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HDN DISCUSSION PAPER SERIES

PHDR ISSUE 2012/2013 NO. 6

Human Development Network

HDN Discussion Papers are commissioned by HDN for the purpose of producing the Philippine Human Development Reports. This research is funded by the United Nations Development Programme (UNDP). Papers under the Discussion Paper Series are unedited and unreviewed.

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1. Introduction

Existing externalities related fundamentally to geography – such as deforestation, climate change, natural disasters, and food insecurity –have a great impact on communities across the country. Communities especially in geographically vulnerable areas face immense, interrelated challenges that will alter their ways of life at the most basic level. The devastating floods in recent years in the country, including other natural disasters such as the landslides and earthquakes, and their impact on the environment signify the larger-scale emergencies and transformation to come.

In the education sector, the phenomenon of climate change calls for a redesign and building of the school of a post-carbon society, with sustainable construction systems and educational tools that will enable the country to minimize or even reduce dependency on external aid. New technologies for construction, cost-effective school models, that will distill lessons learned and best practices from the field, will be necessary.

However, a persistent problem of the Department of Education (DepEd) is the shortage of classrooms. Although the country began a classroom-building program in 2006, classroom shortage remains at over 152,000 on a single shift to meet the 1:45 ideal classroom-students ratio (DepEd, 2011). The department has to build new classrooms each year to keep up with increasing student population and replace aging school buildings and those that were destroyed by calamities. Furthermore, given the low budget for education compared with other countries, amounting to $138 per student, the ability of the government to address this problem remains in question.

This problem is somewhat mitigated by their policies to increase the classroom size to 50 students and to engage in double shift classes. In addition, the expansion of educational subcontracting program or providing high school students scholarships or financial assistance to study in private schools were implemented. With these measures, the classroom gap was effectively closed in 2007. While the national ratios may appear sound, however, the data when scrutinized and analyzed at the division/province level still showed serious gaps, such as certain classrooms being used by more than 100 children, a two-seater desk shared by three to four children, and a teachers holding a class of 100 or more pupils.

Because geographic consideration is seen as a hindrance to the more immediate provision of classrooms, the former is often ignored in the decision to build schools. This is further aggravated by the internal organization of government. Unlike the private sector, the government is characterized by a common agency which refers to the existence of multiple principals (government sectors and departments), all of whom have some powers that influence the behavior of the agent (the contractor or builder). The interests in the output of the agent are at least partly in conflict, and the agent's actions taken on behalf of all concerned principals become substitutable. The question of agency can be quite clearly seen by considering the government bureaucracy. Bureaucratic agencies are chosen by the key sectors or branches of government, and one expects that the agent will be responsible to a government sector. However, the lines of authority are often blurred. Each branch of government yields some power over different agents, but others may have some influence on the other preeminent groups in society such as the executive, judiciary, the interest groups and the media. Hence, although there may be multiple principals involved, the agent can be held captive by a single important principal, and its behavior would tend to favor this principal over the others to maximize its share of the net benefits. In effect, certain tasks which are particularly difficult to satisfy—such as the construction of geographical safe schools—will not be satisfied.

Under the Coase theorem, if all participants in a transaction are brought together, if initial ownership rights to all economically viable entities were assigned among these participants, and if they could costlessly satisfy fully specified and fully binding agreements, the outcome will be economically efficient, only leaving the distribution of gains to be determined by bargaining strengths of its participants. Unfortunately, transaction costs or elements that impede the specification, monitoring and enforcement of an economic transaction exist. Williamson (1989) summarized a number of transaction costs in the context of industrial organization, and such costs may exist as well in political processes and state operations, even with greater intensity.

This paper argues that the reason for the presence of geographically unsafe classrooms can be attributed to these transaction costs, and the solution rests on minimizing such costs. There are two interrelated ways of reducing transaction costs. One view is to limit these costs by relieving forms of technological constraint. If technology can be modified in order to improve monitoring and enforcement of contracts, then greater efficiency can be achieved. Part of the problem is a lack of commitment on the part of the government to adopt new classroom construction technologies that will guarantee protection from calamities. Another view is to establish institutions that can extract the best efforts from the agent. Legal measures or regulations that will restrict certain principals from reducing efforts to satisfy all objectives, and contractual provisions that will turn seemingly substitutable concerns complementary are possible ways of reducing transaction costs, even without improvements in technology.

The paper is organized as follows: Section 2 discusses the key elements of transaction costs politics that will be used to analyze the policies regarding school buildings. Section 3 then examines DepEd policies on school building construction in light of this transaction costs framework. Section 4 provides two case studies in order to highlight two types of transaction costs: the lack of commitment and the weak intersectoral coordination. These are two main concerns which seem to have a bearing on the issue of geography and classrooms. Section 5 offers policy directions and makes concluding remarks.

2. Conceptual Framework: Transaction Costs Politics

This section draws heavily the common agency model discussed in Tirole (1994), Dixit (1996), and Sinclair-Desgagne (2001). This literature posits two types of inefficiencies arising from the internal organization of government. First, as shown by Dixit (1996), competing principals with different objectives might counter each others' incentive scheme by encouraging effort only on those particular tasks that matter to oneself while insuring the risk averse agent against underperforming on the remaining tasks. Second, even if the principals did cooperate, the agent's job would typically consist in a collection of heterogenous tasks, some of which being more difficult to monitor than others. In this context previous work by Williamson (1985), Holmström and Milgrom (1991), Baker (2001), and others indicate that strong output-based incentives would lead the agent to neglect all the tasks but those which look relatively easier to observe. Principals then who more at stake in the arrangement would then try to bring the agent to their side. In effect, the agent's action is captive to some principal but at a cost to the other agents.

A. Principal-Agent Issues

To explain why schools may be located in geographically unsafe and vulnerable areas, two conditions would be necessary. The first is that the effort placed by the construction company, the agent, assigned to build the school cannot be directly monitored. As long as the classroom is structurally sound, the geographical location of the building may conceivably not pose as a problem. If the proper specifications and elements required for a building that can withstand disasters can be adequately provided, then schools can reasonably be constructed in an area that is exposed to a disaster. Through various techniques, such as retrofitting in earthquake areas, the vulnerabilities arising from geography can be remedied.

However, informational constraints, one of the basic assumptions of transactions costs, are naturally found in these activities. This is particularly so in the case of buildings where structural quality- as opposed to the observed construction of the building- can only be determined when a disaster has occurred. The absence of a clear yardstick to measure flood and disaster resistance is enough to minimize incentives. Moreover, once the agent assumes a monopoly position in their activity it will be hard to assess its work. In this case, only the contractor has the information to determine which buildings are structurally sound or not.

North (1990) focused on this particular facet of transaction costs. Referring to this as a failure of "instrumental rationality", he noted the inadequacy of informational feedback, making it difficult for the participants to convey the correct theory or perception on how the geography can be considered in the undertaking. However, beyond this veil of ignorance, there are information problems because of the game-theoretic issues of information and time-inconsistency of actions which affect the individuals' decisions and in turn the outcome of the process and the information it generates. The misinformation arises because of the seeming conflict between the strategic interaction between such individuals and the desired outcomes.

Specifically, the multiplicity of objectives in the building of these structures raises the issue of imposing weights. The private contractor for instance can be instructed by the DepEd to insure that the schools are geographically safe at a reasonable cost. Suppose now that the standards for safe schools are clear (see World Bank, INEE, 2009). Yet, the establishment of a formal incentive to complete these two goals requires placing weights on these two objectives of geographical soundness and cost effectiveness. This then begs the question on what is reasonable or not. The cost of safe schools depends on the available technologies as well as the shadow costs of atmospheric conditions vis-a-vis the possibility of injuries and deaths. The very conditions that are supposed to ground the formal incentive scheme is often hard to incorporate in these arrangements.

