Brundtland Commission Report [4] globally introduced the issue of sustainability. However, it is only recent years that general consensus is manifesting to actually take action. Traditionally, manufacturing plants were the usual suspects of unsustainable consumption and production practices, but today with a majority of people in the western world working in service and knowledge intensive industries the attention has turned to the office workplace.

The built environment is key sector to sustainable development. Worldwide, 30-40% of primary energy is used in buildings [5]. In the United States, commercial office buildings alone account for about 10% of this amount, and thereby represents a significant potential for energy efficiency. Throughout its life, a building’s energy consumption during operation contributes to the greatest environmental impact, but the construction and production of building materials also represent significant contributions. Life-cycle assessment (LCA) is a method that allows the environmental impact of products and buildings to be analyzed and assessed. The entire life cycle of systems is considered in LCA from raw material extraction to the disposal. Within each phase of the life cycle all exchanges with the environment are inventoried and quantified. A building’s main exchanges with the environment are the consumption of natural resources, emissions, land usage, waste production and last, but not least, the working environment. These exchanges are then correlated to a set of impacts on the environment. For office buildings the most relevant impacts are climate change (global warming), acidification (acid rain), smog (photochemical ozone formation), eutrophication (nutrient enrichment) and heavy metals (human & ecotoxicity) – see figure 1.

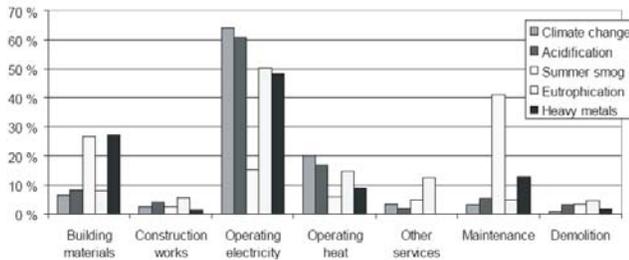


Figure 1. The environmental impact contribution of an office building's life-cycle phases [3].

LCAs are used mainly to compare alternative systems with each other and support decisions on choosing the more environmentally efficient alternative. As a basis of comparison, a unit of analysis must be defined, the so-called functional unit. The functional unit is an attempt to represent the utility that a system provides to the user(s). This is however a challenge to do, as determining the utility of an office workspace is not an easy undertaking. Consider the following; a typical definition of a functional unit of an office workspace would be “a 1000m² building that caters for 50 people working 8 hours daily”. However, this would not capture the true value of the workspace, as an asset that supports productive work activity, the well-being of employees and the achievement of business results in an ever changing environment. Here we begin to touch upon what a workspace actually provides to a company. If we really want to consider what kind of workspace is a better environmental choice, it is not sufficient to consider the physical building and its entire interior; we have to understand the activities and behaviors of people. We cannot assess environmental effects based on physical objects alone, but need to know how they are used and what value they represent to the users.

International and national environmental rating initiatives, such as LEED¹, BREEAM², HQE³, Green Star⁴, etc., have been established to promote environmental efficient buildings. Although the aim of many of these initiatives is to endorse an integrated view of building design practices that include economic, health and community benefits, the rating system focuses on the environmental performance of the physical elements of the building and not the people and resulting work activity. From a sustainable development perspective, in order to truly embrace the concept, an

¹ Leadership in Energy and Environmental Design is developed by the US Green Building Council.

² Building Research Establishment's Environmental Assessment Method is the UK rating scheme.

³ Haute Qualité Environnementale is established in France.

⁴ Green Star is developed by the Green Building Council of Australia.

emphasis on environmental issues without considerations to the economic or social effects is not considered “sustainable” when doing business today. It is necessary to have a holistic and multifaceted view of an organization. Here the term “triple bottom line” [6] – or the more popular “people, planet, profit” has been adopted by many businesses as an approach to gain an understanding of how sustainability needs to be addressed in an integrated manner. The triple bottom line expands on traditional accounting of financial capital to also report on human or social capital and natural capital. These three views of “capital” try to encompass “value” as perceived by all stakeholders: company, its customers as well as society. The aim is then to make decisions in companies that take all these views in to consideration.

