An Inter-organizational View of Implementing Building Standards in Jamaica

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Inter-organizational issues can make a difference in the commercial building industry, where decisions are made by groups in a business setting. Consideration of these issues can make programs for implementing commercial building standards more effective. This paper describes part of a project implementing building energy standards in Jamaica, and presents concepts from the implementation literature that can help policy makers and program designers consider inter-organizational issues when they plan and evaluate programs about implementing commercial building standards. Analysis that includes concepts considered in this paper can improve the efficient allocation of scarce human and material resources by matching human resources to the situation at hand. Policy makers can try to ensure that programs that look great technically do not stumble on predictable inter-organizational hurdles, such as an over-emphasis on a hierarchical management plan when in fact the group at the top of the hierarchy does not control the other groups involved.

Introduction

Organizational and inter-organizational issues make a difference in the commercial building industry, where decisions are made by groups in a business setting. Consideration of these issues can make policies and programs more effective.

This paper describes part of a project implementing building energy standards in Jamaica, and presents concepts from the implementation and organizational literature that can help policy makers and program designers consider inter-organizational issues when they plan and evaluate programs about implementing commercial building standards, particularly in developing countries. This paper does not focus on the technical development of building standards, although some of the issues should apply to that process as well.

This paper presents an inter-organizational 'implementation structure' developed by Hjern and Porter (Hjern and Porter 1981) in the implementation literature as an alternative model for a program for building standards instead of the single organization hierarchical model that is common to many patterns in industrialized society. The 'implementation structure' model blends the hierarchical bureaucracy of the organization trying to manage the overall project, with the more independent market model for all the different groups working out the details.

I describe the portion of the Jamaican Energy Efficient Building Code (EEBC) project that focused on implementing the technical code. This project provides some successful examples of the different groups involved, the different routines they use to approach the work, and how the flexible nature of the 'implementation structure' is well suited for such a project.

Hypothesis and Methods

My hypothesis for this project was that organizational theory would be useful in analyzing why building energy standards for energy are as difficult to implement as they are. However, most of the organizational literature did not address the main characteristic of the commercial building industry - that many organizations interact in the process of creating a commercial building, from financial deals through design to construction. The process is inter-organizational.

My methods for investigating my hypothesis were library research, and acting as a participant observer, as an assistant in the EEBC project. Unfortunately, resources were not available for more detailed formal anthropological interviews or other on-site research.

Jamaican Project

The Jamaican project I was involved with focused on implementing an Energy Efficient Building Code (EEBC) for commercial buildings. This set of tasks included translating the technical standards from formulas to usable compliance procedures, creating and maintaining institutions, and educating the users of the code. These general

tasks were carried out specifically by preparing Compliance Guideline manuals and workshops to present those materials. Deringer and Gilling present a more complete description of the entire project (Deringer and Gilling 1992).

Introduction of Concepts

I present three concepts that are applicable to implementing building standards. The first is a description of basic organization types and their driving principles. One is the importance of routine in a complex setting even where actors do not have control over other participants. The last is the usefulness of the 'implementation structure' as an approach to implementing programs in such a setting.

Building a commercial building is a process that involves many different organizations. Some of the complexity is apparent once you list the major players involved. These include owner, occupant, developer, builder or general contractor, architect, engineer, and banks or other financial backers, plus governmental codes for fire, health etc. The general contractor then subcontracts to mechanical, electrical, drywall, and other subcontractors. And now, concerns for energy efficiency are added to the already complex array of decisions that building a building involves.

Organizational Basics

Westrum and Samaha provide a useful starting place for understanding interactions between organizations when they describe three basic types of organizations; private economic enterprises, public bureaucracies, and voluntary organizations.

Etzioni describes the different principles that drive action in these different types of organizations. He states that the principle in private economic organizations is utility, more commonly known as money. The principle operating in voluntary organization is shared values. In public organizations, both of these principles occur, with the additional principle of force, which is usually buffered by the legal system. These three principles are the most basic means of ensuring that members work toward the organization's goals.

The economic principle operating in the private sector is more easily quantified than the others, so it often takes precedence simply because it is easier to define. As people shift from one type of organization to another, they don't always remember that the principle driving the organization has changed. In addition, in many situations, but particularly in public organizations, all the principles are operating concurrently. Awareness of these different principles can be very helpful when analyzing or working with the interactions among different groups in Jamaica and elsewhere.

Each of the organizational types is present in the Jamaica project. The main actors, the architects and engineers, mostly function in economic organizations such as small private firms or companies, but they are held together loosely by shared values in their respective professional societies, The Jamaican Institute of Architects (JIA) and the Jamaican Institute of Engineers (JIE). These professional societies combine elements of voluntary organizations and of private trade association organizations. The Jamaican Bureau of Standards (JBS) actively represents the public sector.