Another complication related to the monitoring costs is the presence of heterogeneous tastes on the part of the numerous principals whom the agent is supposed to follow. Unlike a private corporation where heterogeneous preferences of claim holders are well-defined and can be objectively identified, the goals of a public agency are conditioned by a political process. In particular, the goals of local government units in constructing classrooms vary over time, especially given a change in the controlling administration. This possible time inconsistency in the agent's objective functions suggests that commitment possibilities in the long run are more limited in politics than in the private sector.

Related to this issue is the problem of dispersed ownership. While private corporations engender productivity through its owners, such the board of the directors and large stockholders, the political parties, especially those opposed to the current administration, and other interest groups often form incentives that are not perfectly aligned with the interests of their constituents. Administrations can pursue and implement takeovers and personnel reshuffling in order to promote personal interests, rather than as a proactive way to improve management. This problem further makes it difficult to determine higher standards for efficiency and improved production.

The presence of all these factors makes it difficult to observe and pursue the quality of any project, much less remain committed to the goal at hand. Apart from the issue of measurement (information rationality and multiplicity of objectives), there is also the issue of governance structures (as reflected in heterogeneous tastes and dispersed ownership) which create hindrances to the proper monitoring and evaluation of a given structure.

The <u>second</u> key factor resulting to the unsafe structures is the lack of incentives to pursue and achieve the goals set by the principals. While the difficulty of monitoring itself is a necessary condition for low powered incentives, this is not sufficient if institutional arrangements restrict the agent's behavior, and hence detect whether or not the tasks established by the principals are performed. For instance, because one principal must make an irreversible and often expensive investment in specific assets, as in the construction of safe classrooms, opportunism -in the form of weak and unsafe structures- can emerge. Once the initial phases of investment are completed, the investor or the principal becomes vulnerable to the agent who will behave differently from the contract in order to obtain a greater share of the profit. Because of asset specificity, the agent knows that it possesses certain monopoly powers in the transaction. Nevertheless, unless this problem is identified, severe under investment occurs because the principal contemplating its investment decision will look ahead and recognize that its return on investment will be expropriated by the agent. As a solution, realizing that both of them can stand to lose by letting the problem be unresolved, both parties can create new provisions in the contract that will consider the interests of each party. It may be possible to arrange a balancing specific investment by the agent that places the two at each other's mercy and therefore result in both to behave well. This can take the form of fines and compensation ex post.

However, there are three reasons why such provisions may not exist. First, there may be a tension between measurable and non-measurable objectives. In particular, the need to complete more classrooms at the quickest possible time, especially around the period of school openings, conflicts with the demand for better structured classrooms that can only be built at a higher cost and a longer period of time. Laffont and Tirole (1991) argue that if agents are encouraged to provide only the measurable and inexpensive objectives, this creates an inefficient environment since the mere supply of the quantity becomes the measure of quality in itself. Those agents who can supply the non-measurable objectives can only be competitive if its reputation is well established. This means that incentives on certain objectives must be carefully weighed in terms of complementary and substitution effects with the other objectives (Holmstrom and Milgrom, 1991).

Second, perhaps the main drive for civil servants and politicians is career concerns. Apart from the monetary reward, their reputation or image in view of future promotions, job prospects in the private and public sectors, and reelections are reasons for generating good performance. However, this concern induces them to 'mislead' the internal organization about their ability. An aspect of career concerns that has seemingly gone unnoticed is the scope for multiple interpretations of performance resulting perhaps to multiple equilibria. In the case of safe classrooms, the problem is that if a disaster occurs it is not clear whether this is due to the calamity or to poor performance or effort on the part of the contractor. Hence, a classroom agent/contractor whose talent is assessed on whether his structures are started and are kept going has little incentive to pay attention to geographic conditions and would focus on getting the programs done; and conversely the superiors and the labor market won't pay much attention to his performance in ensuring the protection of these classrooms .

Third, the need for provisions in contracts and the likelihood of multiple equilibria lead to the question of commitments. Some factors may help ensure that commitments will be followed. First, following Schelling (1960), one may posit that some apparently irrelevant factors can help select a 'focal' equilibrium. In our context, the setting of a DepEd order or even memo may create a common understanding between the sender and receiver of the performance signals. Wilson (1989) finds that clearly defined goals, such as "pay benefits on time and accurately" for compliance of goals and the associated client-serving ethic, work well. In contrast, multiple goals highlight the issue of what weights should be put by the manager on the different goals, and therefore lead to a possible multiplicity of interpretations. Second, a commitment forcefully articulated by a strong leader may be more likely to be adopted. A third factor facilitating the accomplishment of a mission is its alignment with professional norms. The DPWH will emphasize legal or economic aspects of a case in a way that is different from the DepEd or the DENR. This may be because DepEd wants to signal its concern for children's welfare while DENR are keen on proving their talents as geographers to fellow geographers or environmentalists in academia and consulting firms. Yet another factor influencing the success of a commitment is immediate self-interest. If "constructing safe classrooms at the lowest cost" gives rise to immediate rewards such as lack of budget allocation hassle, the mandate is more likely to be followed. The problem though with this solution is that such incentives may lead to greater social costs.

In effect, small formal incentives added to career concerns may help tilt the balance towards one acceptable equilibrium. Unfortunately, career concerns must swamp short term incentives to escape the commitments. As Wilson (1989, p. 38) notes, the focus of a correctional officer's energy is not his commitment, be it rehabilitation or deterrence, but the control of inmates. His main argument is that commitment carries a cost, specifically the sacrifice of flexibility. It is possible to link a commitment to a contingent rule, which will specify the precise actions to be taken in future eventuality, but this is too often too complex to implement. Further, not all conceivable eventuality may be foreseen a leaving some generalized discretion to respond to a genuinely new or unforeseen circumstance. Such "force majeure" provisions can thus constitute loopholes that can be used to escape from commitments and hence undermine the credibility that one seeks.

B. Common Agency

The analysis so far deals with principal-agent problems that result from the non-observability of effort. Indeed, these problems assume a much greater degree of intensity in the public sector than in the private sector. Beyond these problems however lie the issue of government bureaucracies and the presence of multiple participants that engage in common agency (Wilson, 1989). Much of the tasks done in government such as school building involve more than one principal. In this case, each principal is assumed to influence the actions of the building contractor (agent), but their interests of the other principals in the output of the agent are in conflict. Because the agent's actions taken on behalf of each of the principals are seen to be substitutable, the power of incentives in the equilibrium among several principals is weakened, often dramatically.

There are several reasons why the collusion of two or more principals may be infeasible. For one, the parties may not have the same information, causing adverse selection issues in the choice of who to partner with. Also, the multiple principals may not agree on the split of the total gain from cooperation, or may be unable to transfer internally the gains agreed upon in the split. The latter would be prevalent in politics where the benefits of the principals are often non-monetary and are measured in non-computable, nontransferable units, even as the monetary benefits are often seen to be illegal.