Although the general framework for triple bottom line principles have been broadly accepted [7], it still needs to be defined what this actually entails for each company and its many activities. The current focus on environmental issues and in particular climate change has resulted in a plethora of standards, principles, measures and indicators of sustainability from a wide range of organizations, commercial, governmental as well as non-governmental. In the case of the office workspace, there are many recommendations of what defines a sustainable workspace [8], but no common method of assessing the workspace from a triple bottom line perspective. Whatever the case, one has to bear in mind that sustainable development is not just about reporting on your performance in a number of different dimensions, but to constantly improve your performance whilst considering the many dimensions in an integrated fashion. For an organization to truly be sustainable, it's visions, strategies and activities and how they influence the triple bottom line have to be coordinated. This corresponds to the principles of measuring performance using a balanced scorecard [9]. Sustainable development has to be linked to the organization's strategy and be based on the actual context the organization is in. Just like the workspace, sustainability does not make much sense if it is not considered within the context of the organization's own objectives.

A company's activities are never free from influence to its surroundings, any activity a company engages in has economic, social as well as environmental impacts, but each of these must be seen in relation to the objective or value that is achieved by the activity. For example, an energy efficient building is not very sustainable if the workspace does not effectively support the people working. The vision of a truly sustainable society is utopian, but similar to economic growth, sustainable development is not a final destination, it is a journey to constantly do the most with the few precious resources we have.

This paper describes a process of how sustainable development and triple bottom line principles can be effectively adopted for organizations that conduct most of their activities in the office work environment.

THE EFFECTS OF WORKSPACE DESIGN

Throughout the last century, work has progressively shifted in to office environments. Before the 1960s the principles of office workspace design were predominately borrowed from manufacturing facilities and production lines with a clear goal to improve productivity. Studies were performed in a very classical experimental manner where the influence of a single factor of the workplace was investigated one at a time. Typical of these types of studies is the renown studies conducted at the Hawthorne Works [10], which presented surprising findings. No matter what changes (improvements or deterioration) were made in the physical work environment (e.g. lighting) productivity increased. This lead researchers to believe that it was not so much the conditions of the physical work environment itself that induced productivity improvements, but one had to consider the social context of work, i.e. the greater influencing factor turned out to be that the employees knew that they were being observed and were more productive as a consequence (the so-called Hawthorne Effect).

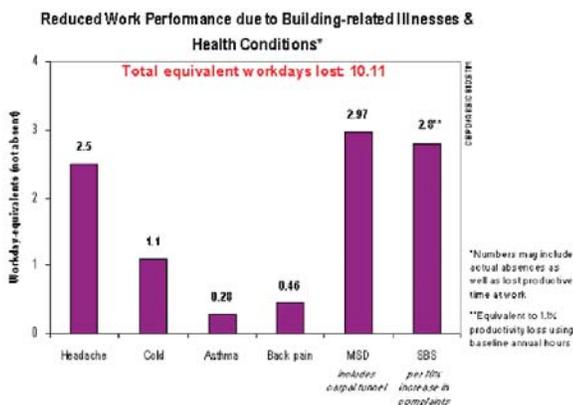


Figure 2. Lost work days due to building related illnesses [2].

Another challenging aspect of determining productive office workspaces was that office work was also evolving. Traditionally when workspace design was inspired by the principles in manufacturing (where measures of input and output were well defined) productivity could be easily determined. With the advent of the computer, office work became less standardized and more complex and more knowledge based. Here determining productivity is a more difficult task, and today, when no evident measure of productivity is available, often a proxy, such as the worker's self-assessment or satisfaction, is used.

Even though researchers still discuss the scientific basis for the Hawthorne studies, much research on the effects of the workspace is still based on individual elements in the physical work environment [11]. This is particularly true of research from the technical and engineering fields, such as indoor climate, lighting, ergonomics, acoustics, etc. Here the effects of the workspace are correlated in case studies to various characteristics of the physical workplace, and researchers typically present findings such as “employees

achieved a 17.8% increase in productivity due to improved ergonomics”.

