

Stakeholders' Analysis, a Key Tool in Feasibility Study of Waste Management Projects

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EXECUTIVE SUMMARY

Environmental aspects of human activities have been intentioned more in recent years and increasing consumption and ever increasing amount of waste have great impacts on this matter (2007b). Due to this fact, sustainable waste treatments have been developed and waste minimization and consumption reduction are considered as the most sustainable solutions. These methods are focused on preserving environment as the core issue. Waste management system as the whole process of collecting, processing and controlled waste disposal covers all above approaches.

Despite of many efforts and investment in waste management systems, the effectiveness of these systems are not satisfying. Amount of landfill as a main indicator for effectiveness of waste management systems as well as environmental impact is still high. The amount of 50% (and more) landfill can be seen worldwide as the main solution for municipality waste. This problem is a worldwide issue and can be seen not only in developing countries but also in developed countries. It shall be added that large numbers of communities have no sanitary and controlled landfill yet. Although, EU landfill directive forces members to reduce their landfill to 35% of amount at 1995 by 2016 (2007b), but there is a wide difference between members, for example more than 80% landfill in Northern Ireland compare to less than 6% in Borås (2007b). Moreover to landfill amount, the cost of waste treatments methods and resources required such as training and awareness as well as the time consumed for implementation is varied from one city to another city for similar projects and methods.

This paper is part of a academic research about quality perspective into waste management systems which discuss about application of stakeholders' analysis as a tool for increasing the effectiveness of waste management systems. This tool has been applied by some researchers in analysis of service sectors including municipal and industrials waste management systems (1995, 1999, 2000, 2004c, 2006, 2007a, 2009b).

The reasons for different results and time consumed in similar projects in Mashhad - as a pioneer city in implementing new waste treatment methods in Iran- and Borås - as one of the best cities in waste management among Swedish municipalities- as well as the relative ineffectiveness of activities in Mashhad has been analyzed. Stakeholders' analysis has been conducted in Mashhad

waste management system and results have been compared with similar system in Borås. Public information provided by responsible organization for waste management plus interviews with responsible managers, experiences of living in the mentioned cities and scatter data, news and reports has been used within this research. Comparison of stakeholders' power and importance in Mashhad and Borås has been used for analyzing of different results at similar projects and activities.

This research highlights the importance of identification of all stakeholders and their needs, consideration and integrating their legitimate needs into planning of waste management projects. Comparison of stakeholders in Borås and Mashhad shows the effects of stakeholders specially those who have not been considered in effectiveness of similar waste management projects. These results also confirm importance of stakeholders' analysis and its application prior or during planning of future projects specially those projects which are bench marked from other cities.

INTRODUCTION

Background

Mashhad is the second populated city (2.4 million inhabitants, 2008) in Iran which produces 1700 tons of waste daily (2009c, d). Fluctuation in waste volume is the main characteristics of waste management system in Mashhad. Due to large number of pilgrims and tourist in national and public holidays, this amount increases up to 2400 tons/day (2009c, d).

Recycling organization of Mashhad municipality (hereafter as ROOMM) has been established on 1996 with goal of collecting, sanitary disposal and treatment of waste by establishing a composting factory which diverts 300 tons/day of degradable waste into compost (2009c). Main part of solid waste including recyclable waste has been collecting by large number of waste collectors since decades before. There is no confirmed information about number of these waste collectors.

ROOMM has implemented and developed several projects such as establishing special recycling factories for PET, paper, and plastic waste during 2003 to 2009, the first biogas power plant in Iran at 2009 and Sulphur enriched granule compost factory at 2009. This organization also started household waste sorting from origin since 1999. At 2008, ROOMM has sent about 70% of waste into the old landfill site located 5 Km from the city and new landfill site which is 50 Km far from the city. Biogas power plant burns methane gas collected from the old landfill site. The emitted gas was burned into the air since some years ago (2009c).

Borås in South West of Sweden have 100,000 inhabitants which make it as the 13th most populated city in Sweden. Attempt for waste management in Borås has started at the end of 80's decade by training households to sort their waste. Since 1992, city hall has operated the first waste treatment plant which has treated 174,000 tons of waste at 2005. There is also a main site for incineration (Borås energy och miljö AB) which provides distance heating and cooling as well as electricity for houses, offices and industries in Borås municipality (2007b). There are also centers for collecting and treating households' staffs and unused articles as well as hazardous waste which are sent to other cities for treatment. Waste treatment processes in Borås are included of incineration, composting, biogas production, as well as recycling. Borås municipality has land filled less than 6% of its total waste at 2005 (2007b, 2008d), which ranks it as one the best performances in Europe.

