

Waste Reduction through Promoting Public-Private Partnership Projects for Material Recycle in Palestine

Ziad Tawafsheh, Mitsuo Yoshida, and Suleiman Abu Mfarreh

Abstract - A public-private partnership (PPP) approach is essential to make the municipal solid waste management in Palestine more effective, efficient, and environmentally friendly. Presently more than 73% of joint service councils (JSCs) for solid waste management are conducting PPP. However, the current public-private partnership is mostly a "one-way" approach of just outsourcing from JSCs or public authorities to private firms. However, in the future, it will be required to be "two-way" approach in which the public and private sectors cooperate with each other to invest, operate, monitor, and evaluate the PPP project in a sustainable manner.

Keywords - Solid Waste Management, Public-Private Partnership, 3R, Recycling Industry, Palestine

I. Introduction

Providing solid waste management (SWM) services are the responsibility of the Local Government Units (LGUs) or joint service council (JSC) for SWM. However, they are in a dilemma: they have to improve SWM services, invest in new SWM infrastructure projects and increase revenues for conducting SWM services but they do not have the capital or finance needed to achieve these objectives. LGUs or JSCs have therefore to find alternative sources of capital and finance. The private sector is an important source in this regard [1]. In recent years, based on the National Policy Agenda [2], the Palestinian authority has taken policy initiatives on Local Economic Development (LED) and Public-Private Partnership (PPP) [3] for enhancing public service businesses. However, in Palestine, the relationship existing between the public and private sectors is still not very high level of cooperation which is often based on mistrust, underestimation, or negligence from both sectors [4]. It is required that updating existing laws and regulations, facilitation of licensing procedures, and activation of the investment promotion law [7] [5].

Palestine is currently in a waste crisis [8], where the amount of waste generated is very large and continuously increasing, but the capacity of the final disposal sanitary landfills is limited, and there will be no place to dispose of it in the next several years.

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In order to overcome the crisis, drastic waste minimization must be achieved, which requires significant improvement in 3R (Reduce, Reuse, Recycle), in particular enhancement of recycling capacity is the priority issue. However, waste recycling will only be possible through collaboration between the private sector and the public authority [9]. In that sense, public-private partnership is a very important issue for promoting recycling and eventually reducing waste [4] [5] [6] [7].

In this paper we focus on the solid waste management (SWM) activities in West Bank, Palestine, and analyze present situation of PPP and future challenges to create a more cooperative atmosphere and some form of partnership between the two sectors for realizing a sound material cycle system.

II. PPP in SWM

A. Merits of PPP in SWM

In most countries, municipalities or local government units are responsible for conducting SWM services. The private sector has been partly involved in the SWM through outsourcing from public SWM agencies and/or implemented as a for-profit business independent from public solid waste management services. In developing countries, there are often a number of informal waste pickers, who are actually playing an important role for material recycling as an informal sector.

However, in past decades in many countries, the private sector in the municipal solid waste management service in developing countries increasingly play a significant role in improving environmental and hygiene solid waste management services [10]. In most cases, the introduction of public-private partnerships will bring about a shift from conventional solid waste treatment to more sustainable and environmentally friendly integrated solid waste management (Fig. 1).

In the conventional solid waste treatment, the public sector (municipalities) simply provides services, while the private sector also provides services as a for-profit business without any coordination with the public sector's SWM services. Therefore, the efficiency is low as a whole SWM system. However, through introducing PPP, the public and private sectors will work together to take advantage of their respective strengths and form an integrated solid waste management system as a whole. An entry of the private sector into PPP projects facilitates technological innovation and the introduction of new technologies, improves the economics of the business, and creates employment opportunities.



Figure 1. Generalized idea of the development of solid waste management from conventional style to environment-friendly integrated solid waste management through introducing PPP (modified from [20]).

At that time, the public sector promotes the institutional design and development, outsourcing, monitoring and regulation, public awareness raising, etc., while the private sector invests in constructions of waste treatment facilities and other SWM infrastructure in coordination with the private sector, and intensifies recycling and energy recovery. Moreover, a regulated private market for SWM management services is essential [18].