In relation to the sustainable workspace, a significant collection of workspace design studies have been compiled in Carnegie Mellon's Center for Building Performance and Diagnostics [2]. The research conducted here attempts to provide key design guidelines to high performance buildings by linking productivity, health and energy-saving benefits to certain characteristics of interior systems. Companies typically view the physical work environment as a necessity that represents costs, which at best only contribute marginally to their business performance. The studies here argue that in office workspaces employee salaries and health care costs are by far the greatest cost to companies and the physical workspace is just a fraction of the total costs, but the impacts of the physical workspace on work performance.

Although research of this kind does inform on better workspace design, they cannot be directly applied as mechanistic causal relationships when designing workspaces. Three reasons for proceeding with caution when attempting to generalize workspace design research is:

- As the research is typically based on individual case studies in each their own context, their use is more inspirational than statistical evidence. Often the significance of an element in the workspace is very much dependent on the conditions of the initial state in which the change was implemented.
- The studies usually focus on one or a few elements of the workspace and very few studies try to determine whether it is lighting, temperature, indoor air quality, ergonomics or some thing else in the work environment that is the cause of performance changes amongst employees.
- As in the Hawthorne studies, the social and cultural factors in which conditions were investigated are rarely taken in to account, and thereby giving the physical work environment more importance than the psychological work environment.

Constant change in today's globalized business world and an emphasis on knowledge workers are getting companies to realize that work is first and foremost a social activity, that has to be agile and adaptive. The design of physical workspace cannot address these challenges alone, but because humans are physical beings that act and interact in a spatial context, companies are increasingly discovering that the physical workspace can be an important asset to achieving an organization's strategic objectives [12]. The workspace can be used as a tool to support change and strategic alignment within an organization. As each organization and its context and drivers are very different the approach here is to design the workspace inclusively with employees and executives, rather than just designing

externally *for* some employees. This user-centered approach engages individuals and respects the social and cultural context of the organization, whilst also ensuring consensus and adoption of change.

Conclusively, research into the effects of the physical workspace is very broad, pointing at numerous influencing factors that are interdependent and should be considered in relation to the social context of the organization. Such a messy affair calls for an overview of the main influencing factors of the work environment and a manner in which to convey this knowledge to designers and organizations so that they can collaborate on how to best leverage the workspace to achieve their strategic objectives.

IDENTIFYING LINKS TO SUSTAINABLE PERFORMANCE

As previously mentioned, the starting point of sustainable development should be the value of the activity in question to its stakeholders. In this article, the focus is on work as an activity that occurs in the context of the office work environment. Therefore a natural place to start is to establish the value of work. This of course could be done in a multitude of different ways, but at a very basic level, work can be seen as the costs of having a workspace - employee staff and ensuring tools, technologies and space to perform work (see Figure 3).

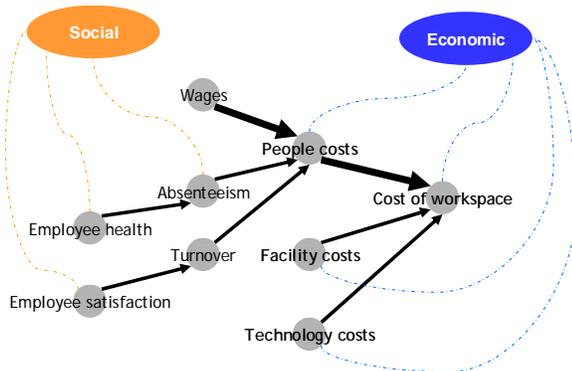


Figure 3. The costs of a workspace.

This of course is a very economic perspective of work, but when employee well-being (i.e. health and satisfaction) and the lost of productive time at work is related to these costs we begin to see the relationship between economic and social performance. To complement this, but in a more qualitative and descriptive way on how the value of work can be assessed, five business dynamics that are key to an organization's performance may be used as a rating [Barros, 2003]. These dynamics, which are all conducted through social interaction, are: *innovation, learning, communication, work process* and *decision-making* (see Figure 4).

