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The Effects Of Innovation On Business Performance In The Construction Industry : An Empirical Study In Pakistan

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Abstract:

Purpose- Based on the research of 94 Pakistani construction enterprises, this work aims to objectively verify the relationship between a organization's level of innovation and its performance. According to research findings, management, process, and product innovation benefit a organization's performance. Innovation is proven to be a way to get an advantage in this aspect, competitive and long-lasting. Entrepreneurs may find this study interesting because innovation is required to promote growth in this industry. For public governments to effectively fulfil their mandate of fostering economic activity and development, and by initiatives to encourage innovation, the Pakistani economy can become more competitive.

Materials and Methods - The industry wide survey had a sample size of 376 (44 public clients, 22 engineering and design consultants, 54 construction management consultants and 123 contractors). Data analysis was done by SPSS 20 and SPSS AMOS 20, through structural equation modelling of 32 construction organizations of Islamabad,

Findings - The results were significant and all the hypotheses were accepted. Moreover, they showed that inter-organizational learning drives innovation that ultimately increases the performance of the organization.

Research Limitations – The study was limited to three cities of Pakistan including Lahore, Karachi and Islamabad.

Practical Implications –A significant implication for business practitioners and researchers is the knowledge regarding the significance of inter-organizational learning for the improvement of construction industry of Pakistan. It was also specific to construction industry.

Keywords: performance, competitive advantage, construction industry.

Introduction:

The construction industry in Pakistan is significant from a socioeconomic standpoint due to its employment and GDP contributions and the substantial multiplier effects it has on other areas of the economy. The industry changes during the cycle's expansion phase into one of the main, positioning itself as the sector most affected during the recession phase at the heart of the crisis, with significant reductions in construction activity. Therefore, it would

appear absurd that, even though the construction industry contributes significantly to the economies of Pakistan and most other nations, investment in innovation in this industry is lower than that of other, less critical economic sectors. Nevertheless, there has been increasing pressure on the construction industry to be more creative and provide clients with better value for their money. Various industrial traits seem to impede development and make innovation more challenging (Haseeb et al., 2011; Rafique & Mehmood, 2022).

Thus, for instance, innovation in this type of organization is believed to perform at a minimum level compared to other industries and is frequently categorized as a costly investment. Because the criteria used by clients to allocate projects tend to be oriented on obtaining the lowest costs and, additionally, the organizations complete "unique" projects. They are required to modify their processes and resources individually (Rafique et al., 2017).

The acceptance of innovations is crucial in a liberalized and globalized market, since the current innovation gap in the construction industry, compared to other sectors, undermines the industry's competitiveness. Therefore, finding ways to boost innovation in the construction industry is always interesting. As a result, the sector's businesses face the challenge of honing their successful innovation execution skills to serve client needs better and boost their ability to compete. Numerous empirical studies exist in the literature on the connection between company innovation and performance. The research was done on businesses in the construction industry in various temporal and geographic settings (Xue et al., 2022).

In this regard, studies that examine the connections between performance, excellence, and innovation in Portugal; are the impact of innovation on production efficiency. The enhancement and measurement of creation to be evaluated performance and operational performance comparison of innovation e construction performance and other sectors and the relationship between classes of innovations an Inventiveness and its effects. Innovation, client happiness, business competitiveness, and small-performance construction enterprises are all characteristics of small construction organizations. Portuguese contractors' competitiveness and financial success (Cabrera-Suárez et al., 2018).

In the Pakistani situation, it is possible to examine some modern works that cover a variety of subjects.

It is related to innovation and construction activities, including innovation and competitiveness, the standardization of innovation and its effects on the organisation, knowledge management, business profitability, and customer satisfaction. Innovation and concentration as the primary strategic tool and the generation of scale economies and the systems approach to innovation and construction (Arnett et al., 2013).

This study examines how innovation affects business success in the Pakistani construction industry, exploring innovation in management, processes, and products separately(Antunes & Pinheiro, 2020). An empirical study is conducted to complete this task, using a sample of 94 Pakistani construction enterprises as a reference. As it demonstrates the necessity to set up procedures that foster the organization’s innovative mindset and achieve a balance between growth and profitability, the research adds additional empirical data to the literature on the Theory of Resources and Capabilities(Antunes & Pinheiro, 2020; Asamoah et al., 2021).