Dixit (1996) formulated a simple model of common agency with moral hazard to show that the multiplicity of conflicting principals can be a reason for low-powered incentive schemes.[1] Assuming that the amount of effort (a disutility) that the agency places on the job is unobservable, even if the outcomes are commonly observable to everyone, the amount of effort

[1] Williamson (1985) makes a distinction between high-powered and low-powered incentives. High-powered incentives are those provided by market transactions in which efficiency gains from a particular transaction flow directly from a particular transaction flow directly to the parties transaction. On the other hand, incentives are low-powered if individuals are not able to lay claim to gains from trade.

that the contractor will exert for one principal is expected to be low once greater level of effort is provided to the other principal. This means that one principal can offer an investment scheme that may enhance the agent's effort to the outcome desired by this principal, but is negatively related to the outcomes favored by the other principals. Wishing to obtain positive net benefits of his own, a specific principal can offer a high-powered scheme to the agent, i.e., one that provides larger marginal reward for producing a given output. The agent responds by giving more effort to this principal at the expense of lower efforts for other principals. In some cases, the agent may be penalized for neglecting the other outputs, but then money as a way of compensation can simply be transferred from the favored principal to the other principals through the agent. The leakage of one principal's money to the other is less than one for one, so each principal will find it necessary to offer greater incentives to the agent in a bid to control the behavior of the agent. This results in a Nash equilibrium of the game of strategy where the incentives offered to the agent is quite low for outputs not supported by well endowed and better positioned principals.

3. Geography and Philippine School Building Construction Policies

Under RA 7780 (Fair and Equitable Access to Education Act, also known as the Roxas Law), the allocation of the budget for the regular school building program takes on the following process. The congress in agreement with the Department of Budget (DBM) first sets the budgetary ceiling for school building projects. The DBM then advises DepEd and DPWH Central offices of the approval of the Annual School Building Program. The DepEd central office next issues a department order to all regional directors and schools division superintendents containing the guidelines in preparation for the priority lists of recipient schools based on the prepared allocation per legislative district. The DepEd regional office advises division offices to prepare priority lists using the department order.

From here, the DepEd Division Office Ad Hoc Physical Facilities Unit usually headed by the Physical Facilities Coordinators (PFC) prepares the final priority list in coordination with the planning unit. The PFC seeks agreement of Congressional Representative concerned prepared list. The division office then submit lists to the DepEd Central Office and Physical Facilities & School Engineering Division (PFSED), copy furnished the Regional office. DepEd-PFSED then consolidates and submits division list to DBM through DPWH Central Office in the case of the Regular School building Program (RSBP). The DBM evaluates list and issues Special Allotment Order (SARO) and the corresponding Notice of Cash Allocation (NCA) of the approved projects. Finally, DPWH and DepEd implement project listings in the Annual School Building Program (SBP), with classrooms bided to contractors by the DPWH.

In effect, under the program, the DPWH (through contractual/outsourcing work), in coordination with the respective local government units and non-government organizations, will construct school facilities, primarily classrooms, following the various prescribed DepEd designs.

The DPWH has 25 designs to choose from. Nonetheless, the standard DepEd design is a 7m x 7m classroom for rural areas with a classroom-student ratio of 1:45, or a 7m x 9m classroom for suburban areas. The 7m x 9m classroom is also the standard size for all public secondary school, regardless of location and class size. Meanwhile, a multi-storey building with 7m x 9m classrooms is prescribed in highly urbanized areas such as the National Capital Region. Classrooms must also have cemented floors, painted or at least finished walls, roofing and weather protection, a complete set of windows, two entrances with doors, a cathedral-type ceiling, complete electrical wiring and fixtures, and a blackboard. Under the structural component, the repair and new construction of schools also incorporates hazard-resistant feature especially against typhoons. The new construction works will build both standard classroom design as well as new school building meant for schools designated as evacuation centers and which will have flexible facets to accommodate large number of people (e.g. accordion-type partition walls, beams or hooks for hanging hammocks, improve/additional sanitation facilities-toilets, bath/washing areas, water points, cooking and waste disposal areas

Three points are important to note concerning the SBP. First, apart from this regular program, the DepEd can actually generate other funds for school construction both from the public and private sectors. RA 7780 mandates that the construction of school buildings under the SBP should be administered by DPWH, based on the work program of the DepEd. Nevertheless, under this program, the DPWH can only program and construct a "complete" school, excluding technically multi-storey buildings which can be programmed by phase[2]. In the SBP, an allocation (amounting to a range from P1 to P2 billion) is given to DPWH annually to contract school buildings. For the other school projects, however the DepEd can generate additional funds with the concurrence of the DBM. This means that both DepEd and DPWH can independently program their separate school building projects and call for bids from different contractors.

There had been speculation that DPWH-led schools cost more than the DepEd schools, resulting to a greater budget given to the DepEd schools not under the regular SBP. In order to reduce the classroom building shortage this year, 2011, a total of P11.29 billion was allotted by DBM to the DepEd as "lump-sum fund for the requirements of basic education" under the DepEd Basic Educational Facilities Fund (BEFF) and subject to the rules and regulations of RA 9184 (Government Procurement Reform Act). Of these amount P7 billion would be used for building and repairing some 9,000 new and existing classrooms.

Another policy outside of the regular SBP is the very recent national and local government counter parting program for classroom construction. As stated in DepEd Memo No. 50, series of 2011, the program institutionalizes an arrangement where the DepEd and the local government units (LGUs) can share the cost of classroom construction on a 50-50 basis. Under this scheme, the initial 50 percent of the building cost will come from participating LGUs with priority given to areas having acute shortage. The release of DepEd's 50 percent counterpart fund will be made upon receipt of certification from LGUs that their 50 percent share had been fully spent. With these new partnerships, the department has generated P429.88 billion worth of classroom building projects.[3]

[2] The features of a complete school are: cemented floor, smooth finished walls, painted walls, ceiling and roofing full cathedral-type ceiling , complete set of windows, two entrances with doors, complete electrical wires and fixtures, roofing or weather protection and blackboards.

[3] These are mostly coming from well-off LGUs. Under the TEEP project where LGUs were originally asked to shoulder 25% of the cost with the project as partner, there were fewer than the expected number of takers. It was only when the LGU share was reduced to 10% that LGUs engaged in classroom construction

Second, because the budget allocation is catered to the local community conditions, the act makes the construction of the school buildings more susceptible to the manipulation of the local officials. It seems that part of the history of this law is to appease local governments whose main function is supposedly to offer affordable education to its constituents. As it will be discussed later, this is in contrast to the less political Principal-led school building program policy introduced recently in DepEd-led schools where school principals or school heads take charge of the implementation management of the repair and or construction and assisted by a DepED Project Engineer. The possible intervention of political local officials in financial decisions can also increase the costs of school construction since, according to the law, ten percent of the budget is distributed based on the discretion of the DepEd and local officials of the areas chosen based on the other criteria are expected to have a greater weight in the allocation of these funds.

In a bill introduced by Senator Mar Roxas in 2007 to amend RA 7880, it was noted that: "From the years 2000 to 2004, only 21,523 were completed out of only 28,412 classrooms programmed for construction pursuant to the school building program under R.A. No. 7880. According to a comparative cost estimate, DPWH's construction cost of a classroom is higher compared to DepEd's primarily due to DPWH's high indirect cost. By itself, DepEd has the capability to undertake school building projects. In a joint monitoring of school building projects conducted by the World Bank, DepEd, DPWH, and G-Watch, it was found out that DepEd-led school building programs yielded better results than those administered by DPWH." Recent Senate Hearings also pointed out that the average cost of DPWH school-buildings is averaged at P650,000 which is substantially higher than the cost of DepEd School Buildings.