Routines

People's actions occur within a context that is limited by humans' bounded rationality. Bounded rationality (first explicitly described by Simon) refers to the model of a person being rational within bounds that are defined by other criteria, which are not necessarily rational. The idea is that humans are not capable of rationally solving all the problems of the world at once, so they narrow the scope and then proceed rationally (Nelson and Winter 1982). Hierarchies or bureaucracies are effective because they economize on bounded rationality and thus allow groups of people to complete complex tasks (Nelson and Winter 1982). The key elements of these bureaucratic organizations are division of labor, and the establishment of hierarchies and routines to regularize the way the workers interact.

Routines, even without hierarchies, are important in complex arenas like commercial building, because they simplify decision making, and allow an actor to act more effectively without having to make a detailed analysis at each decision point. The specific tasks involved in building large commercial buildings strain the edges of bounded rationality even before adding the complex task of including energy efficiency in the process. The new ideas, tasks, and routines that are required to include energy efficiency into the process do not fit into the existing routine and so are often ignored even if they make sense economically.

Standards are a common policy solution and they have advantages in commercial buildings. Standards can address some of the barriers of complexity and inter-organizational confusion by providing an alternative routine. Building standards can be more effective in changing the behavior of participants in the commercial

building industry than utility incentives that change frequently. If there is no routine, there can be no economy of behavior.

The most important role for standards is that they can change the routine, the 'typical practice'. Minimum standards can prod the most energy inefficient practices out of use. This is important in the fragmented commercial building industry, where the low bid wins the job, where liability is based on 'typical practice', and where reliability is more important than economics. The other main role for standards is to provide the public good of information, which can allow some builders to take the next step and go beyond the standards.

Implementation Concepts

Cebon presents an example of how different organizations, with different patterns of routines, can affect the process of implementing the same energy conservation measures on schedules that varied by at least three years.(Cebon 1990) Cebon concluded that the organization filtered the set of feasible options to a much smaller subset. He identified one of the two critical variables that determined the filters as the power people had to induce action by others needed to carry out the energy conservation agenda. This problem of needing to rely on actors one does not control is at the heart of implementation difficulties.

Power is the response in a hierarchical situation, while other techniques such as negotiation, persuasion, adaptation, and compromise are more appropriate responses when you do not control the other actors. Thus models besides hierarchy are appropriate.

Implementation Structures. Hjern and Porter's description of an "implementation structure" provides a useful way to think about implementing building standards among many different groups. An essential aspect of the interactions that happen between many of these organizations is that no one organization has total control. This lack of control is what makes so much of the organizational literature hard to apply to the building standard problem. In contrast, an implementation structure is an administrative structure made up of parts of many organizations. This recognition reflects reality and can lead to more realistic and successful implementation practices than those based on conventional organization concepts. As Hjern and Porter state, 'The hierarchy model will usually lead to frustration as an operating framework for implementation'[1] because the assumption that the lead agency can control all the participating groups is false.

Conventional analysis of implementation is done from the perspective of mainstream organizational analysis which focuses on one organization. Hjern and Porter argue that this focus exaggerates difficulties encountered in implementation. The studies of implementation find that 'clusters of public and private actors are involved.' Hjern and Porter go on to say that actors involved in implementation structures may have to operate in private markets and in public hierarchical bureaucracies at the same time. They argue that few analytical frameworks of policy analysis can operate in both sectors. Hjern and Porter present the implementation structure as a basis for a theory that bridges the gap between the atomistic and adaptable theories from economics that are applicable to the market environment, and the comprehensive planning theories applicable to public administration and bureaucracies.

Some parts of an implementation structure work like markets to efficiently allocate the scarce resources of the program. Dispersed and diverse actors that have a closer view of different local situations can make these decisions more efficiently than a central planner. Some parts still do work like a bureaucracy: these parts include tasks like setting objectives, formulating plans, providing resources and services, and evaluating performance.

The American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) is a successful example of an implementation structure because it brings members together from many different organizations, and because it has its own administrative structure and rules. These internal structures focus the valuable skills of disparate members into an effective organization. An implementation structure like ASHRAE is a good model for other countries to use because it has been relatively successful in the US at maintaining an institutional framework for ongoing action on energy efficiency in buildings. The EEBC Committee in Jamaica follows a simplified version of ASHRAE's model.