Constructing the theoretical framework is the first step in the work's organization, followed by a study of other studies' empirical findings and a research hypothesis approach. Second, the technique is revealed, including how the sample was obtained, how measurement data was gathered, and which variables were employed. In the third section, the results are analyzed together with the conclusions drawn, the work's limitations, and potential directions for future study (Asamoah et al., 2021).

Theoretical foundation and earlier actual research

Two research vantage points can be considered when studying a organization's strategy: the structural approach and the resources and capacity method. A structural approach looks at how a company interacts with its environment by the tenets of the industrial economy, taking into account how the sector's structure affects the performance of the businesses that operate there and how, as a result, the organization's source of competitive advantage would come from outside the country. Instead, the theory of resources and capabilities concentrates on examining variations in firm performance and determining the amount to which the company owns or has access to resources and capabilities that can set it apart from its rivals by favouring better yields (Haseeb et al., 2011).

The diversity of businesses in terms of resources or potential discrepancies in performance is explained. Therefore, depending on each organization's capacity to generate income consistently or how the powers are used for distribution and resource combining, both gaining competitive advantages and the variation in returns between companies in a given sector would occur within the company(Hao & Feng, 2018). As a result, the conceptual framework for this research is the analysis of resources and capabilities, which also serves as a vital instrument for internal analysis and the design of the organization's strategy.

Since a organization's strategic behaviour to adapt to changes, which determines how you manage your resources and the current capabilities and those you decide to develop in the future, is a crucial component of obtaining competitive advantages, they must preserve and improve their performance differential. The environment may have an effect on how the organization's productive fabric develops, but it doesn't change the fact that it does. Analysis of resource and skill development, considered the primary source of competitive advantage for firms and in which learning plays a crucial role, is a factor that has gained significance. The organization's capacity for organization and innovation and its ability to respond to environmental changes. This means that it places a lot of emphasis on the organization's capacity to integrate, grow, and reconfigure its endowment of resources and capabilities to respond quickly to environmental changes. In other words, one of the critical sources of competitive advantage is innovation capacity while creating new resources and abilities. Furthermore, you can add features to the product valued by customers or acquired for fewer money thanks to these resources and talents. In addition, as the implementation expenses can offset the performance generated from the innovation strategy, the cost of resource development or acquisition must be lower than the advantage they bring (Rafique & Mehmood, 2022).

Product innovation and performance:

A relationship through 20 project case studies, the construction industry in the Pakistan discovered the elements that influence and permit the assessment of innovation in goods as well as those that promote and support innovative improvements. Projects that successfully meet and surpass cost, quality, timing, and safety targets result from innovation. Significant businesses have the potential to profit from creation, and in a market where competition is fierce, they must innovate to stay competitive. Examine the variables that affect the growth and adoption of innovations in the construction industry, where 233 novel and 233 novel products have been found.

The poll revealed the elements most conducive to the development and spread of practical innovation, including lower costs, the creation of competitive advantages, improved quality, and increased productivity. Practical benefits include better production and improved quality. They investigate the connections between product innovation strategies, diversity, and performance development. A sample of 93 Iranian construction SMEs is used. They concluded that aggressive, proactive, analytical, and

futuristic innovation strategies impact the growth of industry performance. Additionally, bold, risk-taking, and futuristic techniques are more effective at producing different results. This study serves as a paradigm for big innovation strategies that significantly affect the performance of industries.

Considering the situation of construction firms based on modest projects, we studied seven modest firms' innovation pursuits. It has been demonstrated that the innovations in these firms directly correspond to their operational activities and are driven by owners who use extremely limited resources to make progress in between gaps or empty spaces that do not interfere with their regular operations. No matter the organization's size, innovation is typically driven by the desire to take action and enhance performance. For small enterprises, this means finding a way to guarantee more than just the operations' existence while stabilizing consumer happiness.

In light of the contributions mentioned, the following first working hypothesis was proposed on product innovation:

H1: The performance of enterprises in the construction sector is positively impacted by innovation in their goods.