The Government Watch (or G-Watch) of the Ateneo School of Government, using its school building monitoring project in 2001, also indicated that more than 50% of DPWH-implemented school building projects were not in good quality because plans and specifications were not followed. There were no means to confirm reports submitted to the national office, making the system prone to ghost projects and contractors using second-rate materials, especially if these projects are done in farflung areas (Mandac, 2008). It is possible that schools constructed by the DPWH may be cheaper in some areas, but this may only be because of poor quality.

Third, the DepEd is allocating SBP funds in accordance with the provisions of RA 7880 which requires that 50% of the fund be allocated to all legislative districts based on the student population in relation to the total student population of the country. Forty percent of the allocation is to be given to legislative districts that have experienced shortages, and 10 percent will be left to the discretion of the DepEd. Several issues can be raised concerning this particular policy. First, the assumption is that classrooms are not adequately served to communities with high population. This is, however, no longer applicable under existing conditions where a number of schools have already adequate or more than enough classrooms in urban communities. Compliance with this provision then resulted in the allocation of classrooms even to schools without shortage or need for the same. Second, the emphasis on population and shortages puts a premium on urban areas, presumably areas where the returns to schooling are high and making it difficult to construct schools in remote areas where people may have emigrated. This may result in an urban-biased pattern of school buildings, contrary to the general goal of the policy which is to give fair and equitable access to education to its citizens. Third, since population growth and classroom shortage are closely related, the policy then emphasizes the need to build classrooms to meet the demands of the growing number of students. This objective seems to take precedence over all other objectives.

The priority given by the DepEd for reducing classroom shortage can be seen in the allocation of the BEFF which uses the “Red and Black” zones of the Basic Education Information System (BIES) as guidelines. These codes refer to schools that face acute classroom shortage, and provide the basis for selection of schools that will be given priority to the funds. Those schools belonging in the Red and Black zones or first priority are those with an average student per classroom ratio of 56 and above. Those classified as Gold, or the second priority, are the schools with 51-55 students per classroom and as Yellow, or the third priority, with 46 to 50 students per classroom. Only in the assessment of the priority recipients will geographic conditions be considered, specifically: (1) the proper site adaptation of the standard engineering design wherein the conduct of soil investigation shall be followed and (2) in locations prone to typhoons and situated on the Eastern Seaboard, the Hazard Resilient School Building (HRSB) design will be adapted.

Fourth, because of the emphasis on population and shortages, and hence on highly urbanized areas, the DepEd is pressured to construct schools even in areas that may have become geographically vulnerable because of the mass movements towards cities. The construction of schools in these areas could itself be a source of further mass movements or immigration that could worsen the problem. Apart from the unequal access to education, the provisions of the law thus can heighten the problems caused by geographical features and the adverse effects from interregional migration. This may come about because experts on geosciences may not be consulted on the likely effects that can result from construction of classrooms on the environment. It is then crucial that DENR, particularly the Mines and Geosciences Bureau (MGB) to not only identify the places where natural disasters and calamities may likely occur but determine how schools and other structures can create particular problems regarding geography.

In the past, the overall policy governing the regular SBP as well as other school policies seems to have little regard for problematical issues that may arise regarding the issue of geography. In a book written by senior officials of the DepEd Educational Development Projects Implementing Task Force (EDPITAF), Aurelio Juquillon et. al. (1994) devoted only a passing concern for environmental factors (“natural and man-made features such as rivers, mountains, roads, etc.”) and indicated that the goals of school mapping were “(1) to enhance equality of educational opportunity by improving access to the school system as whole or to individual schools; and (2) to enhance the efficiency of educational system by improving the rate of utilization of the facilities and thereby reducing the per capita cost.” They also wrote that “steep slopes (above 40% slope) may be used for buildings if appropriate designs are prepared,” adding that “vegetable gardens and environmental studies (sic) plots may be needed to be terraced to avoid erosion during heavy rains.”

The pressure to impose geographical constraints came largely from the international community such as the UNICEF and USAID. Indeed, the DepEd has become more recently conscious of the geography issue and has taken a pro-active stance on the matter. This can be traced to tragic events related to natural disasters which seemed to have changed the over-all perception of how important geography is sustainable development. Mass movements towards urban areas are in fact a common cause of infrastructure damage. The Cherry Hills Subdivision Landslide in 1999 which took the lives of over 50 persons and rendering hundreds of families homeless in suburban Manila served as a wake-up call to housing developers on the necessity of conducting geologic hazard assessment prior to development. Although the Philippine geoscientific community had long stressed the need for the conduct of geologic hazard assessment prior to development, it was only after the tragic event of Cherry Hills that government finally made a firm resolve with issuance of DENR DAO 2000-30 which called for a set of rules that will "ensure a rational balance between socio-economic development and environmental protection for the benefit of present and future generations." A little earlier was DENR DAO 2000-28 which required all land development projects to undertake an Engineering Geological and Geohazard Assessment (EGGA) as an additional requirement for Environmental Compliance Certificate (ECC) applications. The Order aims to comprehensively address and mitigate the effects of geologic hazards on project sites proposed for development. As a result of the Cherry Hills tragedy, DENR also created the Urban Geology Units of MGB in March 2000 to assess the geologic hazards in urban areas.

As a result of the DENR regulations, all major DepED projects, particularly those requiring an Environmental Clearance Certificate (ECC), will need an EGGA. As indicated above, Administrative Order 2000-28 of the DENR implemented in March 2000 required subdivisions, housing and all other land development and infrastructure projects to conduct an EGGA to address the possible negative impacts of geological hazards. In effect the DepED and the MGB-DENR shall enter into a Memorandum of Agreement (MOA) for the conduct of the EGGA. The MOA shall stipulate the various undertakings that shall be done by the agreeing parties. Often in these cases however compromises between satisfying geography concerns and addressing classroom shortage are settled and enforced. This is achieved by instituting engineering measures aimed at addressing geographic weaknesses, hence resulting in greater costs and to some extent possibly more risks.

Prior to Cherry Hills, there actually have been efforts by the DepEd to improve the information on geographic conditions of the schools. The school mapping exercise (SME) was already introduced in the mid-1990s with the implementation of the Third Elementary Education Project (TEEP). It was then applied to the Secondary Education Development and Improvement Project (SEDIP) which was started in 1999. The SME under the SEDIP then aimed to provide a system that can support planning and policy-decision making functions. Its translation of database on schools, socio-economic information and the data on topography and mapping generated through GIS was intended to obtain in meaningful information that is useful in: (1) developing a reliable prioritization scheme for secondary education school building and a resources allocation program; (2) identifying sites for new secondary schools to be established under the project; (3) prioritizing schools for rehabilitation, repair, completion and construction of new school buildings, and; (4) plotting exact locations of all educational institutions (elementary, secondary and tertiary, both public and private) for future planning purposes. While the TEEP mapping outputs contributed to the improvement of access to elementary education particularly to the over-all management of pilot elementary schools, the SEDIP mapping aimed to develop a comprehensive database on secondary education and provide a tool for school planning in a more rational and efficient manner**.** The TEEP and SEDIP outputs were later turned over to the Physical Facilities Division, Office of Planning Service (PFD-OPS)

In 2003, an aftermath of the Cherry Hills incident, DepEd then saw a need for a more focused consideration and solution of geographic concerns. By virtue of DepED Order No. 17, s. 2004, the Department of Budget and Management has approved the merging of the PFD-OPS with the Task Force Engineering, Assessment and Monitoring (TFEAM) to become the Physical Facilities and Schools Engineering Division **(**PFSED) under the Office of planning Service – Office of the Assistant Secretary for Planning of the Department of Education which became fully operational on January 3, 2005. Among its functions are:

- Monitor the implementation of infrastructure projects as well as the repair, rehabilitation or maintenance of educational facilities, evaluate progress of work, and ensure that all specifications are followed
- Evaluate request for repair, rehabilitation and maintenance of educational facilities and submit appropriate recommendations
- Give technical specifications of materials to be used in the construction, repair or maintenance of educational facilities to Procurement Service
- Provide assistance in the conduct of technical evaluation of bids for infrastructure projects and school furniture
- Inspect delivered infrastructure projects and school furniture
- Develop and maintain an information system which will include data about physical facilities and structures and geographical information concerning the location of the school and its access to services.