The public sector aims exclusively at solid waste treatment, while the private sector promotes the formation of a material flow of recyclables that diverges from the waste stream and promotes the integration of solid SWM business and recycling businesses. As a result, resource recycling and energy recovery activities will be able to integrate into the SWM. This is the merit of introducing PPP in SWM.

B. Types of PPP in SWM

According to the classification of World Bank [11], the following four types of PPP approach are widely known in SWM:

- (1) Introduction and promotion of more output focused contracts for street cleaning and solid waste collection services
- (2) Involvement of the private sector in treatment and disposal projects to introduce technical innovation into through sanitary landfill technology, recycling and in waste to energy projects
- (3) Involvement of the private sector in financing capital investment for establishing SWM infrastructures and facilities.
- (4) Internalizing and regularizing of informal waste picker initiatives as part of the public-private partnerships (PPP) solution

From a view of dealing in business context, the following two types of dealing of Public-Private Partnerships can be recognized [12]:

The first type is “Public-Private Partnerships of a purely contractual nature (PPPs)”. In this case, the partnership is based solely on contractual relationships.

The second type is “Public-Private Partnerships of an institutional nature (IPPPs)” [12]. These PPPs involve cooperation within a distinct entity and may lead to the creation of an ad hoc entity held jointly by the public sector and the private sector or the control of a public entity to a private operator.

The IPPP can be described as a co-operation between public and private parties involving the establishment of a mixed capital entity (joint public-private venture, a third sector company) which

performs public contracts or concessions. Apart from the contribution of private capital or other assets, the private input in an IPPP consists of the active participation in the operation of the contracts awarded to the public-private entity and/or the management of the public-private entity. Conversely, simply invested by private investors into publicly owned companies, do not constitute an IPPP [12].

III. Present Situation of PPP in SWM Sector in Palestine

In West Bank of Palestine, a total of 13 Joint Service Councils (JSCs) are SWM service providers and also facilitators of SWM services by focusing on planning, coordination, and contract management including monitoring & control, under the supervision and coordination of Ministry of Local Government (MoLG).

MoLG have established institutions for JSC-based SWM services, such as SWM Bylaw and JSC Bylaw, and also formulated a National SWM Strategy [13], in which the promotion of PPP in SWM was clearly mentioned (Strategic Objective, Policy Interventions, etc.). The PPP Policy Paper and a Guideline [17] were issued by MoLG, which is not only for SWM sector but for most of public service delivery business.

Private sector takes the daily operation as well as some investment in West Bank [19]. Private sector is expected its technical & management expertise which improve operating efficiencies of the solid waste management service. Private sector is also expected to innovate SWM technologies.

Currently, people of informal sector are working for collection (waste picking) of recyclables in dumpsite and street, without any plan, rule or public support. Internalization of the informal sector (a part of private sector) into the solid waste management system promotes efficiency of integrated SWM, improves labor conditions, and ensures the dignity of labor.

A. Current PPP in SWM in Palestine

Table 1 summarizes the public-private partnerships currently underway in Palestine regarding solid waste management. According to the questionnaire survey results, it was revealed that 11 out of 15 JSCs (73%) have been conducting some kind of public-private partnership project in solid waste management sector.

In the past, at Salfit JSC, a BOT (Built Operation Transfer) project for waste gasification and power generation (waste-to-energy) was planned with the participation of private companies, but it was not realized due to financial reasons.