Process innovation and performance: a relationship

In a constructed sample of the 110 most significant public works contractors in the Portuguese construction sector between 1996 and 2009, study performance and the characteristics that foster excellence in its construction and innovation processes. The findings show that innovative businesses typically have high levels of profitability. While maintaining this status over the long term is challenging, some companies have managed to do so and retain a respectable level of innovation. Conducted a further examination into process innovation by examining construction innovation by applying the Japanese-origin Lean Construction approach, which aims to improve production efficiency throughout all processes(Hao & Feng, 2018).

It is approximately to minimize costs through waste reduction, innovation, and workplace organization to be more effective. Construction procedures' innovation led to waste, effort, and time reduction improvements. As a result, it dramatically impacts increasing competitiveness and resource utilization efficiency. On the other side, contend that construction firms can enhance their competitiveness by faking advances that increase consumer demand and cut building costs. They have created models of innovation systems, for manufacturing enterprises e of the building, via the examination of statistical data from 18 nations of the Organization for Economic Cooperation and Development (OECD) and interviews with experts in Singapore(Rafique et al., 2017).

A sustained competitive advantage may be created when construction companies increase productivity, which lowers costs. More excellent lead times and construction expenses. This would presumably result in improved performance. Considering the contributions above, the following is the second working hypothesis:

H2: Your performance is positively impacted by innovation in the procedures created by businesses in the construction sector.

The link between performance and management innovation

Analyze the connection between 23 organizational strategies in 383 Australian construction enterprises and the return of innovation in research on innovation in management. The most prestigious and inventive business methods include investing in research and development, joining associations and project alliances, ensuring that learning is transferred, keeping an eye on global best practices, and hiring new graduates. Conducted a study in Pakistan on the standardization of innovation and its impact on the structure of the construction industry, knowledge management, financial success, and customer satisfaction.

The study method of chance is utilized in the research to compare theory and reality during three years in a Pakistani contractor(Hao & Feng, 2018).

The findings imply that standardized innovation management improves the organization's organizational structure, e Additionally, this development makes it simpler to consistently fix administrative issues, which boosts technical proficiency, knowledge management, firm profitability, and client happiness. Consider the case of the appropriation of innovation and performance in small construction enterprises, and argue that the inventive version of small businesses has a significant impact on the growth in performance generated by innovation in the construction sector (Haq et al., 2022).

The study's findings emphasize how crucial business owners are to the success of innovation. Small construction enterprises must transition to social contexts where they may find support. To do this, they must integrate market positioning, work organization, technology, and human capital into their business plan—the relationship between strategy, performance, benefits, competitiveness, and innovation in the construction industry. To simulate strategic decision-making in a construction company, they created a model that links perceptions of the corporate environment to numerous issues connected to the agency's strategy.

They conclude that specific perceptions of the business environment and business strategy variables are highly connected with capacity for innovation but that the relationship between innovation and results still needs to be confirmed. Numerous businesses bring novel ideas in information, building, and business procedures, giving them a competitive advantage. To propose a breakthrough for improving production quality and obtaining the most excellent value for all customers, stakeholders, and end users, the case of rehabilitation in the building sector in Northern Cyprus. If appropriate measures are taken, how engines change to improve innovation can assist construction companies(Xue et al., 2022).

The third working hypothesis is H3: Construction sector organizations' management innovation has a favorable impact on your performance, considering the contributions above.

Research Methodology

Gather data and do data collection

The sample size was chosen to provide a 95% confidence level and a maximum margin of error of fewer than 10 points for percentage estimates (relative response frequency in a question-specific element)—the method of collecting. The information was obtained through a personal interview with the company management utilizing a facilitated self-mediatic questionnaire. The control tests were carried out during the processing of the survey fieldwork. It was conducted from April to September 2011, and 94 companies made up the final sample. The activities' configuration and sample size are shown in Table 1. The information from the Central Directory of the Company Ines was used to determine the number of businesses in each of the resistants created.

Measuring different variable

The organizational performance or variable performance

To measure the performance of firms on a global scale, numerous financial, operational, and other approaches and instruments have been developed; some of those

Table 1: shows the sample's distribution.					
Kind of activity	**Micro from 1 to 10 workers**	**small of 11 to 50 workers**	**Median 51 to 200 workers**	**Number of Deal**	**% of the total**
Preparation of the works	3	3	0	6	6,4
General construction of buildings and works of civil engineering	17	22	2	41	43,6
Structures of Buildings and works	21	15	0	36	38,6
Finishing of buildings and it works	7	3	1	11	11,7
Total	**48**	**43**	**3**	**94**	**100**
Source: original work					

The majority of them are objective, that is, they are derived from facts or data, such as the accounting and budgeting systems or the overall control system (balance scorecard); Others are subjective since they are compiled from the perceptions or points of view of the participants in business operations, as well as, occasionally, from outside observers. Accordingly, it can be claimed that no consensus exists at this time about an indicator that can be used to quantify performance generally (Xue et al., 2022).