With the creation of PFSED, the SME became an even more major activity for the DepEd. This then seemed to have led into independence from DENR. Part of its tasks is to develop a Geographical Information System (GIS) primarily to come up with a computerized prioritization scheme to rank existing schools and municipalities for repair/improvement and to use as a guide for profiling existing schools and for the construction of additional classrooms and establishment of new schools. This technology was well known to the DepEd even as far back as 2004, as part of the SEDIP SME. The outputs of the SME project included among others the Geographical Information System (GIS) maps of the 15 SRA provinces, and a Geographic Database for Secondary Schools (GDSS) manual with corresponding CDs. The GDSS is packed with 300 maps, information on 875 schools, over 7,000 photographs and more about 1,700 pages of documents. Apart from GIS, Global Positioning System (GPS), computer-aided design (CADD), remote sensing or satellite image mapping (SIM) and database management system were also developed. The geographic information was then integrated with statistical and other information on secondary schools.

Nonetheless, despite the warnings and subsequent policies of the DENR and the efforts of DepEd to improve its geographic information, the education sector met its most devastating experience in 2006. When an elementary school in Brgy. Guinsaugon, St. Bernard, Southern Leyte, was covered by mud due to a landslide, classes were on-going, thus resulting to the death of 246 children and 7 teachers. With the help of National Mapping and Resource Information Authority (NAMRIA), the department then sent its engineers in the area to conduct an on-the-job training on the basics of hazard mapping, map layout, digitizing, data gathering and consolidation of data outp uts, and then later pilot tested its school mapping activities. This event in Southern Leyte will be one of the case studies of this paper.

Clearly, as indicated by this tragic incident, a more thorough examination of conditions of many schools is needed despite the various efforts already exerted by DepEd. Inertia coming from past decisions and policies continue to plague the education sector. For instance, the PFSED admitted in 2011 that some schools are located in earthquake faults. In a news article, Architect Felix Villanueva Jr. of PFSED said most of these schools have been donated by private entities some 30 or 50 years ago. According to PFSED officer in charge Oliver Hernandez a continuous assessment of the school buildings nationwide will be needed especially in light of the 8.9 magnitude earthquake that hit Japan recently. Among the schools they have inspected and found to have structural defects are located in the Bicol Region, Cordillera Administrative Region, Caraga Region, Western Visayas Region, and Davao Region. The defects have been attributed to old age, poor construction, and those battered frequently by typhoons, especially schools in the eastern seaboard.

4. Case Studies: Albay and Southern Leyte

In section 2, I gathered together several concepts, particularly commitments and agency, within the context of transaction costs, and argued that these costs would result in low-powered incentives for geographically safe schools. There are dynamics working within the internal government structure which can aggravate the problem further. Hence, in section 3, I described the outcomes of various policies in the context of history, the prevailing concerns of the department, and the inertia that exists in the changing institutions and organizations.

In this section, I will examine two specific problems of DepEd school building policies as case studies of transaction cost politics involving the consideration of geography in the decisions in constructing school buildings. The cases I have chosen are Albay and Southern Leyte, two commonly disaster-stricken areas in the country. This choice is motivated by the very different contexts and concerns they highlight. The experience of Albay pertain to the problems of time inconsistency and commitments, while the Southern Leyte problem, which was already mentioned in the preceding section, deals with problem of multiple principal agency and intersectoral coordination.

A. Albay

For a province that is perennially under a state of calamity, Albay will require new classroom technologies to ensure the resilience of classrooms against all possible disasters. The Learning and Public Use School (LAPUS) building, a one-storey two-classroom building that can be utilized as an evacuation center during calamities and emergencies, was precisely built in Bicol for this purpose. The LAPUS building is the first hazard-resistant, all-concrete DepEd structure in the Bicol region. It is expected to last for at least 50 years without need for any major repairs or rehabilitation work similar to the old Gabaldon buildings. The P2.3-million ($54,762.00) building houses two classrooms that could each accommodate 63 students or at least six (6) families per room.

Designed by the UNICEF, the building costs about P15,000 ($357.00) per square meter. The main feature of this building is that it offers clear, observable indicators to ensure safe structures. Purportedly named after former DepEd Secretary Lapus, this (one-story) building is made of reinforced concrete and elevated from the ground by a meter higher to protect those inside from flood and can accommodate two classes during regular days and at least 60 people when used as evacuation center.
The building has a floor area of 230 square meters, divided into two classroom units. A unit covers 115 square meters, including the 63-square meter classroom plus the kitchen, CRs and lavatory. The DepEd would turnover school buildings in the Bicol region, including some intended to be used as evacuation centers in times of calamity

Funded under DepEd's Bicol Calamity Assistance and Rehabilitation Efforts (BCARE) in the aftermath of super typhoons Milenyo and Reming, a total of 545 new classrooms are expected to benefit same 50,000 students and teachers. Apart from the new school buildings, a total of 6,039 classrooms have already been repaired and are ready for use. Under the BCARE, DepEd has allotted some P1.2 billion for the construction of new classrooms and repair of those damaged in Albay, Camarines Sur, Camarines Norte, Catanduanes, Masbate and Sorsogon. Starting in 2006, the department recorded a 98 percent completion rate in 2008.

In Albay province in 2008, along with the LAPUS buildings, the BCARE contributed the biggest number of new classrooms in Ligao City at 301, followed by 71 in Tobacco City and 56 in Legazpi City. Of the 6,039 repaired buildings, 2,579 are in Albay, 1,620 in Camarines Sur, 204 in Camarines Norte, 358 in Masbate and 936 in Sorsogon and 342 in Catanduanes.

Taking the first step and starting with the basics, school buildings in Albay have been identified as highly vulnerable to disasters. Building the safety of schools has caught the attention of DepEd and being more resistant to hazards, LAPUS buildings seem to be the solution for most of the problems assuming school location is already a given and can no longer be changed. In other words, the LAPUS building can be seen as a standard in Bicol of structurally sound and geographical safe school.

Similar undertakings were also initiated. For example, as part of the program coined as "Be Better, Build Better," the National Disaster Coordinating Council, (NDCC) partnered with My Shelter Foundation, United Architects of the Philippines, and the Private Sector Disaster Management Network in planning and organizing for the construction of innovative school buildings. The program envisions to provide better quality of structures improve the standards of school buildings through available advances in technology.

