9 ECONOMIC INSIGHTS:

ARGUMENTS FOR BETTER DESIGN SOLUTIONS

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Economics of Sustainability
IAAC. MAA 2014/15

1_ MAKING DECISIONS

Architectural design and urban planning are all about making decisions. Developing a project means deciding about each of its parts, choosing the best options and discarding the rest. However, we live in a world in which most of the decisions are taken on the basis of their financial implications, and good design solutions might be rejected because of their apparent excessive price. Cost/benefit analysis are the key element in most decision making processes and any developer is aware of it. As architects, if we want to succeed in bringing good design ideas into life, we need to be able to speak the "cost/benefit language". That means that it is essential to translate the concepts, improvements and features of design into monetary units and bring them into the cost/benefit function. Not all the costs are the direct expenses of the construction and not all the benefits are the direct profit of selling a product. There is much more to analyze. This is one of the most important contributions that economy can make to architecture design: reality is complex, it is made of many different layers of information and good decisions can only be made by taking into account the whole picture with all its implications at different levels.

2_ HOW "VALUABLE" IS IT?

The price of something (a good or a service) is often confused with its value. According to *Collins Dictionary*, price is "the sum in money or goods for which anything is or may be bought or sold". For its part, value is described as " the desirability of a thing, often in respect of some property such as usefulness or exchangeability; worth, merit, or importance". In other words, price is just that part of the value of goods and services that is reflected in the market. It is the amount of monetary units that we are willing to pay for something with specific attributes. In the world of architecture and urban planning, price is what a developer keeps in mind; it is the result of a financial point of view that consists of looking at the city only as an opportunity to generate additional flows of money. However, as architects, we cannot plan a city or design a building on the basis of financial criteria. We must think in terms of value (economic point of view) trying to understand what the added value of our project is and how it is contributing to social welfare. The attributes of our design are what will define its value.

However, as previously mentioned, it is necessary to translate the "good intentions" into monetary units. This is the part where economic analysis plays the main role. Economics mainly deals with the idea of welfare, and everything that affects welfare can be (and will constantly be) valued. Economic analysis simply helps us express this value in an explicit way with monetary units. This is a crucial idea: welfare is tightly related to value and it can be expressed with a market price. In the design of a city, if all that mattered were the financial profitability, we would have no arguments to build public spaces or public facilities, since every square meter would be an opportunity for a developer to make money with private investments. However, public spaces and public facilities have a high value because they contribute to increase social welfare (and that means money) and this is a very powerful argument to

defend the necessity and profitability of their existence.

In a more technical way, welfare can be translated into monetary units with a price/quantity graph. A curve drawn in this graph would be the demand curve (representing the amount of money that we are willing to pay for a certain quantity of goods or services). Given a certain quantity, if the market price is below the demand curve there is a consumer surplus (the consumer was willing to pay more than the actual market price for that quantity of goods). If this is the case, consumers will buy and they will be happy for having paid less than their "maximum". Therefore, there will be an increase of welfare. On the contrary, if the market price is above the demand curve there will not be an exchange. Being aware of that, architects can design to affect the market price in a clever way. Even if our client is a developer, we, as architects, have to design for people, citizens. Affordability (and not only profitability) is what we have to keep in mind.

3_ WHAT IF...?

When making decisions about a design there is always one question that arises: what would have happened if we had chosen a different option? In economics, this concept is called opportunity cost. The *New Oxford American Dictionary* defines "opportunity cost" as "the loss of potential gain from other alternatives when one alternative is chosen". In general terms, the opportunity cost is the value of life that we would have enjoyed had we chosen a different option, or, in other words, the cost of what has been left behind because of our decision. This is a crucial idea: when starting the design of a new building or city all the doors are open, everything can be potentially done. However, each design decision restricts the specifications of our project and thus limits its capacity to add value. For example, deciding not to install solar panels because of their price may look like a rational decision. However, if we think in terms of opportunity cost, we might be missing the chance to reduce carbon dioxide emissions, and hence the opportunity to increase social welfare, which is expressible in monetary units. In sum, not doing something may mean avoiding expenses, but it also has a cost: the opportunity cost.