Model by Quinn and Rohrbaugh

One of the approaches used to measure organizational performance is widely recognized since it allows Examine the organization's performance from a multidimensional standpoint using four dimensions that illustrate the balance that any organization must seek between flexibility and control as well as between the accomplishment of internal and external goals. The model establishes a framework for the analysis organization and shows that the efficiency criterion is applicable. It has three dimensions or axes. First, there is the approach of the organization, which shifts from an insider's perspective (based on a micro view of the property understanding and development of

individuals) to an outsider's perspective (macro-level emphasis on business success).

The second one, which focuses on organizational structure, emphasizes the organization's stability and adaptability. The third refers to the goals and means of the organization. I created the following four models from the combination of these three dimensions:

*** Internal process model:** examine business performance from an internal perspective, emphasizing control, stability, and information sharing. This model considers the evolution of variables such as personnel task organization, internal operational process efficiency, and product and service quality.

*** Open system model:** examines the operation of the business to track the development of its adaptability from the outside, with growth as its primary goal, as well as the acquisition of resources and outside assistance. Model concentrates his emphasis on elements including customer happiness, how quickly an organization adapts to environmental changes, and changes to the organization's and its products and services perceptions.

*** Rational model:** evaluates the organization's performance by focusing on control from a single point from an outside perspective and focusing on efficiency and productivity standards. The model examines changes in variables, including market share, profitability, and firm productivity.

*** Human Relations Model:** Focus on flexibility from an internal perspective when analyzing firm performance, with the development of human resources as the primary goal. The model is happy to consider changing factors, including employee satisfaction, staff turnover, and absenteeism.

Quinn and Rohrbaugh's suggested organizational performance measuring paradigm is shown in Figure 1. The approach developed by Quinn and Rohrbaugh has been widely applied internationally, related to factors including organizational culture, corporate competitiveness, and creativity. To analyze the various models in this work, 12 elements (three for each model) with a type of scale were used.

On a scale of 1 to 5. The arithmetic mean of the three components is used to create the variable that each model represents, resulting in a theoretical range from 1 to 5. Validate Through the widely used Cronbach's Alpha statistic, which evaluates reliability concerning a set of two or more parts of a construct; these metrics confirm the validity of the balance. Values are between 0 and 1. The acceptable range is 0.60 to 0.70, with 0.60 being the lower limit—table 2 displays information about the items utilized and the results of each scale's validation. The statistics' partial and total values demonstrate the reliability of the employed scales.

Source: Quinn and Rohrbaugh (1983) p.369.

Table 2. Performance variables.

	Explain how the following aspects changed during the past two years in your company: (1 = extremely bad, five = very favorable)	validation scales
Internal process model	- Improved goods quality -Improved internal process coordination -Improved task management on a personal level	a de Cronbach = 0.845

Open System Model	- Increased client satisfaction Improve the organization's reputation and that of its people and products. - Greater ability to respond to market demands.	a de Cronbach = 0.849
Rational Model	Market share growth, profitability, and productivity improvements	a de Cronbach = 0.858
Human Relations Model	- Increased employee motivation Reduced staff turnover (employees who leave their jobs voluntarily) and absenteeism at work	a de Cronbach = 0.786
total model		a de Cronbach = 0.838
Source: self-produced.		

Innovation variable

There are two ways to gauge a organization's level of innovation: one uses quantitative data, such as the number of patents, and the other looks specifically at product innovation (number of new products) or process innovation (investment costs). A focus is based on how the manager or business owner of the company feels about the organization's unique enterprise. We undertake research using a subjective methodology because the target tends to undervalue small enterprises' capacity for innovation. This is especially true when these are SMEs. For example, the European Union Harmonized Innovation Study also employed this strategy.