TABLE 1. Current PPP projects in SWM conducted by JSCs in West Bank (as of November 2020)

JSC	PPP practice currently operated in JSCs and municipalities
Hebron-Bethlehem Higher JSC	<ul style="list-style-type: none"> - Partnership with private firm for waste transporting service from transfer stations and operating sanitary landfill - Partnership with private firms for sorting of mixed waste and material recycling (plastics & papers) - Partnership with private sector for infectious waste collection and treatment
Hebron	<ul style="list-style-type: none"> - Partnership with NGO for conducting waste composting project
Bethlehem	<ul style="list-style-type: none"> - Partnership with NGO for conducting home composting project - Pilot project (2020) to be conducted with an agricultural society to produce briquettes from

	cardboard and peat (not implemented yet , still under design)
Tulkarem	- Agricultural composting under the cooperation between JSC and NGO, funded by an international donor
Ramallah	- Partnership with private firm for waste collection and transport - Planning to establish a PPP project for recycling cardboard and plastics in pilot scale - Planning to establish a PPP project for safety treatment of infectious waste
Nablus	- There is no PPP practice at JSC level, but some municipalities have PPP for waste collection, transfer and transport. - An MBT facility was constructed by private sector but not yet operating due to a lack of local consensus building.
Salfit	- A BOT project for waste-to-energy was previously proposed but terminated due to financial problems.
Qalquilya	- Joint project between Announ municipality and NGO for agricultural composting
Jenin	- A joint project between JSC and private sector for waste sorting and recycling was attempted, but unsuccessful due to financial and market problems.
Jericho	- Agricultural/daily farm composting under the cooperation between NGO and agricultural institute - Waste collection and sorting under the cooperation between private sector and JSC
Gaza North (JSC-GN)	- Joint project between private sector and municipality for biogas production and organic waste composting - Small-scale joint project between private sector and municipality on stone (construction & demolition waste) crushing and recycling, funded by UNDP - Ongoing partnership preparation with an international private company to conduct a waste to energy project with capacity of 1500 ton/day
Gaza South (JSC-KRM)	- Partnership with some municipalities and private firms for waste transporting service - Small scale sorting plant for waste material recycling under the cooperation with Rafah municipality and NGOs. The plant has not been operating for more than five years due to a marketing problem and the lack of financial sustainability.

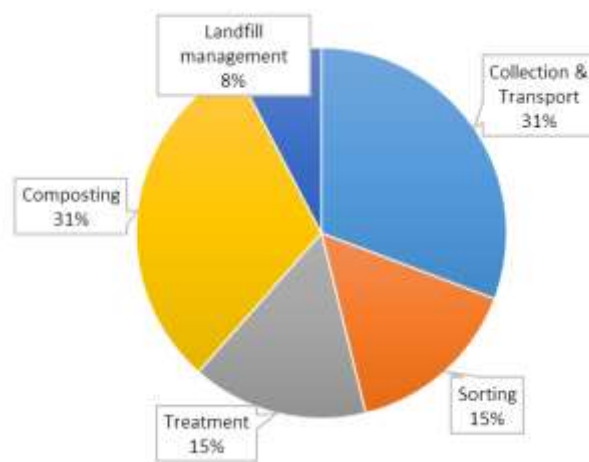


Figure 3. Distribution of the business field of PPP project in SWM in Palestine. The percentage shown in the figure shows the ratio of the number of businesses in the given field to the total number of PPP businesses.

In Nablus, the private sector invested to build an MBT facility and sort the waste collected and transported by Nablus JSC, but failed to reach consensus with the local residents and the facility is not in operation. It means whether private, public, or public-private partnerships, understanding of local residents is one of the most important issues in setting up facilities related to solid waste management.

The business fields of public-private partnership project are collection and transportation services (31%), waste sorting (15%), treatment (hazardous waste treatment, construction and demolition waste) (15%), composting (31%), and Operation and management of landfill site (8%) (Fig. 3).

Typical example of PPP business in Hebron-Bethlehem Higher JSC is shown in Fig.4, where the PPP businesses are in three different fields.

