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Hydropower project ventures: testing international waters

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Abstract

A vanguard project is an effective mechanism for testing new opportunities to deploy existing technologies into new markets in an effort to realize growth. Typically such endeavors are motivated by organizational needs to generate new knowledge and learning to develop or renew existing capabilities of the firm. In the case of Norwegian independent power producers (IPP), a recent trend to achieve company level growth is by expanding hydropower operations into international markets thus testing theoretical foundations of vanguard projects. Whilst many other European IPPs have internationalized stepwise in a pan-European context, Norwegian IPPs have chosen to pursue non-core European markets for international expansion.

This paper serves to underscore the innovative globalization strategy shifts amongst Norwegian IPP by underpinning the challenges and opportunities of these activities in developing and emerging countries. To achieve this research objective triangulation of quantitative and qualitative data is utilized. Primary qualitative data includes exploratory case studies at the firm level, whereas quantitative data includes a national survey amongst Norwegian IPPs. Theoretical considerations lie within how such vanguard projects allow for core business activities to persist by diversifying geographically into dissimilar markets.

The result of this research stream identifies the degree to which Norwegian IPP actors are actively developing such vanguard projects in which geographic locales of emerging markets. The mixed method approach results delineate how Norwegian IPPs are internationalizing and what the managerial implications are for entrepreneurs and IPPs alike.

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1. Introduction

Renewable energy has been a focal point of much political, academic and institutional attention as of late, with a wide range of issues being addressed. Whilst the technological barriers have largely been surmounted, a need for better understanding of the socio-economic barriers has been identified. At the core of this need for greater understanding is what the private enterprise strategies are to pursue widespread deployment of renewable energy technologies.

With regards to Nordic electricity production enterprises much former literature has been dedicated to regulatory structural reformation and the resulting repercussions, but a literate gap exists in what strategic choices firms have been making to pursue growth endeavours when seeking to implement corporate strategies. Norway is the 6th largest producer of hydropower in the world [1] with more than 97% of domestic generation coming from this resource [2]. Consistent high capacity installation and ensuing production coupled with low consumption growth rates have dictated year over year oversupply. The remaining capacity continues to be exported through the interconnection to other Nordic markets. This situation has largely benefitted the generators, as no new large plant investments have been needed to meet incremental demand. The power producing firms have thus begun to explore new growth avenues both domestically and abroad.

This research paper fulfils a research gap by addressing the shift in strategy towards internationalization occurring in the Norwegian hydropower production sector. We investigate the impetus for exploring new international hydropower project developments from the perspective of Norwegian electricity providers. The research question this article seeks to answer is: What are the current and future degrees of internationalization within the Norwegian hydropower production sector?

Theoretical frameworks to understand these activities include the Uppsala internationalization model, vanguard projects, and the big step hypothesis. Also explored is how pursuing a vanguard project may be an effective means to renew firm core competencies in pursuit of achieving long-term growth prospects. The case of the Norwegian hydropower sector is utilized; with specific focus on either the firms with a portfolio of generation assets domestically within Norway or nimble and niche startups that seek to build portfolios of generating assets abroad.

Qualitative and quantitative methods are combined in a mixed methods approach to underpin how firms are pursuing renewable energy project developments far outside their core market. Several case companies are presented for more in depth analysis, with more comprehensive qualitative data extracted through an interview structure. Complementary data utilized is a series of company level presentations given through international business delegations in prospective host countries. The quantitative approach is of limited sample size given the small size of the sector in a small country such as Norway, yet it reveals the shift in attitude towards internationalization as a future potential strategy.

This paper is structured as follows. Section 2 provides a backdrop of the Norwegian electricity sectorial factors that have led to the current issue under analysis. Section 3 probes several theoretical perspectives. Section 4 discusses the mixed methods approach utilized to answer the research question above, and sections 5 and 6 provide the results and discussion. Managerial implications are presented in the final section. An empirical firm and project level data table is lastly provided in Appendix A.

2. Norwegian electricity sector

Norway is an energy nation. Although the North Sea continental shelf has abundant oil and natural gas resources which are extracted predominantly for export, the Norwegian electricity sector is serviced and dominated by an abundant supply of hydroelectric resources. Similarly to many other Western countries, construction of numerous large-scale hydropower plants endured tremendous growth from the 1940s until the late 1980s. The sustained strengthening of electrical power infrastructure over this time period greatly contributed to Norway's industrial success. An industrial economic base comprised of energy intensive industries such as metallurgic and chemical refining, pulp and paper, and minerals utilize 70 TWh per annum on average [2], making up roughly 55% of load demand. In tandem with the Northern latitude geographic proximity, the intensive industrial utilization of domestic hydropower resources explains why Norway has amongst the highest energy uses per capita in the world.