Among all similarities and differences in waste management systems in Mashhad and Borås, there are some similar projects which show different results and implementation time. Table 1 list a short timeline of activities in Mashhad and Borås.

Table 1 of timeline of waste management in Borås and Mashhad

	Borås (2007b), (2008d)	Mashhad (2009c)
Late 80 s	Sorting of household waste in small scale	
1991	Landfill as high as 75%	
1992	First waste treatment plant	
1994	Sorting from origin covers whole city	
1995	First Biogas reactor - shut down later	
1996		Establishment of ROOMM – Composting factory
1997	Landfill reduced to 10%	
1999		Sorting from origin started in small scale
2005	Second biogas plant started working	
2006	Landfill reduced to 6%	Paper, PET & Plastic recycling factory
2007		Burning methane gas at landfill area
2008	Landfill reduced to 4%	New landfill site
2009		Biogas power plant - Granule compost factory
2009	Landfill <6% Sorting from origin about 100%	Landfills 50-70% Sorting from origin > 6%

Table 1 shows at least three major differences in waste management system in Mashhad and Borås which are: Different views about the importance of training in projects; Ineffectiveness of sorting from origin in Mashhad; and different amount of landfill in Mashhad and Borås.

Process Map

Figure 1 illustrates main processes (product realization) in Mashhad waste management system. Solid lines represent those activities which are managed by ROOMM since dashed lines are managed or executed by traditional system or unknown methods. It can be understood from the mentioned process map that, there are unorganized activities in all groups. There is no confirmed information about the volume of waste treatment and disposal beside the ROOMM borders.

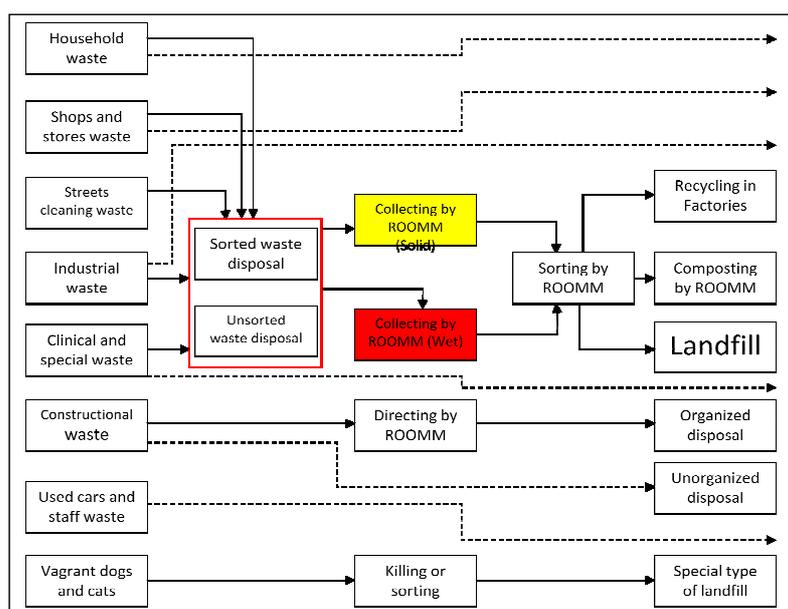


Figure 1 of process map for main processes in Mashhad waste management system

A main group of activities are conducted by traditional waste collectors who are active many years before establishment of ROOMM. Traditional waste collectors are newly called “waste finders” disturb the system by buying solid waste from citizens and even ROOMM employees, or they steal solid waste from waste boxes before arriving the special truck for collecting (2009d). Another group is including those industries, citizens and shops which are interested to deliver waste to ROOMM, but they are not covered by the system due to different reasons such as lack of resources or conflict in municipality laws. This group has their own waste treatment method which is mainly non standard disposal. The third group is including those who have their own waste treatment system such as hospitals, special industries and agricultural system. There is also a wide group of waste which is not processed under controlled conditions including some hazardous waste such as batteries, lamps and electronic wastes. New facility has been established for storing electronic devices but there is no treatment predicted.