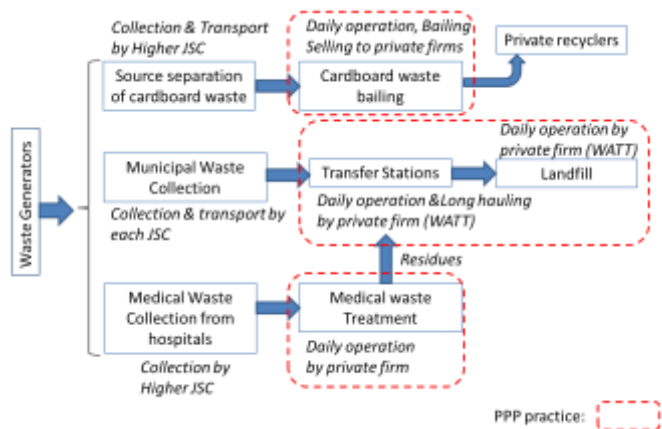


Figure 4. Examples of PPP in SWM implemented in Hebron-Bethlehem Higher JSC.

Similarly, in the Zahrat Al Finjan Landfill of Jenin JSC, a project on the sorting of recycled materials by introducing MBT (Mechanical Biological Treatment) was attempted with the investment of foreign private companies, and some facilities were constructed but suspended for financial reasons. Both cases show that, under Palestinian given conditions, ensuring financial sustainability is the most important issue for successful PPP project.

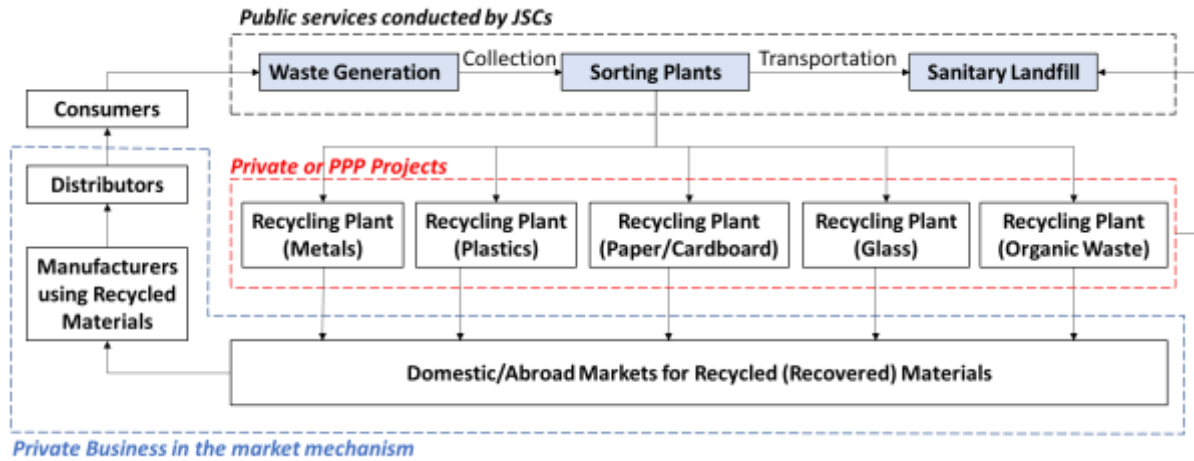


Figure 4. Relationship between the solid waste management as public services conducted by JSCs, and recycling system by private or PPP projects.

These are (i) cardboard waste bailing and selling to private firms, (ii) waste transfer and sanitary landfill operation, and (iii) infectious waste collection from medical facilities and treatment. These PPP businesses have been organized by Hebron-Bethlehem Higher JSC and the (organized) informal private sector.

However, most PPP is rather small scale and simple outsourcing from JSC or municipality, the Types (1) or (2) according to the definition of the World Bank, and investment from private sector or institutionalization is not much observed; only two small-scale projects in Qalquilya and Gaza.

Azzoun municipality, a member of Qalquilya JSC, is jointly conducting a composting plant with local NGO and they share the profit 40% for municipality and 60% for NGO under the contract agreement, which is an example of institutionalized PPP (IPPP).

There is still legal uncertainty regarding the use of institutionalized PPP scheme, e.g., to establish a special purpose company (SPC), a joint public-private venture, a quasi-public corporation, which will be a future challenge for Palestinian Authority.

B. Recycling Industries in Palestine

The waste recycling can be divided into the “sorting” process from a given waste stream and the “recycling” of the sorted materials for the production of economically useful products (commercial goods) for markets (Fig. 4).