Norway produces approximately 25% of all hydropower in Europe [3]. Hydropower capacity comprises 29,2 GW of the total installed capacity of 29,6 GW, with fluctuating annual production between 122 and 132 TWh. The share of renewables to primary energy consumption is the highest in Europe at 64% [4]. Only a few select countries in the world such as Brazil, Venezuela and Sweden possess similar high percentages of renewable electricity generation based on hydrologic resources.

Norway has more than 100 years of experience with harnessing its hydropower resources. Over the past 50 years it has developed a strong and competitive industrial base throughout the value chain including project developers,

power producers, engineering, fabrication and service providers. The sector thus has a long tradition of capturing and exploiting hydropower resources for renewable and domestic security of electricity supply.

The Norwegian electricity sector was amongst the first to undergo the deregulation process in the early 1990s. Similar to many other countries, previously all supply, transmission and distribution was held under the responsibility of a single state owned and centrally controlled entity in a monopoly market. The Energy Reform Act of 1991 created a decentralized free trade model for exchange of power, where a large number of producers and distributors trade in openly accessible spot and futures market exchanges, and where hydrological cycle price signals are utilized for bilateral forward contracting purposes [5]. An important aspect of the Nordic market is that of decoupled vertical integration, as most generation firms also buy on the wholesale market [6] and distribute to end users (albeit each distinct activity is owned by a separate business entity as dictated by the reform).

Although a decentralized competitive marketplace was created, the political debates revolving around the deregulation process resulted in a shaping of the institutional reform that distributed ownership rights down from solely being held at the national level down to local and regional levels thereby creating the decentralized public ownership model. Therefore Norwegian electricity generation stakeholder is largely dominated by publicly ownership. Of the 15 largest generation companies, 13 possess this public ownership structure (accounting for 71-80% of all generation depending on the year).

The deregulation and interconnection of the Nordic electricity market has had profound effects on electricity power providers. The shrinking of electricity power producer wholesale and retail profit margins can be attributed to both the new open market competitive landscape [7] and the former uncovering of an oversupply of generation in Norway. As business competition intensifies, many firms are increasingly confronted with tension between choosing to exploit existing capabilities or exploring new ones all together [8-11]. In a similar vein, other researchers have recognized that larger well established firms at some point must choose between developing existing capabilities supporting existing business lines or creating new sources of competitive advantage by exploring into new technologies or markets [12-14]. As such, many well-capitalized Nordic traditional electricity power producers are left assessing different options in pursuing company level growth. Therefore these firms with specific technical human resource competence and financial resources must decide between several proactive choices. Among these may be to focus on efficiency or rehabilitation upgrades within existing operations and assets, or pursue new domestic generation opportunities with ever evolving renewable energy technology (RET) options of wind or biomass. Until recently, political frameworks pertaining to subsidy support mechanisms have been lacking in Norway that offset additional costs inherent in many RETs making their business case lackluster. Whilst it can be seen that a number of firms have been domestically dabbling in a number of different RET options to achieve their strategic growth plans with varying results, the option to continue medium to large scale hydropower energy project development and production exists abroad.

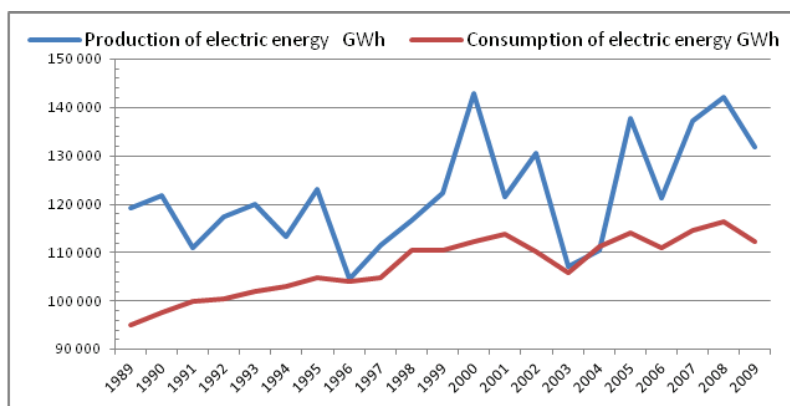


Figure 1. Production and consumption of electrical energy in Norway 1989-2009 [15]