These different activities of work take place in a building and are supported by various settings, tools and technologies. Here we can identify the economic and

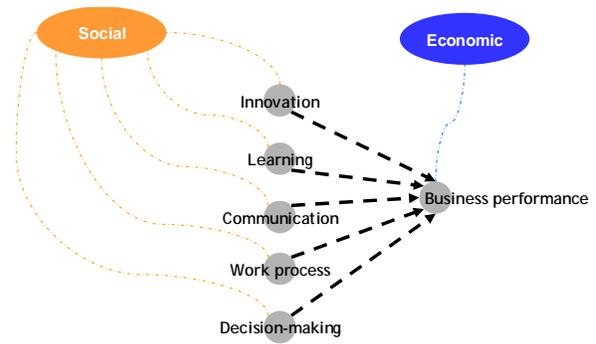


Figure 4. An organization's performance can be assessed through the five business dynamics: innovation, learning, communication, work process and decision-making [Barros, 2003]

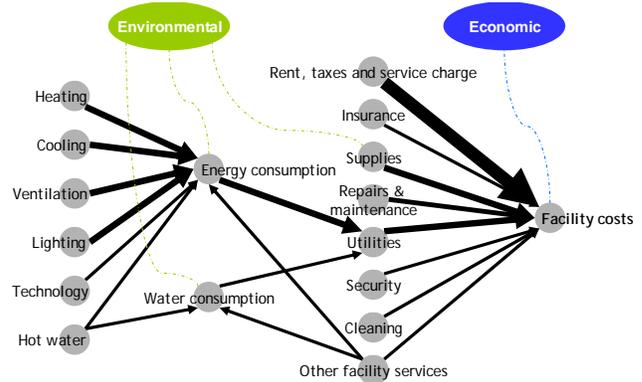


Figure 5. The links from the physical workspace to environmental and economic impacts.

environmental impacts as a result of the use of space and products, but also the relationship of the physical work environment back to employee well-being (Figure 5 & 6). In order to determine the actual quantities of material and energy consumption, we need to understand how space and products are used.

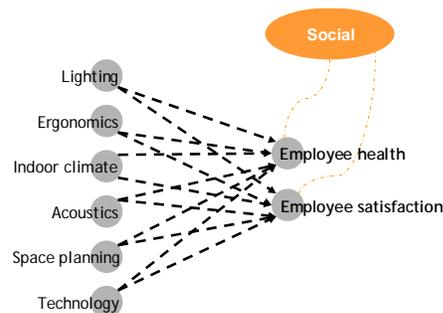


Figure 6. Linkages from the physical workspace to employee satisfaction.

Finally, with today's distributed workspace, where work is no longer a fixed place, but can be done anywhere, transport is a major contributor to environmental effects, one might want to consider the commute and business travel of the employees in the organization (Figure 7).

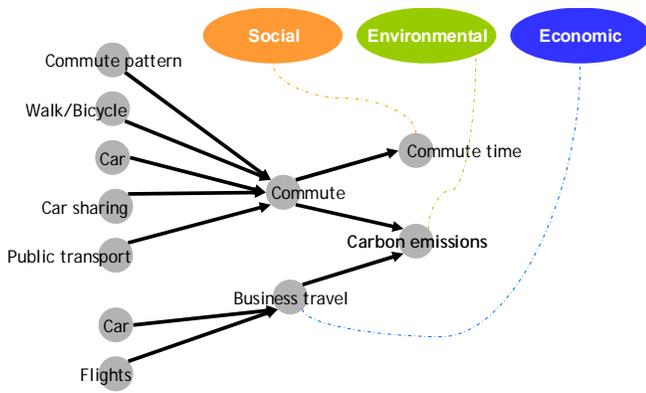


Figure 7. Workspace is not limited to one location and can involve travel.