However, over the last 2-3 years, the interest in developing new technology to construct long lasting buildings in response to geographic vagaries seemed to have waned, and discontinued in other regions. After the change in the administration and the department secretary, there is to my knowledge no longer any mention of the LAPUS buildings. The latest word in Albay on this matter was in 2010 when it was reported that JICA will finance the construction of P480-M permanent evacuation centers which will be converted into 20-classroom type schools. Note however that this building is not intended for schools, but as evacuation centers to ensure the goal of "zero casualty" in times of disasters such as Mayon eruption, floodings, lahar flows and landslides. Since the building will be used for classrooms in certain periods, the DepEd was not directly involved in the construction. Instead, this was a project of the local government and JICA. This seems also unfortunate since the construction of these buildings have significant implications to schooling. In particular, these will de-clog the existing school buildings during periods of calamities, allowing classes to continue smoothly despite the influx of evacuees in time of calamities.

Nevertheless, what seems to concern the DepEd and the Local Government Units is the issue of shortage. Albay has partnered with the DepEd in an P86-million school building program that aims to construct 112 school buildings with 142 classrooms in 42 campuses to solve the perennial classroom shortage and strengthen Albay's creative educational program. It goes on record as the first province to do so. The law provides for a 50-50 percent sharing of the project costs with Albay and DepEd committing P43 million each for the project. According to the Albay government, the school buildings under the MOA, mostly a single classroom edifice, will be constructed according to quality specifications and will not only be used as classrooms, but could also be used as their emergency holding centers during typhoons and thus serve a lot of purposes.

However, given the cost per classroom, estimated at around US$ 13,000, there is a question of whether the standards set here is equivalent to that of the LAPUS building. Table 1 provides the available data on the cost of standard unit schools in selected Asian countries, including two types from the Philippines (the standard school and the Lapus building). Three points can be noted. First, the schools are constructed at a higher unit cost in the Philippines than in other countries. Cost per student is also substantially higher. This can be attributed partly to the poor infrastructure which made the delivery of construction materials to the school sites more costly. Second, cost per square meter of Philippine schools despite still being higher is at par with the other countries especially Pakistan. This seems to suggest that school buildings in the Philippines are situated in larger campuses. In general, it seems difficult to explain inter-country comparisons since there is no uniform design for schools.

Theunyck (2002) pointed that "the Philippines, with experience building more than 10,000 classrooms per year, made its attempt at pre-fabrication in 1994-95 with the objective of lowering costs from US$10,000 to US$9,200 and simplifying procedures by reducing the number of contracts. However, cost savings were reduced by the cost of site preparation by LGUs, and more than 25% of the prefabricated classrooms could not be transported to or assembled on the sites due to road or land conditions. Prefabrication was quickly abandoned by the country which returned to previous classic technologies." This seems to suggest that much of costs of school buildings can be traced to transportation and hauling costs, as well as the various site preparation costs (mostly permit and legal fees) imposed by the LGUs.

A crucial feature of this table is the cost of the LAPUS building relative to the cost of the standard school. This is about 27 percent more per hectare, roughly 61 percent more per classroom unit and 85 percent more per student. Controlling for its dimension (i.e., number of classrooms), the LAPUS building reflects the best standards for constructing geographically sound buildings. This indicates the marginal relative costs of ensuring the safety of students and teachers during disaster periods.

Since the LAPUS is relatively more modern than the standard classroom, it might be instructive to see how costs have grown over time. Table 2 shows the evolution of the available cost per classroom unit for selected countries based on government programs. Note that in certain countries like Mexico and India the costs of classroom construction can be reduced over time due perhaps to better management of funds or improved technology. Also, in the Philippines, the costs have increased like Bangla Desh and Brazil, but the rate of increase is the lowest of these countries, at around 15 percent. In real terms, the costs of standard school buildings have actually fallen by 25.16 percent. Finally, take note that the cost of classrooms under the DepEd-LGU sharing scheme in Albay is only slightly higher. This means that the quality and design of such schools may not be the same as the LAPUS.

Indeed, the costs of strengthening the classrooms may be higher, but the benefits of such programs may outweigh these costs. Some discussion began on the use of damage and needs assessment as economic and financial aspects of Disaster Risk Reduction are considered. Estimating total damage cost in project development in a continual basis will provide inputs to a cost-benefit analysis and evaluate the efficiency of mitigation and preparedness. In order to settle this issue, a monitoring and evaluation of these structures would be necessary.

However, the monitoring and tracking of school assistance were poor. Though partners monitor which schools receive assistance, the lack of a centralized database at the government or the foreign agencies, like the UNICEF to track this information has led to inconsistencies in reporting the true worth of these structures. As a result, the lack of such information could have led to time inconsistencies and the inability to commit to geographically sound structures given their higher costs in the face of classroom shortages and limited budgets.

The emphasis on addressing the shortage at reasonable costs can be shown clearly in Table 3 which displays the programmed cost per school (standard one-storey building) in each region. Based on the DepEd Order No.3, series 2011, the DepEd and DPWH, through a series of 2010 coordination meetings, have agreed to adopt a schedule of regional costing in the implementation of the regular school building program. In order to determine the costs objectively, these are computed, based on the prevailing cost of construction materials in a particular province, including hauling and handling costs. The costing shall be provided by the Regional Office, through the Regional Physical Facilities Coordinators (RPFC) or by the Physical Facilities and Schools' Engineering Office of the Central Office. These costs are based on two school building designs that are constructed on the following material specifications:

Material Specification	Type I	Type II
Concrete Hollow Block	6" Ordinary Type	4" Ordinary Type
Flooring	With Rebars	Without Rebars
Doors	Panel Door	Flush Door
Exterior Ceiling	With Exterior Ceiling	Without Exterior Ceiling

In the computation of the Total Project Cost (TPC), the following formula is to be followed in order to minimize administrative costs:

TPC=DC+IC+CT+GE
DC=MC+LC
IC=19%(DC)
CT=12%(DC+IC)
GE=1%(DC+IC+CT)

where DC refers to direct cost, IC is indirect costs, CT denotes Contractor Tax, GE is for Estimated Government Expenses, MC is material costs and LC is labor costs. Costs then will vary not only depending on the type of materials used but also on the dimension of the buildings. Schools with more classrooms and more storeys are expected to cost higher. Table 3 shows the regional costs for a one storey, one- and two- classroom building for the two specifications of materials, and the cost of a muiti-purpose building. The last two types of buildings, i.e., the two-classroom and multi-purpose buildings, seem to resemble the LAPUS more closely.

According to the DepEd Order, these costs are estimated for normal conditions only. The costs can be increased for remote and island schools which incur additional costs for handling of materials to the project site. The costs may be also modified for schools that will need additional site development or require special design such as the LAPUS building. Furthermore, soil analysis is required only for at least a three-storey building, and hence not included in the costs reflected in the Table. In any case, soil analysis for the smaller buildings, if necessary at certain conditions will also be conducted, with subsequent funds to be added.

Three points are noteworthy from the table. First, the differences in the costing of these school designs are explained only by the difference in direct costs, exclusive of geography. What makes the two classroom and multi-purpose buildings more expensive is not because of the concern to make it safer, but simply because these are larger buildings. Relative to the standard two-classroom and multipurpose buildings, the LAPUS building is seen to be twice more expensive. Second, if investment in geographically stronger building is to be reflected in costs, the table should indicate different costs per region given the differing vulnerabilities across regions. In particular, given that Bicol is prone to disaster, then its costs would have been higher. Third, since the costs seem to be uniform across regions and because schools with special designs are still to be evaluated, the purpose of setting a programmed system of costs is thereby forfeited. Although geographic factors can be included in the final costs, these costs will be subjective, with its value dependent on the interests of the parties concerned. Unless all parties concerned have been given a voice in this matter, this process is exactly what the programmed costing wishes to prevent. Clearly, while, in this matter, discretion is preferred to strict rules, the process of negotiation needs to be transparent and properly institutionalized.