As illustrated in Figure 1, Norwegian electricity production and consumption growth each respectively realized an equal compound annual growth rate of 1,1% and 0,86% from 1989-2008 [15]. Figure 1 displays the production of electrical energy in Norway outstrips demand year over year. The interconnection to other European markets through Nordpool over the past 10 years has enabled the excess capacity to be exported. Therefore the business impetus to add more capacity is rooted in increasing electrical exports. The large fluctuation in year over year production is closely tied to the Nordic hydrological cycle, given the high Nordic reliance on the resource. Figure 2 reflects a large drop in investments into fixed assets (specifically power plants) over the 1980's lasting until the mid-2000s. The nadir period over the 1990s can be attributed to the uncovering of an oversupply in the Norwegian electricity sector when markets were opened to deregulation.

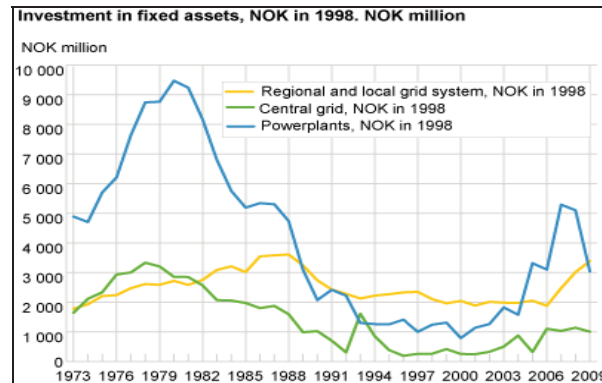


Figure 2. Norwegian electricity sector's investments in fixed assets 1973-2009 [16]

Historically, the electricity sector by and large has been a domestic industry. Since deregulation has occurred across Europe and other continents, a shift towards internationalization has been possible. Whilst German, French, Spanish and Swedish electricity production and distribution firms have internationalized, until late nearly all Norwegian firms have remained domesticated. A primary causality may be cited as geographic proximity to interconnect with many other European markets as the Nordic market is already connected in a common electricity trading pool Nordpool. Therefore opportunities for internationalization dictate entirely new operations abroad through a series of activities resulting in significant foreign direct investment.

The opportunity for these sector specific firms to internationalize comes at a time where two major global business trends have been unfolding. Renewable energy and emerging markets are the decussation of two international business trends that reflect strong prospects for sustained growth and demand. Considering the renewable energy technology market place has grown 540% from 2004 to 2010[17], it is rather clear that global demand for successful implementation of economically feasible renewable energy projects has never been greater. Additionally, with over four billion people and the fastest growing populations existing in developing and emerging markets with substantially rising electricity demands, it is undeniable that tremendous opportunities exist to unleash the market potential in these 'base of the pyramid markets'[18]. The IEA commented that electricity generation growth has historically been led by OECD countries, but projects that this trend will shift with non-OECD leading growth before 2015 [19]. Furthermore, with an 80% increase in energy demand coming from non-OECD countries by 2035 [19], consensus is that emerging countries will need to secure domestic supplies of low cost renewable energy to fuel their economic growth. The growth in RET market demand in these emerging markets of developing countries is estimated to range from 10-18% per annum over the 2010-2020 period [20].

Whilst an institutional revolution has thus taken place throughout the electricity industry over the past 20 years, the deregulation process and its initial consequences for electricity power producers has been already well documented in prior literature. The privatization of prior state owned and protected enterprises has forced such firms to employ new strategies, test institutional capabilities, and restructure competitive and cooperative external relations. An area that thus remains limited in content of academic exploration is that of widely globalized renewable electricity power producers. Few other academic articles exist that partially address this specific niche in literature. Amongst them is Högselius's *ex post* case study of the Swedish giant Vattenfall's European expansion over the past twenty years [21]. Another is the Harvard Business Case that more succinctly addresses experiences a Chilean former state owned electric provider endured when capitalizing on newly deregulated electricity markets in emerging countries throughout South America [22]. These types of explorative business activities correspond to risk taking in a capitally intensive industry where flexibility, patience, and resiliency towards adapting to the myriad challenges involved are required.