Project Description

The Energy Efficient Building Code (EEBC) project has been supported by a major international development agency and by the Jamaican government. Earlier phases of the project sponsored energy consultant services for a new large building in Jamaica, the preparation of interim energy construction standards for buildings in Jamaica, and the preparation of a draft Energy Efficiency Building Code.

An important part of the most recent phase of the project was implementation of the standards, particularly to encourage the Jamaicans to work with and use these standards. The basic technical information has existed in earlier documents prepared by an international consultant for Jamaica (Dubin 1983, Jamaica Bureau of Standards 1988), and in the model US standard ASHRAE 90.1. Part of the recent project was further development of the code into a formal document, the EEBC (Jamaica Bureau of Standards 1990). However I concentrate on the portion of this phase that emphasized translating the code and earlier information into working materials and routines that people would use. Another longer term related goal was creating a Jamaican maintenance process for these standards.

I want to briefly point out some differences between the Jamaican program and others that the reader may be familiar with. The Jamaican project is different than the US process because of the condensed scale of the effort, because it takes place within a development framework, and because implementation was a major emphasis.

The Jamaican project started with the results of the efforts of the US and other countries. The process of adaptation and refinement was more telescoped than was the US process, both in time, and in the number of people involved. Tasks that were separate steps in the US process were combined in Jamaica. The island has a smaller society, so there is more overlap between standard setters and implementers. There are also fewer existing organized codes groups. More practically, there are fewer other resources in terms of technical experts for builders and designers to rely on. For example, the US model standard, ASHRAE 90.1, describes lighting energy requirements, but stresses that these are energy requirements, not lighting design guidelines. There is an implicit assumption that one should go hire a lighting designer to do the lighting design. However, in Jamaica, there aren't any lighting design consultants; engineers do the lighting design. This situation led to recommended lighting levels being included in the EEBC. Another example of telescoped tasks is that the process is trying to educate and create the actors and procedures for future code maintenance at the same time. These telescoped tasks may be common in smaller and less developed countries, where there are fewer professionals.

The climate in Jamaica is hot and humid. Trade winds keep most of the island pleasant for much of the time; especially the northern coast that boasts such tourist meccas as Montego Bay. Unfortunately the major city of Kingston is in the wind shadow of the 7,000 feet Blue Mountains, the island's highest. Thus the largest concentration of commercial buildings is in the hottest part of the island. In Jamaica, energy in commercial buildings is used for cooling, lighting, power, service hot water, and a small amount of heating in the higher mountain elevations. Electricity, generated primarily from imported oil, is the major source of energy supplied to buildings in Jamaica. Reductions in electric energy use in buildings can be very cost effective to society because of the reduction in imported oil.

I focus on the implementation of three of the technical areas of the standards, the building envelope, lighting, and air conditioning. Approximately 15 people and 3 major organizations were actively involved in these three technical areas of energy standards work in Jamaica. The major organizations are the Government and two professional societies; one for the architects, the Jamaican Institute of Architects (JIA), and one for the engineers, the Jamaican Institute of Engineers (JIE). Each person has at least two organizational affiliations. The architects and engineers function primarily in economic organizations such as small private firms or companies, but they are held together loosely by shared values in their respective professional societies. These professional societies combine elements of voluntary organizations and of private trade association organizations. The main public sector group directly involved in the effort is the Jamaican Bureau of Standards. The active members of the government group are engineers and belong to the engineers' professional society. Members of these separate groups interact in the Energy Efficient Building Code (EEBC) Committee, which has a mandate to review and implement the standards. The existence of another group, the quantity surveyors, has confounded the project somewhat by making cost information very difficult to gather.

I concentrate on two of several implementation tasks: the actions of each group of Jamaicans in preparing a Compliance Guidelines manual for the technical standards, and workshop sessions devoted to explaining the standards. There were three workshops in Kingston that were addressed to architects and engineers. The international consultant presented the first workshop and provided a first draft of the Compliance Guidelines manual. The Jamaicans then took over the major tasks. They were the major presenters at the second and third workshops. The Jamaicans who gave the substantive presentations of the workshops were also responsible for the revised drafts of the applicable section of the Compliance Guidelines manual. A practical advantage of this arrangement was that the presentation provided a goal for the presenter to prepare sections of the revised draft Compliance Guidelines manual. The workshop presentation then provided an opportunity to get feedback on those documents. The international consultant provided considerable 'behind the scenes' preparation assistance to

each of the Jamaican presenters and drafters. This assistance was an important part of the detailed tech transfer that provided the skill level in Jamaica that will ensure that the standards can be used and maintained.

The behind the scenes aspect is important as it encourages direct skill transfer in a non-public working situation. It required that the Jamaicans dig in and work with the standards instead of merely listening to them in workshops, and it leaves the Jamaicans as the visible implementers of the new standards.