In the case of Palestine, most of them are sorting businesses, and the final destination of sorted recyclables is external recycling industries such as Israeli ones. Therefore, the price of sorted recyclables is controlled by the external (Israeli) buyers to remain low, which is disadvantageous to the Palestinian sorting company. Under such situation, it is difficult to stimulate waste sorting and recycling industries in Palestine for promoting 3R.

Actually, there are not many private companies that can manufacture recycled products in Palestine, and the scale/capacity is small. In West Bank, there are 63 private recycling companies registered that operate sorting and recycling businesses, as of 2019 [14]. Figure 5 shows the distribution of business fields of the recycling companies; in which metals (steel, aluminum, and copper) recycling is most common, and followed by plastics recycling, organic

waste composting, and paper/cardboard recycling. Glass recycling and construction & demolition (C&D) waste recycling industries are still scarce in West Bank.

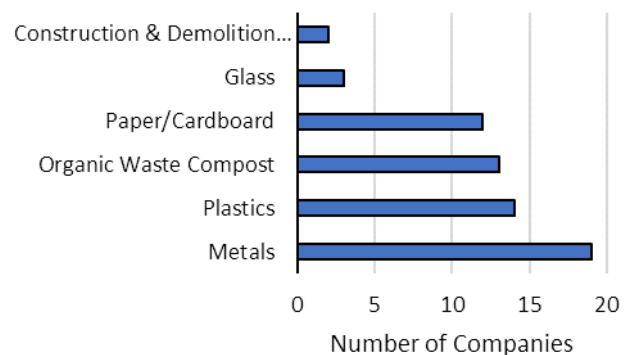


Figure 5. Number of Type of material recycling companies in West Bank (Data source: Final Report of the MoLG-JICA Project Phase-II)[14]

The recycling industry is unevenly developed in the West Bank, and the location is concentrated in Hebron (Fig. 6). Metal recycling plants exist in most governorates, but waste plastic and paper recycling plants are limitedly available in West Bank, while glass recycling plants exist only in Hebron. Such regional uneven distribution will be a problem in terms of transportation costs in promoting recycling widely in West Bank, Palestine in the future.

In Gaza Strip, there is a sorting plant and compost yard in Rafah, that was installed by UNDP and Japan, while it was interrupted the operation. Because sorted recyclables (paper, plastic, metal, and glass) could not be sold to recycling companies due to the closure of the border.

According to the results of questionnaires survey (2019) by the MoLG-JICA Technical Cooperation Project Phase-II [14], these recycling industries (metals, plastics, paper/cardboard, and glass) have the maximum processing capacity, about 235 tons per month, but it is far less than the total amount of generated recyclables in the West Bank, about 24,778 ton/month [15] (Fig.7). In other words, West Bank, Palestine is absolutely lacking in processing capacity to complete material recycling, domestically.

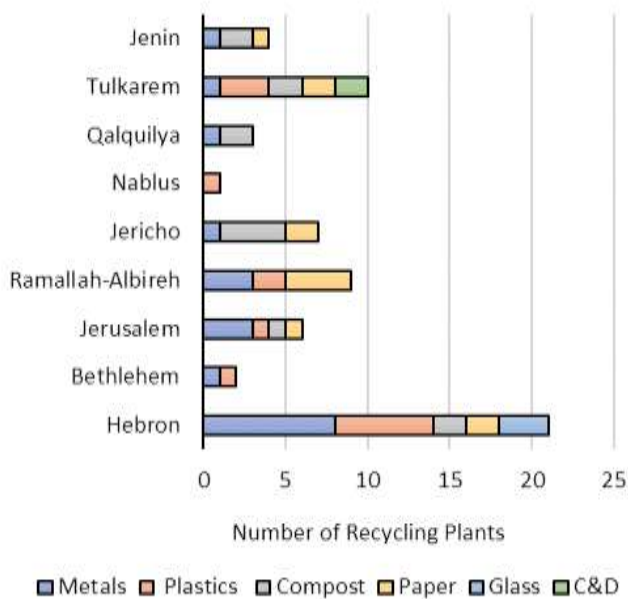


Figure 6. Location of recycling industries in West Bank (Data source: Final Report of the MoLG-JICA Project Phase-II) [14]