Nordic renewable energy development firms are well positioned to match their niche services to such specific target markets and capitalize on such opportunities. However, companies cannot simply export their domestic business practices to foreign markets and expect to reap the full benefits of internationalization [23]. Many obstacles and uncertainty lies on the path of converting economically feasible renewable power projects to commercially operable and financially successful.

3. Theoretical considerations

Several complementary theoretical frameworks are explored to understand how these activities tie into within existing collective academic knowledge. Theories selected have been drawn from the disciplines of project management, internationalization and strategy to reflect upon the multifaceted activity.

3.1. Internationalization

A number of existing theories explicate product and service internationalization processes. The neoclassical theoretical perspective of the Uppsala internationalization model [24, 25] views the process as incremental in nature, suggesting that firms choose to take a risk adverse approach to the process.

In step with aforementioned incremental Uppsala internationalization process, throughout the 1990's and 2000's many European electric power providers have internationalized by slowly expanding stepwise into neighboring markets. These acts of international expansion were mostly brought about through the deregulation of European electricity markets, whereas the playing field was opened for competition amongst producers, retailers, and transmission providers. Most commonly the strategy employed was to expand beyond national borders to the closest markets consisting of bordering countries. More specifically as in the case for Swedish giant Vattenfall and the now German giant E.On, markets within a cable lengths distance [21]. This allowed generators and retailers to internationalize by servicing new markets with existing investments in capital generation plants. As further expansion brought about increased demand for electricity service, actors also employed strategies for meeting this new load demand by purchasing existing generation assets, most commonly through mergers and acquisitions.

Such a slow moving internationalization strategy allows such firms to adapt, manage, and overcome both cultural and psychic distance. Whilst cultural distance refers to macro level differences in cultural values, the psychic distance is the manager's perception of these differences between host and foreign markets [26]. Therefore innovative managers must look for compensating resource-based advantages [27] to offset the liability of foreignness, which results from unfamiliarity with international markets [28]. This lack of knowledge and experience equates to an initial cost of foreignness that poses a specific entry barrier when managers cannot fully address the unknown costs associated when conducting business in a new foreign market. This phenomenon explains why firms internationalize with a series of incremental decisions that each builds greater knowledge in a foreign market which enables them to surmount the information deficiency required to make sound business decisions. As they invest greater involvement in a foreign market thereby acquiring more knowledge with each incremental decision, they are able to overcome such psychological and cultural barriers to entry.

It has been suggested that the resources of the firm determine its choice of market entry [11]. Some authors identified that when internationalization occurred at a later stage some firms benefit from market knowledge and technical experience acquired on home soil over a longer period of time [29]. Internationalization resources may include financial, technical, information or human resource capability based. Previous international business research has outlined three specific types of knowledge requisite for the internationalization of firms: technical, market, and internationalization process knowledge [30]. Whilst these firms possess the required technical knowledge, foreign market and internationalization process has been identified as lacking. In the search for foreign market knowledge with specific regards to the cultural or business climate contexts of doing business in a specific geographic locale, some firms have tap into foreign embassy and national development aid institutions to consult and inform them. This fact adds credence to Fletcher and Harris's proposition that such internationalization knowledge is most likely acquired vicariously from governmental advisors and consultants that work closely with actors from that geographic locale and have established network relationships within [30]. Knowledge acquisition from existing established business network relationships can be central to the internationalization process by influencing foreign market selection [30, 31]. Internationalization knowledge demands firms search for information to identify and evaluate opportunities, screen country markets, assess potential joint venture (JV) partners [30, 32, 33], or understand country specific customs and tax regulations.

In the case of Norwegian electricity power providers, one trend currently being observed is the bypassing of interconnected neighboring market opportunities. Norwegian renewable electricity power producers are bypassing such exemplified slower procedural internationalization within these lower successive stages and jumping directly to foreign direct investment. This is in line with the proposed "Big Step" hypothesis [34], which suggests that internationalization is a discontinuous rather than incremental process by taking an initial large plunge with considerable sunk costs. The big step theory additionally argues that firms choose to take the big step over a more gradual internationalization process because the opportunity cost dictates that lower risk factors translate into lowering corresponding returns with close neighboring markets [34].