B. Guinsaugon, St. Bernard, Southern Leyte

The Province of Southern Leyte is one of the top ten highly disaster-prone provinces in the country, thereby slowing down the economic progress of the province. Although the province was among the top 20 poorest provinces in the Philippines In 1990–1998, it has grown however progressively in recent years and has been stricken out of the poorest provinces since 2000.

Established in 1954, the municipality of St. Bernard in Southern Leyte has a total population of 25,767 individuals or 5,081 households in March 2005 up from 23,089 people in 4,746 households in 2000. As already cited, on 17 February, 2006, a catastrophic landslide buried the village of Guinsaugon, the third largest barangay in terms of population in St. Bernard, killing more than a thousand residents and displacing approximately 19,000 people. This included the 247 students and seven teachers who perished when their elementary school was buried by the avalanche. The landslide was found to have originated on an approximately 800 m high escarpment produced by the Philippine Fault that bisects Leyte and the major islands of the Philippines.

In an effort to synthesize various studies on the subject, Guthrie, et. al. (2009) arrived at the following conclusions:

- The approximately 15 million m3 landslide was a result of progressive failures and tectonic weakening in a region made especially vulnerable by the inter-reaction of geological or tectonic, climatic and cultural factors. Geology and tectonics (including historical seismicity, the progressive disintegration of the rock mass, the development of smectite layers and the continuous development and movement of shears within the Philippine Fault Zone) all combined in a steep rugged terrain to produce a series of massive landslides ([10 million m3) of which the Guinsaugon event was included.
- The presence of rice paddies in the valley bottom had a major effect on the mobility of the rock avalanche, increasing the vulnerability of communities established to tend these fields.
- Having considered the available evidence, the landslide was not triggered by a seismic event that occurred several minutes afterward and that the recorded seismic signature was not a trace of the landslide itself. Rather, the earthquake could be a result of tectonic unloading after the landslide occurred, thus completely independent of the landslide event.
- The role of climate is, in some respects, similar to that of the seismic event. In terms of the trigger, the storm rainfall that occurred several days prior to the landslide undoubtedly raised pore water pressures in the source rock mass. However, as failure became imminent, the progressive deterioration in the region made the prolonged rainfall an unlikely factor. In the lag time between the end of the period of heavy rainfall and the occurrence of the rockslide-debris avalanche, evacuated residents had even returned to their homes. Possible trigger mechanisms can be incidental to the landslide itself; however, the progressive development of a large failure often produces telltale signs that are observable by a community of non-experts.

Other field investigations, particularly Asio (2008), have shown two important aspects of the landslide. The first is about the importance of the thin layers of mudstone in between thick layers of sandstone or siltstones which could have served as contributing factor to the landslide. The other is the likelihood that the Guinsaugon village itself was developed on old landslide debris. This was clearly shown by the fact that the lower hills not affected by the recent landslide showed similar materials as the landslide area. Also, the behavior of the stream indicates that the stream was covered by landslide debris in the past which is the reason why it changed its course and appeared circumvent the community. Early settlers may have found the slightly higher part of the area safe to build their houses since it was elevated (and thus not prone to flooding) but without any idea that it was a landslide debris. In effect, with the people not realizing it, the tragic landslide was just waiting to happen. Certainly, people could have been warned of this likely event.

In light of these findings, the DepEd and the other government agencies, both local and national, can be held accountable for the choice of the school site. First, because of similar disasters in the past such as Mount Pinatubo lahar flows[4] and the Ormoc flooding also in Leyte, greater deliberation should have been forthcoming on the part of these agencies in vulnerable areas where people seem to have settled and population has gradually increased. In particular, the LGUs should have been given a venue to articulate their concerns. Second, the failure of the government agencies to coordinate among each other, especially the Department of Agriculture (DA) and the DENR, might have led to wrong decisions. As indicated in the analysis, the interaction of social, environmental as well as the geographic factors all played a role in the calamity. The coordination of various sectors in the government and the local schools would have gone a long way towards addressing these changes simultaneously. Third, the DepEd at that time has no policy of keeping track of changes in the status quo. The dynamic quality of geographic condition makes it imperative for decisions to be more flexible. A system for responding institutionally for these changes will hence be important. Indeed, even as commitments to various causes are necessary, a high degree of flexibility to various realities will also be important.

In the aftermath of the Guinsaugon landslide two major events affecting government policy has been introduced. First, the DepEd has implemented the Principal-led School Building Program (PL-SBP) for its schools. This policy decentralizes construction management through Principal empowerment with the active participation of the community. The objective is to rationalize management responsibilities and accountabilities and accelerate DepEd decentralization of the school system while simultaneously building management capacity at the regional, division and school levels. Assessment, design, and inspection functions are provided by the DepED engineers, who also assist the Principal during the procurement processes. The Parent Teacher & Community Association (PTCA) and other stakeholders in the community are responsible to

[4] It was not the eruption of Mount Pinatubo, but the lahar flows and flooding that caused major dislocations. The eruption rendered an entire area vulnerable but one cannot stop the settlements in this area because it is also more fertile. Moreover, the eruption of Pinatubo is far between (every 600 years). Hence, the lahar flows and flooding that rendered particular sites unfit for school construction and residential settlements.

audit all procurements. With support from AusAid, 40 classrooms were retrofitted to resist typhoons using this approach. Complementing the retrofitting works, training is provided to teachers, students and staff and disaster management is integrated into the school curriculum.

Second, the MGB has completed this July 2011 the geohazard assessment and mapping of the country, and has distributed geohazard maps with a scale of 1:50,000 to local governments. Although the MGB has done surveys and investigations to identify geohazard-prone areas since it was established in the early 1900s, it was only the early 2000s that a systematic program was implemented. Soon after in 2004, a National Geohazard Mapping Program started to identify areas susceptible to various geologic hazards. The mapping was actually intensified after the landslide at Saint Bernard, Southern Leyte. Now classified as highly susceptible to landslides, Saint Bernard was one of the first places to undergo MGB's geohazard mapping and assessment.

While these policies are laudable for the flexibility and public accountability that are introduced into the system, one can note however that the institutional arrangements to make these effective still need to be established. For the PL-SBP, the Principal continues to be an agent in the whole process. In effect, his or her action remains under the supervision of its main principals, the DepEd. Unless the DepEd offers an environment of high-powered incentives for geography vis-à-vis the construction of schools to reduce classroom shortage, the action of the principal can remain in question.[5] Moreover, the point is that the Principal should find it to his advantage to perform his or her tasks well, and that the government agencies do not conflict.

For the MGB mapping, the institutional arrangement that will allow MGB map to be fully integrated with the PFSED GIS still has to be threshed out. Apart from the approval of the EGGA, the MGB remains outside of the decision process, and has not been consulted. Even after the MOA has been signed between the DepEd and MGB, the latter should continue to monitor the performance of the agent or contractor. In effect, the MGB should have a stake in the process and an ownership in the final output of the arrangement. Unless this is done, the likelihood of another Guinsaugon incident will always be present.

5. Conclusion and Policy Directions

A common agency is a situation where several principals have a stake in the actions of a particular agent. The agent must then allocate nonobservable effort to various principals whose interests may be diverging. Given the theory presented in section 2, these features, defined as transaction costs, pose as major obstacles in providing the correct incentives to the agent. These are lack of commitment and intersectoral coordination. Given the enormous problem in classroom shortages, the paper argues that the DepEd's main interest lies in the construction of as many school buildings as possible at reasonable cost. Hence, the recent policies to incorporate geography in the school building decisions may not be effective in achieving the desired protection from natural disasters.