During my brief visit to Jamaica in February 1991, as an assistant to the international consultant team, I saw a clear demonstration of the potential success of the implementation program. By engaging the Jamaicans in direct participation in the workshops that explain the EEBC, as the Energy Efficient Building Code is known, their interest, understanding and commitment to using it increased significantly. The Jamaicans who are responsible for the revised drafts of the Compliance Guidelines (which explains the code) gave the substantive presentations of the workshop. These Jamaican presentations allowed two things to happen. First the Jamaican presenter filtered the original presentation from the international consultant to fit those areas that had been less than clear to his or her own perception. Presuming that the Jamaican is at least more typical of the Jamaican professional than the international consultant is, the presentation is more immediate, and practical for the listeners. Second, it allowed the workshop takers to ask questions more easily, without concern for offending the "international consultant". In addition, the presenter could answer questions in terms of the local practice and experience.

By involving the Jamaicans as drafters of the Compliance Guidelines and workshop presenters the project practiced 'building institutional capacity through action' as recommended by Korten (Korten 1980). This learning by doing is a common concept, but Korten shows that it is routinely ignored in favor of centrally controlled blueprint plans for development.

The second method of engaging the workshop participants in direct participation was the use of simple spreadsheet models to perform the calculations required for the system performance aspects of the code compliance. This allowed the participants to promptly apply what they had heard, in a group effort (to minimize embarrassment), to try the different options out, (without having to go through tedious calculations) and then to present the results of their solutions to the various problems that had been posed in the workshop session (to meet code, to maximize energy savings, to effect the most practical solution). The presentations of results by the participants after the spreadsheet exercise were the idea of one of the Jamaican presenters.

This particular example of Jamaican involvement is one of the successes of the effort of this project to involve the Jamaicans substantively. This public commitment to these standards has another effect. The focus of the implementation effort in Jamaica is different from the US where implementation at the professional level is more oriented towards simply educating professionals to use existing code. One of the goals of the Jamaican project is to encourage the Jamaican professionals to take on the maintenance of the standards in the future. The Jamaican presence makes it possible for the listeners at the workshop to identify the standards with Jamaicans, not with international consultants. The presenters become more committed to the standards as well.

Implementer's Experiences

Building Envelope. The Jamaican involved most directly with implementing the building envelope section is an architect. She has status because she is a past president of the Jamaican Institute of Architects. She chose to focus on the parts of the earlier international consultant's presentation that had not been clear to her. Her presentation took an existing building that all of the participants in the workshop were familiar with, and worked through the details of gathering the information needed to feed into the spreadsheet calculation of the OTTV.

She did this by 'taking off' the needed measurements and specifications of materials, building facade by building facade. She related the specific information that architects work with every day to the unfamiliar formulas in the code and spreadsheet. Thus she started with the drawings and material specifications that the architects were familiar with, and then moved on to translating this information into the format the architects would need to comply with the code. Thus she took an architectural routine and adapted it to the routine of the code, which is largely dominated by the routines of engineers.

In general architects do not respond well to, or immediately understand, the formulas and tables that engineers like to use. Unfortunately, these formulas are the bases of many codes. To some extent architects want graphic representation of information, since drawings are their day-to-day working medium of exchange. Architects are trained to be creative and not to worry about technical details. Since many of the elements of the code are quite technical in nature, this predisposition of architects can

create difficulties. Since many design decisions, such as building orientation, that have a major effect on energy use are made early in the process, before engineers are often involved, it is important to adapt the compliance materials the architects work with to the architects' routines. The Jamaican architect did this.

Lighting. In Jamaica, lighting is generally designed by engineers, as one of several services they do - there are no specific lighting designers. The engineer responsible for this section put together a very practical worksheet (that was translated to a computer spread sheet) that details the steps needed to reach compliance with the code. This worksheet ties in the light levels required as measured in footcandles to the energy allowed as measured in watts per square foot.

Lighting controls are an important part of the code. The code allows credits that allow a higher level of watts per square foot installed, if controls are used to minimize the use of those installed watts. However, the Jamaican lighting implementor down-played the controls section due to his skepticism about whether they would work. This skepticism indicates that some demonstrations of this technology would be useful.

Ventilating and Air Conditioning. The air conditioning section was worked on by two engineers. The main emphasis of the section, and of the engineer's role in determining the requirements for the air conditioning equipment, is a procedure known as load calculations. This involves calculating the load on the air conditioning equipment from outside conditions as tempered by the building (external load factors) and from people, lights, and equipment inside the building (internal load factors). This calculation is usually done using tables of information and standardized worksheets (of varying complexity) and handbooks. The other key elements of the air conditioning standards concern control strategies and equipment efficiencies.