3.2. Vanguard projects

Firms needing to adapt to environmental changes typically explore new business ideas or develop new products or services for emerging markets [11, 35]. When firms venture away from path dependency to initiate a program to diversify into a new or emerging market, Brady and Davis [36] define this as a ‘vanguard project’. Davies and Hobday [37] formerly dubbed these as ‘base-moving projects’ to emphasize that such novel initiatives recombine resources in order to discover, explore, and test new market opportunities [14]. Such vanguard projects may be an effective mechanism for testing opportunities, as well as mobilizing and integrating dispersed specialized knowledge residing within the firm [14]. The quintessential view of a vanguard project is that it acts as a trial vehicle for testing business diversification. Fredriksen and Davies [14] outlined two case examples to demonstrate that the aim of each vanguard project was to ‘search for new opportunities, develop some preliminary capabilities in a new but related business area and generate experience that would inform subsequent strategic decision making about whether the firm should build a portfolio of similar sized plant operations’ in the future. Their contributions to the field argued that such vanguard projects serve as an initial corporate entrepreneurial device to stimulate innovation in either new technologies or new markets. Although Frederiksen and Davies offered heuristic connections between corporate entrepreneurship and vanguard projects, they also acknowledged their propositions needed further empirical testing to support heuristic reasoning.

4. Methodology

This paper follows an inductive mixed method research approach, initially conducting focused literature queries followed by both a quantitative survey and a series of subsequent qualitative interviews. The quality criterion, contextuality, and validity of mixing and combining research methods has been fervently debated amongst key practitioners [38-40], yet this approach is defended with the rationale that in doing so the most profound empirical work could be uncovered within the limited population size. Whilst quantitative research aimed to produce generalizations from the larger sample, the limited scope of these activities demanded a qualitative method also be employed. The qualitative research component thus allowed us to uncover more compelling empirical evidence directly from respondents.

4.1. Case study interviews

The primary qualitative research method utilized for this paper is the case study. This method is preferred because it examines contemporary phenomenon in a real life context, especially when the phenomenon and context are not clearly evident [41]. A total of 12 interviews were conducted with electricity production firms’ management, board members, engineers, or consultants and other industry representatives active within these endeavors. The company level list of interviews is referenced in Appendix B. The case studies’ in depth interviews followed a semi-structured format that utilized primary guiding questions. The use of multiple respondents with disparate roles served to capture a variety of perceptions and meanings from diverging perspectives, which can be seen as a vital way to understand complex business decisions.

Table 1. Quantity of interviewees positions throughout Norwegian hydropower developer value chain

Project Manager	Board Member	Executive; Sr. Manager	External Consultant	Industry Representative	Governmental Representative
1	1	2	3	3	2

4.2. Longitudinal survey

A longitudinal quantitative industry survey was conducted in 2010 and updated in 2011. The survey was conducted by Energy Norway under the project titled *Energy and Development 2009-2011*. The survey consisted of a questionnaire followed up by personal communication with chief executives of regional energy producers throughout Norway. The questionnaire succinctly sought to answer the following question: Can the investment of hydropower production assets outside Europe be a future possibility for your firm?

Three firms with these types of activities were excluded from the sample due to existing knowledge regarding their strategic intent on the international scale (Statkraft, SN Power, Agua Imapara). However no statistical analysis was applied due to the fact statistical techniques demand large frequency of observations, which are lacking in a niche sector in a small country like Norway. A total of 19 firms were surveyed to uncover firm appetite in such new

international growth endeavors. The feature of prolonged engagement allowed us to observe if the attitudes towards internationalization had changed over time, and possibly identify what factors played into this shift.

4.3. Triangulation

Complementing the other two data sources into the mixed methods approach, document analysis was incorporated to utilize triangulation analysis as a means of providing corroborative evidence of various collected data [42]. Additional documentation came mostly from a series of personal presentations at business delegations and industry conferences from the companies analyzed. The presentations were considered to be of acceptable merit for inclusion based upon their corroboration with the other two forms of empirical data. In addition to utilizing the personal presentations as a means of providing corroborative empirical evidence, the third data set resulted in complementing the robustness of the other empirical work.

5. Results

From the triangulation of all data, Table 2 displays the level of internationalization in percentages of either capacity (MW) or generation (GWh). The full data table in Appendix A reflects both former activities and future international capacity and production ambitions at the country and project levels. Excluded from Appendix A is the associated timeline for these initiatives. A small number of these projects were undertaken before 2000, whilst the vast majority of operational projects were brought online within the past 5 years. When juxtaposing operational projects to those under development it becomes clear that for the firms with existing operational assets the testing of these vanguard projects has made the business case to pursue increased involvement in international activities.