By identifying the necessary elements of a well performing workspace and uncovering the most significant links, we can build a model of what is relevant to consider in terms of sustainability. Each node and link in the model represents some form of information that is either derived from research or provided by the users of the workspace. When no data is available from the specific workspace, statistical data can be used in its place to allow the entire perspective to still be shown. A model will of course always be a simplified view of the real world, but here we can get a multifaceted view of what constitutes workspace performance, and begin to understand the interrelations of the social, economic and environmental dimensions.

This mapping approach that we have presented here should not be seen as a static standard to what a sustainable workspace is, but more a flexible framework that constantly changes with new knowledge from workspace design. As new insights are made, factors regarding the workspace in the model may be added or removed, and linkages may be created, adjusted or severed.

ENGAGING ORGANIZATIONS IN SUSTAINABILITY

Spurred by the concerns for the environment, as well as, the on-going struggle to attract and retain the best employees, companies are looking for ways to support sustainability in their organizations. For companies that predominantly employ knowledge-workers and work in office environments, it has not been clear how they should address sustainable development. There are many standards, indicators and rating systems that propose how sustainability can be approached, but they typically do not consider the actual value of the workspace as the starting point and tend to have a bias towards one dimension of sustainability.

Steelcase Applied Research & Consulting (ARC) has been successful at employing user-centered methods in workspace design that engage employees and executives with corporations and architectural firms around the world. Typical for their approach, the starting point is always

focused on defining the context of the organization, and trying to establish what are the key issues. Information that is relevant to these issues is then gathered and interpreted to give insights and form a complete impression of the current state of the workspace. Involving employees and executives, aspects of change and improvement in the workspace are identified and possible solutions are visualized and made practical.

Using the same principles in ARC engagements and applying the framework presented in the previous chapter, sustainable workspace performance can be assessed for organizations on the basis of their own context.



Figure 8. Process for engaging organizations to address the sustainable performance of their workspace.

It is key to sustainable development that the activities in companies are inherently integrated with their business practices. Otherwise social and environmental issues risk being conceived as excessive, only done to please stakeholders and do not provide benefits to the organization. By correlating activities and their effects with the organization's own goals, companies can essentially construct their own sustainability business case. The approach to workspace sustainability presented here, is expected to engage and empower companies to take action and make informed sustainable decisions in the design of their workspace.

DISCUSSIONS AND PERSPECTIVES

Sustainable development is path that never quite ends. In the same way organizations never cease to constantly improve their performance, sustainable development is an on-going challenge to ensure that we achieve our goals whilst using the economic, social and natural resources as effectively and efficiently as possible.

Researchers in workspace design are persistently searching for answers to what the perfect workspace is, but instead of attempting to give a single explanation of the workspace, we should acknowledge that is a complex system with multiple factors that may contribute to its performance. The framework for sustainable workspace performance proposed in this paper may be a simplified assessment of a workspace, but given the conditions in which companies operate within, its aims are more to understand and engage in sustainable development. For the practicality of companies, the framework provides indications on sustainable performance relevant to the organization, so that it may take action, but as long as information and research is not always available it cannot provide a complete and exact result.

Research in the workspace is often broad and from many different sources and contexts and therefore it is difficult to get an overview of the existing knowledge. As mentioned previously, the framework presented in this paper is flexible and adaptive to new insights to the sustainability aspects of workspace, but one perspective of the usefulness of engaging organizations in sustainability, is that the framework could be a vessel for tracking and gathering information about workspaces in various organizations. If the framework was used with companies over time, it could be a means of registering the effects of changes in the workspace and thereby “learning” through each engagement.

CONCLUSION

The workspace is a complex system and on-going research is constantly trying to provide knowledge to a better workspace. At the same time companies are realizing that the physical workspace can be an asset that can be used to achieve the organization’s strategic objectives.

In order to provide insights to the design of workspace, this paper proposes a framework for sustainable performance in the office environment and an approach to engaging organizations in this process. Unlike current standardized practices to assess sustainability, this approach uses the value of the workspace as a reference to its economic, social and environmental perspectives. It is consider key that the organization’s context and objectives are linked to the activities in the workspace.

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