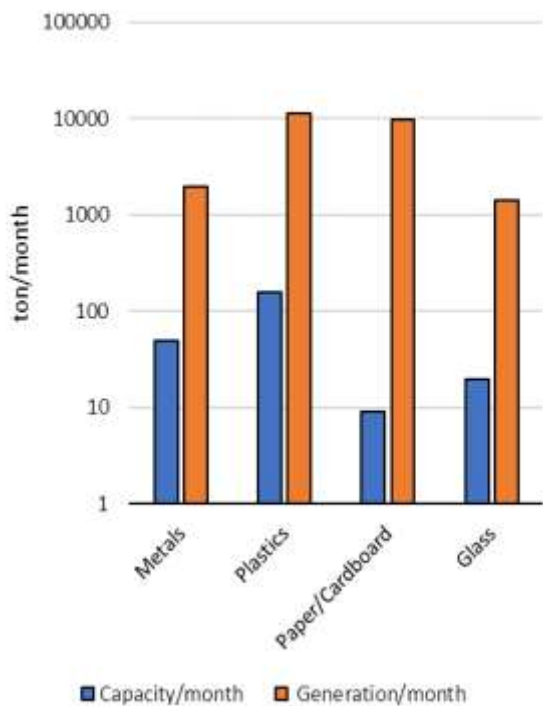


Figure 7. Total generation amount of recyclable [15] and its treatment capacity for material recycling in West Bank, Palestine

C. Towards Waste-to-Energy

As a method of reducing the amount of solid waste, it is important to introduce Waste-to-Energy together with prevention of waste generation and material recycling.

Construction of a new sanitary landfill site is extremely difficult in a very small land area like Palestine and with many restrictions on utilization under Israeli occupation. While reducing the waste generation, reusing, recycling, and composting, that is the 3R policy, it is possible to recover a thermal energy using a waste incinerator without polluting the environment, which eventually reduces the volume of waste that must be finally disposed in landfills. This will also change the situation of energy resources that depend on foreign countries.

Building such a system (Waste-to-Energy) requires a large amount of initial investment and recurrently operation/maintenance costs. The financial scale of the waste-to-energy project depends on the scale of the facility, but it is expected to reach more than a several hundred million USD because the West Bank alone has to treat more than 2,000 tons of solid waste per day.

Therefore, it is necessary to prepare financial plan and introduce the vitality of the private sector based on well-developed medium- to long-term business plan. When inviting waste-to-energy projects, not only determining a gate fee for solid waste but the government needs to carefully consider feed-in-tariff (FIT) schemes and pricing of generated electricity.

Currently, the Palestinian Authority (MoLG) is officially calling on the private sector to propose a DBOO (Design, Build, Own, Operate) project of Waste-to-Energy, and a progress in this field is expected in the future [16]. At Gaza North (JSC-GN), a Waste-to-Energy project by waste incineration is planned with the support of international donors.

D. Business Risks and Safety Nets

PPP project is a long-term contract between a private party and a government entity, for providing a public asset or service, where the private party bears business risks and management responsibility, and the profit corresponds to the performance. On the other hand, the government entity also bears a great risk in entrusting private parties with part of its own mission to provide sustainable public services. Therefore, a transparent system and contract are required for both private and public parties.

In general, the risks linked to a PPP can be divided into five categories: organizational, legal, financial, technical, political, and societal risks as shown in Table 2. As shown in the table, to reduce the risk for the private sector, the public sector will need to provide some kind of a “Safety Net” [12], such as licensing system, subsidies, tax exemption, partial burden of treatment costs, partial burden of initial investment, information provision, etc.

The most basic and common safety net to all fields is to provide reliable information to investors and to develop human resources, which is the role expected of government authorities and public institutions.