Table 2. Firm level of internationalization as a percentage of capacity* or generation**

Firm	Current degree of Internationalization	Planned degree of internationalization by 2015
NTE ^{b**}	0,19%	0,99%
Tronder Power*	2,49%	23,81%
BKK ^{c**}	0,92%	11,94%
Statkraft Group*	5,14%	20,76%
SN Power*	100%	100%
Agua Imara*	100%	100%
Technor Energy	100%	100%
Tinfos & KF Gruppen	100%	100%
Clean Energy Invest	0%	100%
Miklagard Energy	0%	100%

As reflected in Table 2, three firms have extremely ambitious international growth plans. Tronder Power acquired the rights to develop their first project in 2008 in sub-Saharan African, with operational status being achieved merely a year later. Since that time it has set a capacity growth target in the same region for 100MW, equating to almost a quarter of its current domestic capacity in Norway. Tronder's first project was purchased from SN Power after tariff negotiations broke down in disagreement. The decision to sell off the rights allowed Tronder to move quickly, as most greenfield work was completed. Revisiting tariff negotiations resulted in Tronder securing a 17% IRR over the 25 year project lifetime under a BOOT^d structure, the end of which time the plant will be returned to the Government of Uganda.

In terms of production, the Statkraft Group and BKK are the first and fifth largest generation firms in Norway. BKK has been internationally active as far back as 2001 when they engaged into a multi-partner JV in Nepal. Further investments into projects in Nepal and Turkey alongside another joint venture result in half of the group's production growth strategy goals slated to come from abroad.

^b Nord-Trøndelag Elektrisitetsverk

^c Bergenhalvøens Kommunale Kraftselskap

^d Build, Own, Operate, Transfer

The Statkraft Group created two subsidiaries to organize and segregate their international expansion beyond European borders, SN Power and Agua Imara. SN Power has thus become a prominent international IPP player. With operations commencing 10 years ago, the firm has built up extensive knowledge of foreign electricity markets and forged a number of JV alliances that have enabled their growth in numbers. This proven track record attracted two domestic generation firms to JV into Statkraft's second subsidiary, Agua Imara. The fourth largest producer in Norway had begun an international expansion as far back as 1995, but decided to retreat after the World Bank concluded it would not extend a financial package for their project under development for various controversial reasons [43].

Four of the actors cited above are solely pursuing international activities with no domestic production capacity (six when decoupling the two subsidiaries from their parent companies). These latter "born globals" do not precisely fit within the traditional internationalization shift as previously proposed in section 3.3, on the contrary the firms were created solely for the purpose of capturing value within hydropower projects abroad. The ownership structure behind these firms or their special purpose vehicles reflects former or existing ties to the hydropower sector, although it cannot be said whether any possess existing portfolios of generation assets under control to draw equity upon.

The results of the survey suggested that in 2010 a total of six firms already possess existing investments in international hydropower projects, whilst three others were internally debating such prospects. When the survey was re-conducted a year later two other firms indicated a slow positive change in attitude towards internationalization, while two others indicated interest in assessing joint project venture opportunities presented to them.

6. Discussion

This article has explored the motivation for internationalization and the resulting efforts on behalf of the Norwegian electricity production sector. Three forms of methods were applied to produce the results in Table 1 and Appendix A. The firm and project level database table in Appendix A reflects limited activity on behalf of the smaller regional energy producers and a larger dual subsidiary approach from Norway's largest state owned player. Given their available financial, human, and network resources at their disposal, the results fit within heuristic reasoning. Firms that possess international ambitions that have the most capacity to undertake such activities should possess the highest levels of internationalization, dependent upon when their strategies were initialized and engaged. It need be duly noted that the largest state owned utility Statkraft, owns a large stake in a number of the regional firms. Therefore an interesting question for further research is: what level of ownership control does Statkraft exert upon the regional firms in which it possesses a considerable ownership stake?

An interesting facet of these firms' internationalization is the utilization of partnerships. Whilst a number of projects have been taken on solely, a large number of projects are owned in JV structures. Partnership selection thus becomes an interesting aspect of Norwegian hydropower IPP internationalization strategies. As one firm stated "our board does not have the risk tolerance for a standalone project, meaning that all international projects must be in some form of joint venture." Whilst the competitive landscape for customers and new generation capacity within Norway can clearly be recognized, these firms are quick to recognize that they are more resource solvent acting unilaterally abroad. Several generation firms with no current international activities indicated their precondition to engagement onto the international scale is impinged upon forging a successful partnership with a firm which also shares similar organizational vision and values and possesses local knowledge of the target country. In a first or future project round, the JV structure is thus considered to be an essential strategy component to further reduce risk exposure, even at the expense of sharing rewards.