The various concepts assembled in the review of the works were considered to analyze this component in the survey, emphasizing that innovation may be categorized as technological and organizational. On the other hand, corporate innovation corresponds to changes in the organization's administrative structure, marketing, etc. Technological innovations include substantial innovations in products and processes. Similar classifications have been utilized in several construction-related undertakings.

A multi-item multi-criteria measure with a Likert scale of five points (from 1 = marginally necessary degree of innovation to 5 = significant degree of creation) was used for each form of the invention to assess the degree of innovation in products, processes, and management. Marketing new products and updates or improvements to current products or services make up the arithmetic mean of product innovation variable. The typical two-item math that makes up the process innovation variable is (1) changes or enhancements to manufacturing processes and (2) purchasing new equipment.

Additionally, the three-item average arithmetic for the management innovation variable is (1) management, (2) purchases and supplies, and (3) trade and sales. To validate these measures, the reliability of the scales is checked using Cronbach's Alpha statistic (Table 3). The partial and total values of the figures indicate the validity of the scales used.

Control variable

Size: This variable's value was determined by converting the average number of employees

for 2010 into logarithmic form. Among other metrics, such as the number of years since the organization's founding or the start of its activity, the number of employees has been frequently employed as a size assessment in this line of work.

Table 3. Innovation variables

	Describe the level of innovation used by your organization over the past two years: (1 = Not important at all, 5 = Very crucial).	validation scales
innovation in products	(1) Product updates, enhancements, or new services (2) Advertising for fresh goods.	α de Cronbach = 0.726
Innovation in processes	(1) Productive process changes or improvements (2) Purchasing new equipment	α de Cronbach = 0.633
Innovation in management	(1) Address administration, (2) Buying and supplying, e (3) Business and sales	α de Cronbach = 0.806
Source: self-produced.		

Analyzed model

Consider the following research paradigm to evaluate the ideas put forth in this work:

Yi = b0 + b1 innovation i + b2 size i + b3 age i +εi

Dependent Yi

Rpi Performance internal processes

Rsa Open system performance

Rr rational performance

Hr Human resources performance

Rgl Overall performance

Control

Size The number of employees' logarithm

Age Years from the establishment or beginning of the business

Explanatory

Iprod product innovation

Iproc Process innovation

Iges Innovation in management

Analyzing the findings

Table 4 displays the findings of the calculations made about the linkages between the five performance systems and the three categories of innovation (products, processes, and management) (internal operations, open system, rationality, human relations, and global

performance). The estimations were derived from multiple linear regressions with MCO. To rule out the possibility of multicollinearity, all models first verified that the regressors had an inflation variance factor (VIF) of less than 1.08 (1.077).

Table 4. Innovation and performance Number of observations: 94

	Performance Models				
	internal processes	Open system	Rational	Human relations	Overall performance
Innovation Products	0.325*** (3,234)	0.405*** (4,176)	0.228** (2,257)	0.397*** (4,067)	0.411*** (4,262)
Size	0.106 (1,039)	0.084 (0.857)	0.237** (2,320)	-0.034 (-0.342)	0.118 (1,211)
Age	0.003 (0.029)	0.030 (0.308)	-0.077 (-0.744)	0.051 (0.513)	0.002 (0.021)
highest FIV	1.060	1.060	1.060	1.060	1.060
F	4.028***	6.461***	3.535**	5.880***	6.825***
adjusted R2	0.090	0.151	0.076	0.137	0.160
Innovation processes	0.297*** (2.909)	0.342*** (3.404) 0.041	0.311*** (3.120)	0.342*** (3.389) -0.077	0.394*** (4.006) 0.069
Size	0.068	(0.407) 0.050	0.197*	(-0.748) 0.070	(0.689) 0.017
Age	(0.658)	(0.494)	(1.953) -0.077	(0.686)	(0.176)
highest FIV	0.016 (0.160)		(-0.769)		
	1.062	1.062		1.062	1.062
	3.351**	4.474***	1.062	4.177***	6.104***
F	0.071	0.102	5.172***	0.094	0.143
adjusted R2			0.120		
Innovation Management	0.206* (1.963)	0.247** (2.374) 0.044	0.238** (2.326)	0.364*** (3.624) -0.096	0.325*** (3.202) 0.064
Size	0.072	(0.415)	0.197*	(-0.936) 0.083	(0.619) 0.038
	(0.672)		(1.894) -0.060	(0.826)	(0.374)
	0.034		(-0.586)		
Age	(0.325)	0.070 (0.671)			
highest FIV	1.077	1.077	1.077	1.077	1.077
F	1.791	2.453*	3.648**	4.732***	4.132***
adjusted R2	0.025	0.045	0.079	0.108	0.093

The value of the t-student statistic is shown in parentheses beneath each standardized coefficient.
* p≤ 0.1; ** p≤0.05; ***p≤0.01

Source: self-produced.