Uncovered activities by ROOMM as well as high amount of landfill highlight several opportunities for new projects in Mashhad, but success in new project is mainly dependent to understanding the present situation.

Stakeholders’ Analysis

Stakeholders’ analysis has been used as a management tool since last decade (2004a) and represents the process of identification and mapping all individual, organizations and factors which are affecting on or affecting by the system. This process is including identification of stakeholders’ needs and integrating or consideration of their needs and expectations into strategies of the organization or the system.

There are different approaches into identification of stakeholders. Some researchers believing, stakeholders shall be considered based on their power and its effect on the system such as Eden and Ackerman (2004a), but some other believing to identification of broader range of stakeholders regardless their power such as Nutt and Backoff (2004a). Stefan Book represents a group of stakeholders in addition to powerless stakeholders, as “silent stakeholders” such as environment, laws and culture and suggests considering them into analysis. Stakeholders’ analysis typically consisted of the following steps: *Identify stakeholders (Brainstorming; Understand stakeholder needs and interests; Classify them into meaningful groups; Compare or Stakeholder Mapping; Prioritize, balance, reconcile or synthesize the stakeholders; Integrate stakeholder needs into the strategies of the organization and into its actions (2009a).*

Identification of stakeholders in Mashhad waste management system has carried out by reviewing different source of information and brainstorming on the system to find all stakeholders including those referred to “silent stakeholders” as Stefan Book. Table 2 shows a list of stakeholders in Mashhad waste management system. The table also lists stakeholders groups and basic needs of each stakeholder. General terms used as stakeholders’ needs have different meaning for each stakeholder, but during the step for integrating the needs into strategies shall be deployed into specific terms.

Table 2 of stakeholder list and their needs in Mashhad waste management system

Group	Stakeholders	Needs			
Service Users	Citizens	Cleanliness	Ease	No noise	Low Cost
	Tourists	Cleanliness	Comfortable		
	Small Businesses	Cleanliness	Comfortable	No Conflict	Low Cost
	Industries as Waste Producer	No Conflict	Low Cost	Availability	
	Agricultural Systems	No Conflict	Low Cost	Availability	Less Impact

	Shops	Cleanliness	Comfortable	No Conflict	Low Cost
Employees, Suppliers, Other Involved	Share Holder	Profit	Sustainability		
	White Collar Employees	Income	Sustainability	Hygiene	
	Blue Collar Employees	Income	Sustainability	Hygiene	
	Suppliers	Income	Collaboration	Sustainability	Hygiene
	Recycling, Processing Co.	Sustainability	Market	Profit	Availability
	Product Users	Low Cost	Hygiene	Quality	Availability
	Traditional Waste Recycler	Profit	Safety	Sustainability	No Conflict
	Neighbors	Good View	No Emission	Less Impact	
Environment	Environment	Less Impact	Sustainability		
	Land	Less Impact	Sustainability		
	Sub Surface Water Resources	Less Impact	Sustainability		
	Urban Environment	Beautifulness	Less Impact		
	Wild Life	Sustainability	Less Impact		
	Global Environment	Less Impact	Sustainability		
	Weather	Less Impact	Sustainability	Low Emission	
Law Makers and Supervisors	Government Authorities	Obeying Rule	Collaboration	Less Impact	Sustainability
	Environ. Protection Organization	Collaboration	Less Impact	Sustainability	
	Legislation Organization	Collaboration	Transparency	Sustainability	
	Religious Institution	Collaboration	Transparency	Obeying Rule	
	Public Health Care	Obeying Rule	Information	Transparency	Collaboration
Scientific Centers and Int. Org.	Academic Centers	Collaboration	Information	Transparency	
	Int. Protocols	Collaboration	Transparency	Information	
	Int. Organizations	Collaboration	Transparency	Information	
	NGO, Individual Activists	Transparency	Information	Sustainability	
Finance System	Citizens (Tax Payers)	Efficiency	Effectiveness	Transparency	
	Banks	Transparency	Efficiency	Collaboration	Sustainability
	Tax Organization	Transparency	Efficiency	Collaboration	
	Investor	Transparency	Efficiency	Profit	Sustainability
Other	Religious Cost. and Culture	Obeying Rule	Sustainability	No Conflict	Less Impact
	Media	Collaboration	Information	Supporting	
	Children and Next Generation	Cleanliness	Sustainability	Less Impact	
	Local Traffic	Less Traffic	Less Impact		
	Urban City Planners	Collaboration	Effectiveness	Sustainability	Obeying Rule
	Other Product Developers	Collaboration	No Conflict		
	Transportation, Derivers	No Conflict	Sustainability		