[5] Recent developments seem to indicate that the PL-SBP has not undergone the Commission of Audit process, and is thus endangered of being scrapped.

Based on the discussion, four main policy directions can be introduced to minimize these transaction costs. First, the DepEd needs to commit itself to new classroom technology that will allow clear indicators that will guarantee the public of safer structures. The appropriate objective is to ensure that the design and specifications of classrooms that address geographic vulnerabilities are translated into specific empirically observable outputs/outcomes. But this can be done feasibly if more improved technology that allows easy monitoring can be developed. In which case, the ones monitoring the classroom construction can be oriented to these expected outputs. The idea of using observable indicators is well known in the field of information economics. The output of the agent is a mixture of effort and chance. It is first-best to reward effort, but if this cannot be observed, then output is the best available substitute. Introducing outputs that are independent of chance would then reduce transaction costs.

Second, the DepEd has to ensure that all bureaucratic entities are given a voice in the final output. The principal-led school building program (PL-SBP) is a move in this direction. However, the possibility of dominating principal such as the DepEd whose main concern is rightfully on the immediate construction of an adequate number of classrooms should be counteracted by a legal restriction preventing the DepEd from having a say in all aspects of the output. In matters pertaining to geography, for instance, DENR is supposed to have a comparative advantage over DepEd. Yet, even if it may have some adequate expertise in geography, the DepEd is expected to prioritize immediate classroom construction above anything else. The dominance of DepEd over classroom construction decisions then gives it an incentive to place this priority at the forefront to the neglect of other concerns, such as geography. The creation of some legal provision, such as a Republic Act, that allows other parties whose main concern is geography (such as the DENR) to examine and inspect existing structures for their structural quality at a level equal to the DepEd reduces this dominance. So far, apart from the provision of ECC, and the subsequent EGGA, the DENR has no other role in the SBP once the DepEd-DENR(MGB) MOA has been signed. An objective and impartial assessment of the school structures by the DENR will guarantee the incorporation of geography into classroom decisions.

Third, since the DPWH has nothing to contribute in resolving this “geographic vulnerability–school shortage dilemma”, and since the DepEd can already perform the functions and operations of the DPWH, a legal provision should be drafted to keep DPWH away from this activity. Adding an additional layer of bureaucracy which only increases transaction costs only raises the chances of cheating on the agreement in order to gain some extra benefit. A legal provision that limits such cheating if enforceable can be mutually beneficial. This can be done by forbidding the DPWH from engaging in school building construction and focusing instead of infrastructure that will improve access to schools.

Fourth, following the issues raised in second point, a simple incentive scheme that deals with the obstacles of intersectoral coordination and conflicting interests simultaneously can implemented. This scheme is to have both DepEd and DENR assign two separate tasks to a common school contractor. As already noted, DENR is viewed to have a greater expertise on geography matters. Let DENR monitor the task dealing with geography and pay the agent according to output on this task. Let DepEd commit to the measurement of performance on the task of completing the school building in time for the class opening and at a reasonable cost, and to compensate the agent, *only* when the output on geography task (assigned to DENR) gets *above* a certain prespecified level. Compensation from DepEd varies according to the observed return on both tasks, the agent being penalized after displaying low performance on the completion of the school building on time and prior to this not being able to meet the standards for geographical safety. Thus, while *ex ante* the agent would *seek* DepEd's appraisal, the separation of these key tasks will clarify the accountability issues and hinder any connivance between DENR and the contractor.

Intuitively, this (lexicographic) scheme can mitigate the two obstacles of coordination and competing interests - for the following reasons. For one, it makes the amounts of effort expended on both tasks complementary in increasing the agent's total compensation. To be sure, the school contractor is now eager to work on harder and stronger buildings because this not only raises the expected reward from DENR but also the likelihood of a favorable appraisal by DepEd. Seeking DepEd's intervention makes little sense if geography is neglected. The agent would therefore not increase his effort on one task without putting more attention as well on the other task. The tendency to overspecialize which characterizes intersectoral bureaucracy and hampers incentive provision in that context is henceforth alleviated. As long as the agent sees tasks as complementary, furthermore, the incentives set by one principal on her preferred task will also benefit the other principal. This (designed) positive externality counterbalances an inherent negative one – i.e., all things equal, stronger incentives to work on one task raise the contractor's opportunity cost of putting extra time elsewhere, but because the incentive is hinged on another task, it is also more expensive to focus on this single task. In effect, competition between principals is mitigated. It then becomes easier for the principals to coordinate their respective incentive provision.

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Table 1. Available Classroom Construction Cost in selected Asian Government Programs
(in current US$)

	Classroom unit cost	Unit Cost per Student	Unit Cost per Sq. Meter	Year
Bangla Desh	3900	36	91	1998
China	2450	-	55	1997
India	3100	62	95	2001
Pakistan	4500	30	175	1987
Philippines-Standard	10400	144	172	1996
Philippines-LAPUS (per classroom)	27381	435	357	Based on 2007 prices
Philippines-LAPUS (per classroom)	16787	266	219	Based on 1996 prices
Vietnam	2500	28	58	2000

Source: Theunynck, 2002, and Author's computation of the costs of LAPUS

Table 2. Evolution of Standard Classroom Unit (Nominal) Costs in Selected Government Programs

	US$	Year
Bangla Desh	2700	1980
	3900	1998
Brazil	6000	1989
	8200	1993
India	3700	1993
	3100	2001
Mexico	16000	1991
	10000	1998
Philippines Nominal	10400	1996
Nominal	14555	2010
Real (1996 prices)	7783	2010

Source: Theunynck, 2002, and Author's computation of the costs for the Philippines, in 2010

Table 3. Programmed Regional Costing of Selected DepEd Designed Schools, 2010
(In Pesos, Thousands)

	One Classroom One Storey		Two Classroom One Storey		Multi-purpose Building
Region	Type 1	Type 2	Type 1	Type 2	
NCR	649	580	1,182	1,055	1,691
CAR	682	613	1,245	1,116	1,782
I (Ilocos)	629	560	1,148	1,020	1,661
II (Cagayan Valley)	644	576	1,175	1,047	1,690
III (Central Luzon)	626	558	1,141	1,016	1,654
IV-A (CALABARZON)	672	598	1,228	1,091	1,757
IV-B (MIMAROPA)	674	606	1,228	1,099	1,763
V (Bicol)	667	594	1,218	1,082	1,754
VI (Western Visayas)	646	578	1,177	1,051	1,692
VII (Central Visayas)	674	602	1,231	1,099	1,754
VIII (Eastern Visayas)	674	607	1,231	1,106	1,751
IX (Zamboanga Peninsula)	644	578	1,173	1,052	1,682
X (Northern Mindanao)	649	579	1,184	1,053	1,694
XI (Davao)	660	595	1,201	1,077	1,713
XII (SOCCSKSARGEN)	663	583	1,209	1,071	1,723
Caraga	648	581	1,180	1,056	1,698
ARMM	633	633	1,277	1,145	1,825
Average	655	589	1,202	1,073	1,723
Standard deviation	17.28	19.25	36.10	34.07	46.28
Coefficient of Variation	0.03	0.03	0.03	0.03	0.03

Source: DepEd PFSED Memo, No. 2010-06