Therefore, when introducing PPP in SWM as well as promoting private sector participation to public sector projects, it is necessary to reduce the risks as much as possible, which leads to the entry of private companies and the promotion of PPP project.

It is expected that the entry of the private sector into PPP projects will be promoted through such institutional reforms.

Based on experiences of PPP projects previously attempted in Palestine, there are significant financial risks associated with investment as well as risks associated with land acquisition and consensus building. It is necessary to develop a safety net for these risks.

TABLE 2. Risks linked to PPP businesses and possible Safety Nets

Category	Risk*	Safety Net / Countermeasure
Organizational	Risks linked to the project/risk management of the PPP	- Human resource development - Information provision - Monitoring and guidance
Legal	Risks linked to the regulatory compatibility of the PPP, the interpretation/enforcement of contractual provisions constituting the PPP	- Law/regulation for PPP business - Licensing system
Financial	Risks linked to the long-term private investments and the return on investment, the insolvency/bankruptcy of private partners and their subcontractors, and the underestimation or overestimation of financial means and effective use of the PPP-infrastructure	- Rule of financing in PPP business - Cost recovery system - Gate fee system - Feed-in-Tariff (FIT) system - Financial audit system - Tax exemption - Subsidies - Official development finance
Technical	Risks linked to side-effects of the use of complex and innovative methods and techniques	- Research and development (R & D) grant - Standards - Information provision
Political	Risks linked to the changes in the policy, decision-making and political landscape after the constitution of given PPP project	- Recognition by high-level officials and political leaders - Authorization of the PPP project by official policy or strategy
Societal	Risks linked to a lack of coordination among stakeholders of the PPP project	- Preliminary coordination meeting among stakeholder - Participatory approach - Information provision
	Risks linked to a negative perception of waste facilities by the community or general public	- Public awareness raising - Social education - Information disclosure

* The categorization of risks was adopted by the definition of ISWA [12] while the "Societal" category was newly added.

IV. Conclusions and Recommendations

In order to achieve the reduction of waste in Palestine, it is absolutely necessary not only to prevent the generation of

municipal solid waste by raising the awareness on waste problems but also to promote a waste diversion and reduction of waste amount flowing into landfills, such as material recycling and waste-to-energy. However, at present, the processing capacity of the recycling industries in Palestine is very small compared to the amount of recyclable materials in generated waste.

In solid waste management projects in Palestine, public-private partnerships are primarily styles, (1) Introduction and promotion of more output focused contracts for street cleaning and solid waste collection services, and (2) Involvement of the private sector in treatment and disposal projects to introduce technical innovation into through sanitary landfill technology, recycling and in waste to energy projects, which are one-way relationships of outsourcing from the public sector to the private sector. There are still few two-way relationships such as private sector investment and joint venture establishment.

In order to promote waste recycling in Palestine, it is necessary to introduce a sorting process to separate recyclable materials from the waste stream, and foster recycling industries that can operate material recycling which operate under given market economy mechanism.

In order to tackle the above issues, it is necessary to change the style of public-private partnership from one-way to two-way. For that purpose, it is necessary to establish mutual trust between the public sector and the private sector, and to establish various safety nets (Table 2) to reduce business risk.

Overall conclusion is that a realistic way to achieve waste reduction in Palestine is only possible through the formation and promotion of private business and/or PPP projects of SWM, in sorting, material recycling, and waste-to-energy, which can be accelerated once the government authorities, such as Ministry of Local Government (MoLG), Ministry of Economy, and relevant authorities, provide legal/institutional supports to JSCs and economic incentives and safety net to potential private investors in order to encourage them to join PPP projects.

In particular, material recycling businesses are possible only through private or public-private partnership projects, not as a government-owned public entity. Therefore, the promotion of public-private partnership projects in this field is extremely important in promoting waste reduction.

The following factors are probably important to facilitate PPP projects on waste material recycling: information provision, raising public awareness, institutional development for promoting PPP approach including safety net, and formulating PPP proposal that is attractive for investors. In the case of PPP projects in SWM sector Palestine, a feasibility study including a market analysis is also required for assessing financial sustainability.

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