Stakeholders' Mapping

Interest/ power matrix has been proposed by Gardner et al (2004a) and describes the general model for stakeholders mapping. Each stakeholder is classified based on their interest as well as their power to waste management system. This model gives basic information about the situation of stakeholders in waste management system.

Table 3 represents interest/ power matrix for waste management system in Mashhad based on stakeholders' list in table 2 and process map in figure 1. Information supporting the matrix content has been gained through various methods such as public information provided by ROOMM, interview with stakeholders involved and other sources. Black color stakeholders are those which has been considered in waste management system, compare to blue color stakeholders which have not been considered fully and red one which have been neglected. Table 3 basically shows that consideration of stakeholders into waste management system in Mashhad is based on stakeholders' power and stakeholders with low power has not been considered fully even though they showed high interest to waste management system in Mashhad.

Table 3 of power/ interest model for stakeholders in Mashhad waste management system

	Low interest	High interest
Low power	<p>Minimal Effort Derivers Citizens (Tax Payers) Tourists Agricultural Systems Children and Next Generation Small Businesses, Shops Local Traffic</p>	<p>Keep Informed Citizens Product Users Blue Collar Employees Traditional Waste Recycler Environment Sub Surface Water Resources, Urban Environment, Wild Life, Global Environment, Weather, Soil NGO s, World bank Universities and Scientific Centres Int. Organizations and Protocols Urban City Planners Service Suppliers</p>
High power	<p>Keep Satisfied Religious Costumes Legislation Organization Media Religious Institution Banks and Financing Organizations Industries as Waste Producer</p>	<p>Key Players Share Holder White Collar Employees, Office Employees at ROOMM Supervising Organization, Government and Governmental Authorities Environ. Protection Organization Public Health Care Local Traffic Recycling, Processing Companies Neighbours Society</p>

Discussion

Analysis of power / interest matrix (table 3) and process map (figure 1) highlights some dependencies with important aspects in Mashhad waste management timelines (table 1)

Mashhad and Borås have followed different approaches in training of household for sorting from origin. Whereas Borås has started the training some years before establishing the first treatment plant (2007b), Mashhad has started this activity about 3 years after establishment of ROOMM (2009c). Although there are many reasons for this approach such as short term planning for ROOMM, but the root cause of all potential reasons goes back to neglecting or underestimation of citizens and their role in waste management system. This problem has been understood by ROOMM and all groups of citizens including households, school students and tourists are trained by different methods and approaches.

Although the training of households have been started with delay in Mashhad but the project covers only 6% of collected waste (2009d). In addition to seasonal increase in amount of waste due to tourist, there are other reasons for ineffectiveness of the project. Traditional waste collectors steal or buy recyclable waste from citizens before arriving ROOMM’s vehicles to collecting them. When reviewing the power/ interest matrix, it is easy to understand that this group of stakeholder and their needs have not been considered in ROOMM strategies. Review of ROOMM actions and strategies reveals that traditional waste collectors (or “waste finders” as ROOMM) are considered as disturbing factors which shall be deleted from the system or shall be organized under ROOMM supervision. All efforts for removing or organizing waste finders have not been successful and ROOMM is competing with them all the time (2009d). Due to lack of interaction and group problem solving with urban city planners, no solution has been proposed by urban planners and

architects for sorting from origin, something like waste shooting systems, locked waste boxes and waste pipes in Borås. Power/ interest matrix in table 3 shows weak interaction between city planners and traditional waste collectors as highly interested stakeholders.

Another important aspect of waste management system in Mashhad is high amount of landfill compare to Borås. Again, table 3 shows that environment has not been considered as a main stakeholder, even though environment protection organization has been considered as a main stakeholders and ROOMM have a close collaboration with this organization (2009d). There are no national or regional laws or instructions at environment protection organization regarding reduction in landfill, setting targets or deadlines for landfills or any limitation for biodegradable waste (2009e). Compare to Mashhad waste management system; Borås goes beyond national laws and EU landfill (2007b) directives which forces their members to limit diverting waste into landfill by measurable targets.