For all performance models based on internal processes (0.325 ***), system open (0.405 ***), rational (0.228 **), human relations (0.397 ***), and total performance (0.411 ***), product innovation has related coefficients that are positive and substantial. This suggests that

marketing new items or revisions to existing products or services results in greater performance from businesses in the construction industry. In this regard, the first theory put forward can be confirmed. Internal processes, the open system, the rational, the based on human connections, and the global model are all found to have overall validity since the values of F were substantial (FA = 4028 ***, FA = 6461 ***, FA = 3535 **, FA = 5880 ***, FA = 6825 ***).

For performance models based on internal processes (0.297 ***), system open (0.342 ***), rational (0.311 ***), human interactions (0.342 ***), and global performance (0.394 ***), process innovation is similarly linked to favourable and significant coefficients. This shows that your performance improves noticeably when manufacturing procedures are modified, or businesses purchase new equipment in the Pakistani construction sector. This further supports the second posed theory. As for the overall validity of the model, it is valid for all models considered, including internal processes (F = 3.351 **), system open (F = 4.474 ***), the rational (F = 5.172 ***), the one based on human relations (F = 4.177 ***), and the global model (FA = 6.104 ***), because the values of F were significant.

Finally, all performance models based on internal processes (0.206 *), open systems (0.247 **), rational (0.238 **), human relations (0.364 ***), and global performance (0.325 ***) have positive and significant coefficients related to innovation in management. This suggests that management innovation, including management of procurement, suppliers, and commercial and commercial management, leads to more building being performed by businesses in the industry. Regarding the overall validity of the models, the open system (F = 2.453 *), the rational (F = 3.648 **), the one based on human relations (F = 4,732 ***), and the one based on overall performance (F = 4,132 ***) were found to be valid.

The case size variable of the rational performance model, which was positive for all types of innovation studied—products, processes, and management—emerged as the only control variable with statistical significance (0.237 **, 0.197 *, 0.197 *).

This demonstrates that, in the case of Pakistani construction enterprises, the larger the organization, the more innovation types generate a gain in market share, profitability, and productivity.

Conclusions and Implications

Innovative businesses are more adaptable and heavily measured, which enables them to better adapt to environmental changes, respond quicker and better to needs changes in society as a whole, and produce superior outcomes. Innovation is, therefore, essential to the long-term performance of the business environment in the construction sector. Using a sample of 94 organizations, this paper examined the relationship between innovation and the implementation of businesses in the industry in Pakistan. Research in this way adds to the body of knowledge on innovation based on the Theory of Resources and Skills in the context of the Pakistani entrepreneurial fabric. The empirical studies applied to the buildings are pretty limited.

Regarding innovation and its impact on productivity, it can be deduced from this study that innovation in products, processes, and management has a positive and considerable effect on the productivity of the Pakistani construction industry's businesses. In this regard, the findings are consistent with numerous empirical studies that have been conducted in the past, performed internationally, and used as a guide when formulating the hypotheses, which found that, generally speaking, innovation has a positive impact on the external performance of the business and its implementation.

The conclusions from this research can be helpful for entrepreneurs in the industry because they outline the kinds of innovation projects they should support in their businesses

to increase their competitiveness and profitability. It provides new perspectives on the significance of bolstering their programs to promote innovation to bridge the gap that currently exists when compared to other sectors of activity, which affects the competitiveness of the industry and the profitability of businesses, to public administrations in their role of promoting economic activity, growth and competitiveness of the Pakistani economy.

The study's primary flaw is that it only included company executives when it would have been wiser to welcome participants at various levels to reduce the likelihood of perceptual bias. The examination of additional control factors, such as the gender of the firm management, his educational background, the possibility of the company being a family or not, etc., could be added as a further development of this work.

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