Perhaps the most crucial JV partner is the Norwegian government fund for developing countries, Norfund. The organization is a hybrid state owned firm with limited liability, an innovative financing institution in its own right. The fund's objective is to provide capital for the development of economic activities in developing countries on commercial terms [44]. Norfund's higher tolerance for risk makes it the most likely candidate for JV partnerships given it has a mandate to invest in challenging markets with other partners, and has a strategic area focused on renewable energy investments.

The future of Norwegian firm level investments within international hydropower project ventures occurring in developing countries is impinged upon a variety of factors. From the case study interviews, longitudinal survey, and company level presentations at foreign market business delegations it can be clearly said that appetite for international expansion is firm specific, dependent upon forthcoming resource commitments to support ongoing domestic operations and risk tolerance.

One numerously cited challenge was that of international experience. These path dependent firms have only operated domestically since their inception, thus international competence was cited as lacking. Firms that have succeeded in promoting internationalization as a long term growth strategy have possessed a single 'champion' of the idea. These individuals propel the initiative at all levels, from winning over administrative approval by expending their

social capital within the organization, to successfully selling the board of directors on the growth strategy. It has been stated without these champions that possess unwavering enthusiasm for pursuing activities, the likelihood of organizational approval was bleak. In light of this, firms seeking international expansion must possess or acquire the key person(s) that possess the capability to win over colleagues and promote the expansionary activity, or defend it when it's greatest in jeopardy.

Given the level of risk inherent in these ventures, a critical consideration to make is the firms' board members' attitudes towards risk aversion. Many of the traditional energy producing firms in Norway have strong local political ties due to their regional public ownership, which results in significant political representation at the board level. The myriad forms of risk entailed in committing capital abroad encumber politically active board members. Acting as ownership representation, these board members are under pressure to promote regional growth through economic development and job creation. The prospect of investing abroad is therefore a politically hazardous activity for the board members, who view the activity as risking capital without producing regional economic growth or future employment creation. The ownership characteristic of the Nordic social democracy model begins to create tension when these firms begin to move beyond the geographic areas they were originally created to serve. Midttun et al. [46] argued that these Nordic companies will eventually have to expand in a wider geographic context, and thus when doing so they may have to diminish their components of public ownership to accommodate their new commercial positioning. Whilst each of the aforementioned firms in Table 2 has its own financial wherewithal limitations, the production and financial results of each international project invested into will be the linchpin within the decision of pursuing a strategy of replicate similar vanguard projects to build international portfolios of income generating hydropower production assets.

7. Implications

Managers facing the choice between pursuing domestic growth strategies through asset diversification and international opportunities must clearly define their internal competencies, risk-reward profile tolerances, and opportunity assessments. Firms with existing domestic profitable operational assets may find more security in domestic diversification rather than moving onto the international scale, where human resource competence is lacking within their organizations. To alleviate cultural risk and the cost of foreignness managers should seek out target country partners who provide them with the opportunity to gain local market knowledge and develop relationships requisite to pursuing penetration of those markets.

Several entrepreneurs in Table 2 that lack a domestic base of production asset operations are solely pursuing projects in the global marketplace. These niche opportunists seek to bridge the divide between their international business network connections and identified project prospects, and the incumbent generation utilities who seek reputable partners to JV with in navigating target markets.

Therefore business opportunities exist on both ends of the business continuum, with entrepreneurial actors on one end providing local knowledge and investment opportunities, and incumbent utility generation companies on the other bringing the required financial and engineering competence to bring such hydropower project ventures to operational fruition. This article has contributed empirical based work to the vanguard project model theory suggesting that testing of international project opportunities is proving to be one avenue for achieving company level growth amongst Norwegian based hydropower project developers.