Engineers use equations, standard worksheets and tables. The workshop presentation emphasized these calculation-oriented tools, and the question session reinforced the value of the Jamaican presenters. Again, the presenters could answer questions in the context of the local experience and practice.

Quantity Surveyors. Although not directly involved in the presentations or the Compliance Guidelines manual, the group of the building industry known as quantity surveyors caused some confusion in the process of the standards implementation. One of the necessary pieces of information in determining which energy efficient measures are most practical is how much the measure costs. Much of the program was based, at least implicitly, on a model of the US building industry. In the British building system, which operates in Jamaica, the group known as quantity surveyors are responsible for surveying the quantities of materials needed for a project and estimating costs from those quantities. Because the quantity surveyors have the practicing knowledge of cost information, and because they usually present the information in a overall format such as: structural steel: $X, with no breakdown, estimating the incremental cost of a change in material for energy efficiency reasons is not straightforward. This made the initial efforts to define cost very difficult. A member of the quantity surveyors group was belatedly included in the team working on the economic analysis portion of the project, but the information provided even then was in a format that was hard for the cost estimators to work with. This complication is an example of the unexpected complexities that are typical of an implementation process. This example also shows the advantage of a flexible implementation approach, that could respond to a difficult situation be adapting to meet the original goal.

Discussion

The Jamaican project has been relatively successful in applying the concepts presented earlier. The diverse members of the EEBC committee follow the successful model of ASHRAE and provide a simplified implementation structure as described by Hjern and Porter. The informal and collegial structure of the professional groups in Jamaica also helps to cut across the lines of public and private organizations and to improve the chances for success of the EEBC Committee's work. This is a step toward heading off the inter-organizational obstacles that plague building standard projects. The workshops have given the Jamaicans an opportunity to build institutional capacity through action as Korten recommends.

The Jamaican EEBC Committee is a simpler version of ASHRAE. The EEBC also has members from several different groups so it has the characteristic of cutting across several organizational groups. It is not clear from my experience whether it has solved the common but difficult problem of such a diverse group having a procedure for coming to closure on decisions. How critical is formal closure compared to the consensus model of talking long enough that everyone's view gets partly incorporated? It probably depends on the project. The international development agency probably wants closure, while long term changes may benefit from incorporation of views and thus commitment from many players. In some regions the need for methods of closure may depend

on the growth rate of the economy. If new buildings are going up fast enough to be putting pressure on the utility grid, a program probably needs procedures to reach closure and make a schedule, otherwise, a more inclusive process may be more successful in the long run.

The Jamaican government plays a role as a sub-implementation structure at its level. The Jamaican Bureau of Standards (JBS) provides funds and legitimacy, while the more flexible EEBC committee members lend the project practical expertise and a private sector interest in action. The legitimizing effect of government backing, while the professional committee members do the supporting work, lends power to both parties.

Conclusion

The professionals in Jamaica come from many different groups, and any plan of action that relies on the tools of hierarchical control are not likely to be successful, since none of the professionals have any long term hierarchical relation to the international development agency. In contrast, a plan like that used in Jamaica, that retains the strengths of a bureaucracy for planning, providing resources such as funding and the technical advice from international consultants, yet allows flexibility to the actors in the country to adapt draft materials and resources to their needs has two chances for success. First, the allowance for adaptability means that the project can move forward without waiting for central office approval for each step, and provides the Jamaicans with a sense of responsibility for the project. Second, the experience of working through the details of the standards in Compliance manuals and workshop presentations provides the experience and capability to carry out that responsibility. Thus the project is a successful example of the implementation structure described by Hjern and Porter.

Policy makers may find it useful to consider these implementation concepts in addition to economics and technical issues in considering standards for energy efficiency for commercial buildings. Public policy analysis that includes the inter-organizational aspects considered in this paper can improve the efficient allocation of scarce human and material resources by matching human resources to the situation at hand. Public Policy action can (and has) led to pressure to look for innovative programs to achieve energy efficiency in the commercial building industry. Public policy makers have an even more important role in influencing the debate and decisions that go into selecting the most successful programs as models to replicate, so that those programs will result in new routines that will really work, both technically and socially. Policy makers can try to ensure that the selection process is conducted with attention to inter-organizational criteria, so that programs that look great technically do not stumble on predictable inter-organizational hurdles, such as an over-emphasis on a hierarchical management plan when in fact the players at the top of the hierarchy do not control the other groups involved.

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Endnotes

1. Hjern and Porter, p.218

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