4_ PRESERVING NATURE:
THE MOST PROFITABLE IDEA

Throughout history, architects have looked at nature from many different perspectives: as a source of food and materials, as an inspiration in terms of proportion and beauty, or as a model for complex structures and patterns, among others. The economical approach, however, gives us more arguments than others to preserve the biosphere. The biosphere contributes to the economy in four different ways: first, it provides goods and services; second, it has the (limited) capacity to assimilate waste; third, it provides utility to our welfare; and finally, it makes biodiversity possible.

In the article "The value of the world's ecosystem services and natural capital" Robert Costanza and other authors studied "the services of ecological systems and the natural capital stocks that produce them", which contribute to human welfare (directly and indirectly), representing part of the total economic value of the planet. This value amounts to 16 to 54 trillions of US Dollars (10^{12}) per year. The aim of the study made by Costanza and others is to quantify these ecosystem services in terms comparable with economic services and manufactured capital, so that we can be aware of their importance in all our decisions. The studied ecosystem services are: gas regulation, climate regulation, disturbance regulation, water regulation, water supply, erosion control, sediment retention, soil formation, nutrient cycling, waste treatment, pollination, biological control of population, *refugia*, food production, provision of raw materials, source of genetic resources and recreational and cultural activities. It is important to understand that natural assets cannot be valued on their own. It is only when humans interact with nature, taking advantage of its services to increase our own welfare, that a value can be established.

The economic way of looking at nature is stunningly revealing: nature must be preserved because it is the major contributor to the world's economy. Even the fiercest developer will have to surrender to this argument. Preserving the biosphere is no longer an idealistic "green" idea, it is the most profitable decision that we can make.

5_ EXTERNALITIES:

A GOOD REASON FOR IMPLEMENTING CLEAN ENERGY PRODUCTION SYSTEMS

The economic concept of "externality" is especially interesting for architects and urban planners because it deals with the direct and indirect implications of our decisions. James Buchanan, in his text "Externality", defines the concept as "the cost or benefit that affects a party who did not choose to incur that cost or benefit". Externalities have two characteristics: they have a *unilateral effect* (the affected party cannot decide whether or not it wants to be affected) and they imply *non-compensation* (the affected party is neither compensated for its loss of welfare, nor it is charged if its welfare is increased). Externalities can be positive or negative.

The concept of externalities is crucial when discussing the different power-generation technologies available nowadays. Each technology produces different amounts of polluting substances. These substances negatively affect parties that have nothing to do with the energy production process. This is a clear example of a negative externality.

Unfortunately, the most commonly used technologies for power generation are not the cleanest ones. The reason is very simple: cleaner technologies are, from a short-sighted point of view, more expensive. However, this reasoning does not take into account the cost of negative externalities generated by "dirty" energy production systems. The "impact pathway approach" is a bottom-up method designed to translate these negative externalities into monetary units. This approach examines seven steps, starting with the source of the emission and ending with its effects on people. The seven steps are: (1) transport and chemical conversion of the emission; (2) concentration and deposition; (3) response of receptors; (4) physical impact; (5) change in utility; (6) welfare losses; and (7) the cost. This cost (expressed in monetary units) should be incorporated in the calculation of the total cost of an energy generation system. By doing so, we would realize that, because of the cost of their externalities, "cheap" technologies turn out to be more expensive than we initially thought. This opens the door to using cleaner energy production systems, which, despite having higher initial costs, do not have a negative impact on the environment.

In the scale of a building, renewable energy technologies can be even financially profitable. Indeed, after some years, the savings in the energy bill will not only pay for the installation, but will also generate profits.

Again, the economic approach with the wider picture in mind, provides us with arguments to support cleaner technologies and more sustainable design solutions.