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Appendix A. Full project data table

Firm	Country	Project	Stake (%)	Operational Capacity (MW)	Annual Production (GWh)	Stake MW	Gwh stake	Cost (MUSD total)	Under development (MW)	Est. Production (GWh)	MW stake	GWh stake
Tronder Power	Uganda	Bugoye	73 %	14,4	82	10,44	59,45	63				
	Uganda	Kikagati	100 %						14		14	
	Uganda	Nsongezi	100 %						20		20	
	Uganda	Mubuki 1	100 %						5		5	
			Agua Imara	19 %								
NTE	Montenegro	Glava Zete	49 %	4,5	11,8	2,2	5,7	10,7		63,1		30,9
		Slap Zete	49 %	1,2	3,8	0,5	1,8			16,9		8,2
BKK	Nepal	Khimti-1	26 %					140,2				
	Nepal	Kirne	100 %						67	50	67	50
	Turkey		100 %							250		250
Norfund	Uganda	Agua Imara	20 %									
		Bugoye	28 %	14,4	82	3,96	22,55					
		Agua Imara	10 %									
Clean Energy Invest	Georgia	SN Power	40 %									
		Shuakhevi	100 %						175	500	175	500
		Koromkheti	100 %						150	450	150	450
Statkraft	Georgia	Chorokhi	100 %						70	265	70	265
		Turkey	Kargi	100 %					102	467	102	467
		Turkey	Cetin Main	100 %					401	1400	401	1400
	Turkey	Cetin Lower	100 %					116		116		
	Turkey	Cakit	100 %	20	95	20	95					
	Albania	Devoll 1	50 %						173	1000	86,5	500
	Albania	Devoll 2	50 %						138		69	
	Albania	Devoll 3	50 %						28		14	
	Laos	Theun Hinboun	20 %	210	1100	42	220					
	Laos	Theun Hinboun2	20 %						220		44	
SN Power	Bosnia	Vrbas							75	450		
		SN Power La	60 %									
		Chile	Confluencia	50 %	158	672	79	336	350			
	Chile	La Higuera	50 %	155	761	77,5	380,5					
	Chile	Colmito	50 %	60	350	30	175					
	Chile	Trayenko							600	2628		
	Peru	Arcata	100 %	5	37	5	37					
	Peru	Cahua	100 %	43	280	43	280					
	Peru	Gallio Ciego	100 %	37	150	37	150					
	Peru	La Oroya	100 %	9	65	9	65					
	Peru	Malpaso	100 %	54	200	54	200					
	Peru	Pachachaca	100 %	9	43	9	43					

	Peru	Pariac	100 %	5	24	5	24		
	Peru	Yaupi	100 %	108	800	108	800		
	Peru	Cheves Allain	100 %	168	837	168	837	400	
	India	Duhangan	49 %	192	800	94,08	392		
	India	Malana	49 %	109	375	53,41	183		
	Nepal	Khimti-1	57 %	60	350	34,26	199	802	
	Nepal	Kirne	100 %					60	60
	Nepal	Tamakoski 3	100 %					880	880
	Sri Lanka	Assupiniella	30 %	4	17	1,2	5,1		
	Sri Lanka	Belihuloya	30 %	2	10	0,6	3		
	Philippines	Ambuklao	50 %	105	332	52,5	166		
	Philippines	Binga	50 %	124	419	62	209,5		
	Philippines	Magat	50 %	381	929	190,5	464,5		
		Agua Imara	51 %						
Agua Imara	Panama	Bajo Frio	50 %					58	260 29 130
	Zambia	Mulungushi	51 %	28,5	250	14,535	127,5		
	Zambia	Lunsemfwa Lower	51 %	18	160	9,18	81,6		
	Zambia	Lunsemfwa	51 %					100	
	Zambia	Mukuski	51 %					100	
	Mozambique	Alto Malema						55	
	Mozambique	Massingir						27	113
Technor Energy	Bosnia-Herz	River Bosna						85	420

		MW	GWh
SUM TOTAL	EXISTING	1216	5564
L	FUTURE	3135	4051 ^e

Appendix B. Qualitative empirical data collection

1. Norwegian Water Resources and Energy Directorate (NVE), September 2011 Trondheim. Selected interviews with personnel
2. Tronder Power Ltd., November 2011 Trondheim. Selected interviews with personnel
3. International Centre for Hydropower (ICH), November 2011 Trondheim. Selected interviews with personnel
4. Multiconsult AS (Norplan), November 2011 Trondheim. Selected interviews with personnel
5. Energi Norge, December 2011 Oslo. Selected interviews with personnel
6. Norwegian Agency for Development Cooperation (NORAD). December 2011 Oslo. Selected interviews with personnel
7. Norwegian Renewable Energy Partners INTPOW, December 2011 & February 2012 Oslo. Selected interviews with personnel
8. Sogn og Fjordane Energi, December 2011 Sogndal. Selected interviews with personnel
9. SN Power, February 2012 Oslo. Selected interviews with personnel