Table 4 lists visions for Borås and Mashhad as well as some key performance indicators. Whereas the waste management system in Borås has SMART indicators and measurements clearly consider environment; indicators and measurements in Mashhad focus on the system efficiency. These types of measurements and indicators show that environment have not been considered by waste management system in Mashhad. Although waste management system in Mashhad may has gone beyond requirements of environment protection organization.

Table 4 of visions and indicators in Mashhad and Borås waste management system (2009c)

	Mashhad	Borås
Vision	Preserving the environment Job creation Supporting the national economy	The city without need to fusil fuel
Indicators and measurements	Number of trucks used for waste collecting Volume of waste collected and treated Percentage of sorting from origin	Emission to air Analysis of emitted gas Amount of landfill Share of biological treatment

Figure 2 and 3 are illustrating stakeholders' power and importance in Mashhad and Borås waste management systems based on a ranking approach (1 to 4). These two models are showing the different patterns for stakeholders in Mashhad and Borås. Without consideration of the method for ranking the stakeholders in two mentioned systems, they show significant differences between stakeholders' power and importance in Mashhad and Boars.

Whereas international protocols and organizations have strong power in waste management system in Borås, they have very low power to affect on waste management system in Mashhad. This difference can be traced in actions in both cities, for example Borås system is reporting their efforts for reducing the total carbon dioxide emission not only in Borås, but also in different countries. But there is only one report about burning methane gas emitted from landfill site in Mashhad to decrease the green house effect of methane. This action is not reflected in strategic plans, measurements and indicators.

Another considerable difference could be seen for investors and banks in Mashhad which hold higher power due to their types (mostly governmental) and the weak role of private sector in investing in waste treatment methods. This is important for those projects which need powerful investors or financing.

Another difference also can be traced for official employees in Mashhad and Borås. Official employees in Mashhad affect on the system through holding more authority for policy making, target setting and suppliers' control, since these power in Sweden comes from top level law makers and municipalities, and high level collaboration between academic and research centers.

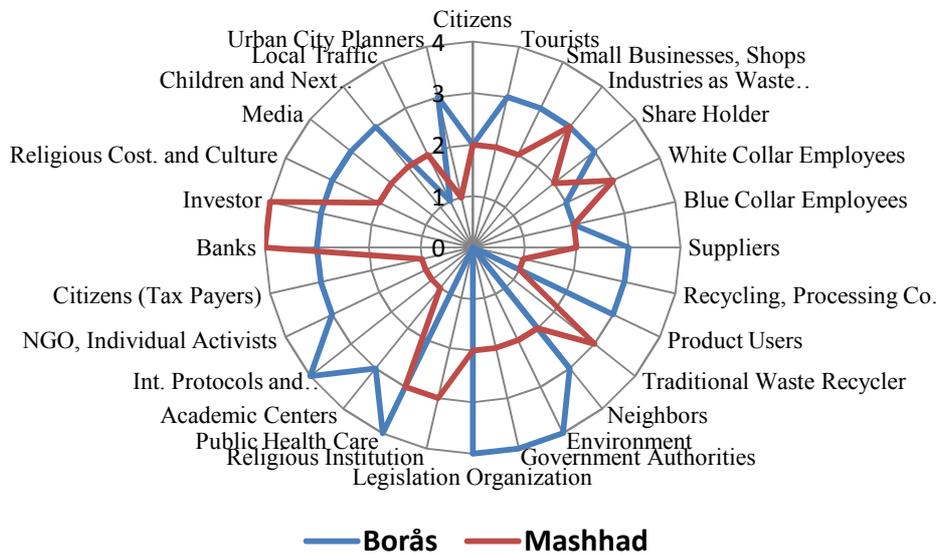


Figure 2 of graph for stakeholders' power in Mashhad (Blue) and Borås

Similar pattern can be seen for stakeholders' importance. Due to tax laws in Sweden, importance of tax payers as well as subscribers who pays charges for waste management in Borås is higher than Mashhad. Although the waste collecting process consumes 30 million USD in Mashhad, there is no clear relation between tax payers and cost of waste management system. The proposal for receiving 10% of annual municipality tax for waste management was rejected by Iranian parliament (2009d).