6_ INCENTIVES:

THE KEY TO UNDERSTAND AND MODIFY BEHAVIORS

When looking at the behavior of humanity in relation to environmental issues one might be tempted to think that we behave in an irrational way and that this must be the cause of all the ecological problems we face. However, human behavior is absolutely rational from an economic point of view. We follow a preference structure. We behave in a certain way because we have incentives to do so: we make those decisions that improve our welfare. There are three effects related to the human behavior that must be understood in order to design successful sustainable solutions: the scale effect, the rebound effect and the isolation paradox. The *scale effect* implies that any improvement in the energy consumption of a product will be neutralized if the number of people using it keeps increasing. The *rebound effect* means that any achievement in energy consumption creates incentives to increase the use of energy because its price decreases. The *isolation paradox* deals with the decisions we take on our own when we ignore everyone else's choice; in this situation we rationally know that our individual behavior (isolated decision) will make no difference in the world's scale. However, if everyone made the same decision - using the same rational deduction process - and that choice implied non sustainable behaviors, that would create a real problem worldwide. These three effects are a direct result of human nature and they clearly illustrate how rational behavior can lead to unsustainable patterns. Therefore, self-sufficient buildings can be easily inhabited by non sustainable people. From a design point of view, the key idea that can be extracted from these reflections is that sustainable design has to deal not only with the strictly technical issues of energy consumption and water management, but also with human behavior. It is extremely important that our designs affect people's behavior in order to make them more sustainable. However, as we have discussed, telling or showing the "sustainable way of behaving" is, by no means, enough. The right way of approaching this issue is by creating the right incentives in order to match the rational human

behavior in its search for welfare, on the one hand, with sustainable behaviors, on the other. This will open the door to new and creative design solutions.

7_ REGULATION:

WHEN PRIVATE INCENTIVES ARE IN CONFLICT WITH PUBLIC WELFARE

Incentives created through design decisions might not be enough in some cases. In these circumstances, legislation and other types of regulation should be used. A clear example is the behavior of a private factory: its incentives to keep growing stop when the marginal cost of its production (price of producing one extra unit) equals the marginal benefit (profit) of doing it. However, from a social point of view, this point differs from the optimal point. This difference is due to the negative environmental externalities caused by the pollution that the factory is producing. An optimal situation is such that the factory has incentives to grow until the point that the social benefit that is producing equals the social cost (externalities expressed in monetary units). The only way of achieving it is by a regulation that incorporates the social cost of the production of the factory into its cost/benefit analysis. A possible solution is imposing a fee depending on the amount of pollution that the factory is producing.

8_ COMPACT-CITY AND DENS-CITY

Creating sustainable buildings is a relatively simple task thanks to the big improvements in technology. We can perfectly imagine a new house, in the middle of the mountain, which is completely self sufficient thanks to new technologies. However, as we have discussed before, a sustainable building can be full of non-sustainable people. Indeed, the whole technological effort incorporated in the house can be banal if its inhabitants have to drive every day for many kilometers to go to work. A regular apartment in the city at a walking distance of the work place may be more sustainable than the high-tech house in the mountain.

It is important to highlight that transportation is a very important and worrying environmental issue: it represents two thirds of the energy consumption in the whole world, and a good alternative to contaminating oil based fuels has yet to be found. Therefore, minimizing the need for transportation (and commuting in big cities) is crucial.

In this line, compactness and density are two key concepts in urban planning. Concentration of buildings and services in compact and dens areas is a good way of reducing the use of vehicles. However, the benefits of compactness go beyond efficient mobility: it safes a lot of resources (energy and water) and it improves the access to services (like water services). The compact city is a model opposed to the urban sprawl, in which every house relies on the car as the only way of transport and all the services (water, electricity, gas, telephone, etc) have to reach every single building creating long and inefficient services lines. In some situations, an uncontrolled urban sprawl can even lead to a situation in which some buildings lack access to basic services.

Therefore, the traditional image of an isolated house surrounded by a garden (Ebenezer Howard's idea of the ideal city in his book "Garden cities of tomorrow") represents the opposite of a real sustainable model.

From an economic point of view, the concentration and agglomeration in the cities (with limits) has remarkable advantages reflected in the economies of scale and scope. They refer to the advantage of reducing the average cost of a product by incrementing the amount of production because the fixed costs are spread out over more output units. From an architectural point of view: building one isolated house is much more expensive than building several apartments at the same time.

In short, cities can be planned in a more clever way, taking density and compactness as the two main concepts to improve efficiency in energy and water management, reducing construction costs and minimizing the transportation needs.