Another significant difference in importance graph comes from religious institution and costumes. The importance of religious stakeholders in Mashhad is so high that they can stop methods conflicting with basic religious rules in Islam, for example the location of landfill area, mixing of food residue and other waste, type of treatment for residue of animal in poultry industry such as blood and method for inhalation of vagrant dogs. The similar situation does not exist in Borås.

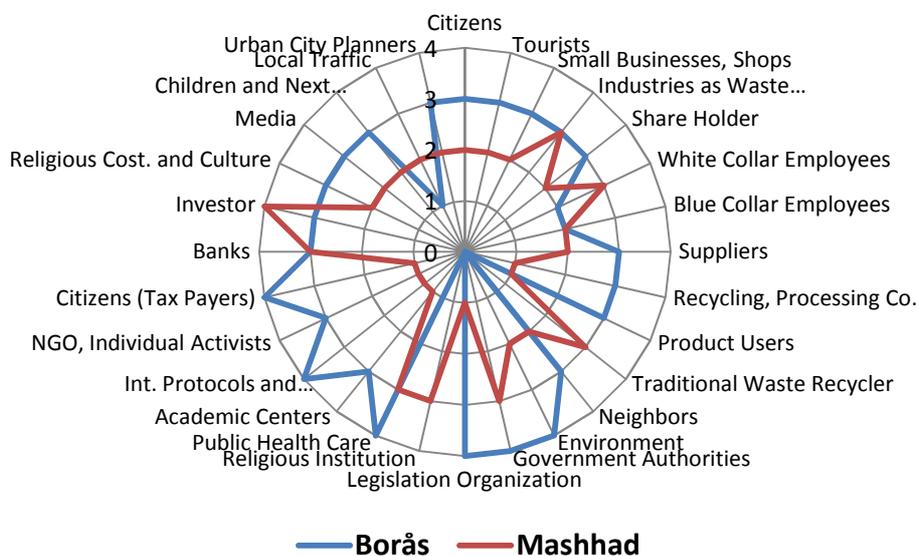


Figure 3 of graph for stakeholders' importance in Mashhad (Blue) and Borås

CONCLUSION

Review of activities during the implementation and development of waste management system in Mashhad as well as application of stakeholders' analysis to finding the reason for ineffective projects in Mashhad shows strong dependency between ineffectiveness of the projects and poor stakeholders' analysis. All ineffective projects show that whenever the involved stakeholders have not been identified or their needs have not been considered in planning, the project has consumed more time and has given insufficient result. Comparison of similar project in Mashhad and Borås confirm this claim such as those where waste management system has considered all potential stakeholders.

Sustainable waste management systems are environmental oriented systems. Due to this fact, environment with all dimensions (weather, water, wild life and so on) and all levels (urban, local, national and global) shall be considered as independent stakeholders, although NGO's and environmental organizations may act as powerful stakeholders. Neglecting the environment in Mashhad has reduced the importance of more sustainable waste treatment methods instead of landfill.

Providing a clear frame for target setting based on real needs is the main advantage of stakeholders' analysis which brings up all involved stakeholders with an understandable level of importance. Application of this tool helps policy makers to ensure that all legitimate needs has been considered in waste management projects and set SMART targets which cover all stakeholders' requirements and expectations.

Stakeholders' analysis ensures planners whether all relevant factors have been identified. This advantage comes from classification of all information including data and scatter news during stakeholders' analysis. Stakeholders' analysis provides an easy to understand frame for gathering, classification and analysis of scatter data and news which are neglected basically in scientific case studies and feasibility studies but they may affect on the project during its implementation and development. In addition the output can be linked to risk assessment as verified inputs.

Stakeholders' analysis facilitate comparing and ranking of all parameters in a contest. Power, importance, legitimacy, urgency, or any other dimensions of stakeholders can be easily ranked and compared with each other. The common steps during stakeholders' analysis which are based on brain storming in different levels of involved people ensuring that overestimation or underestimation has not been happened. This advantage can be used in bench marking of successful project for implementation in different area.

This tool facilitates the identification of possible actions for diverting threads to opportunities. The use of this tool highlights the role of each stakeholder in the system and make easy to identify opportunities to use their power for the system performance. Evaluation of all stakeholders in a unique contest makes it more effective.

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