Discussion Paper

Situation of Municipal Solid Waste Management in African Cities

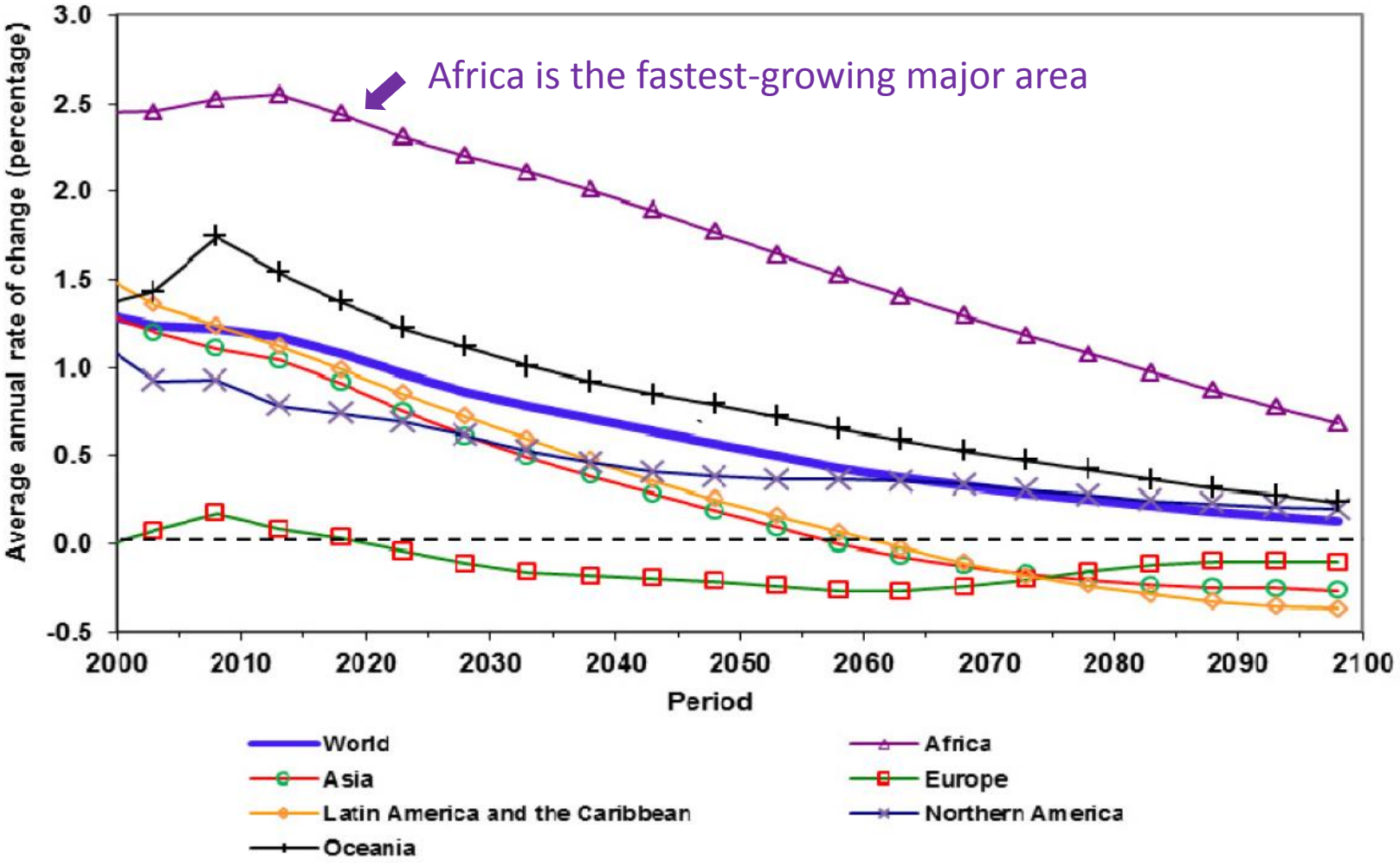
- An Interpretation of the Information provided by the First ACCP Meeting -

Mitsuo YOSHIDA, Ph.D.
Global Environment Department
Japan International Cooperation Agency (JICA)
June 2018, Rabat
Yoshida.Mitsuo@friends.jica.go.jp

Topics

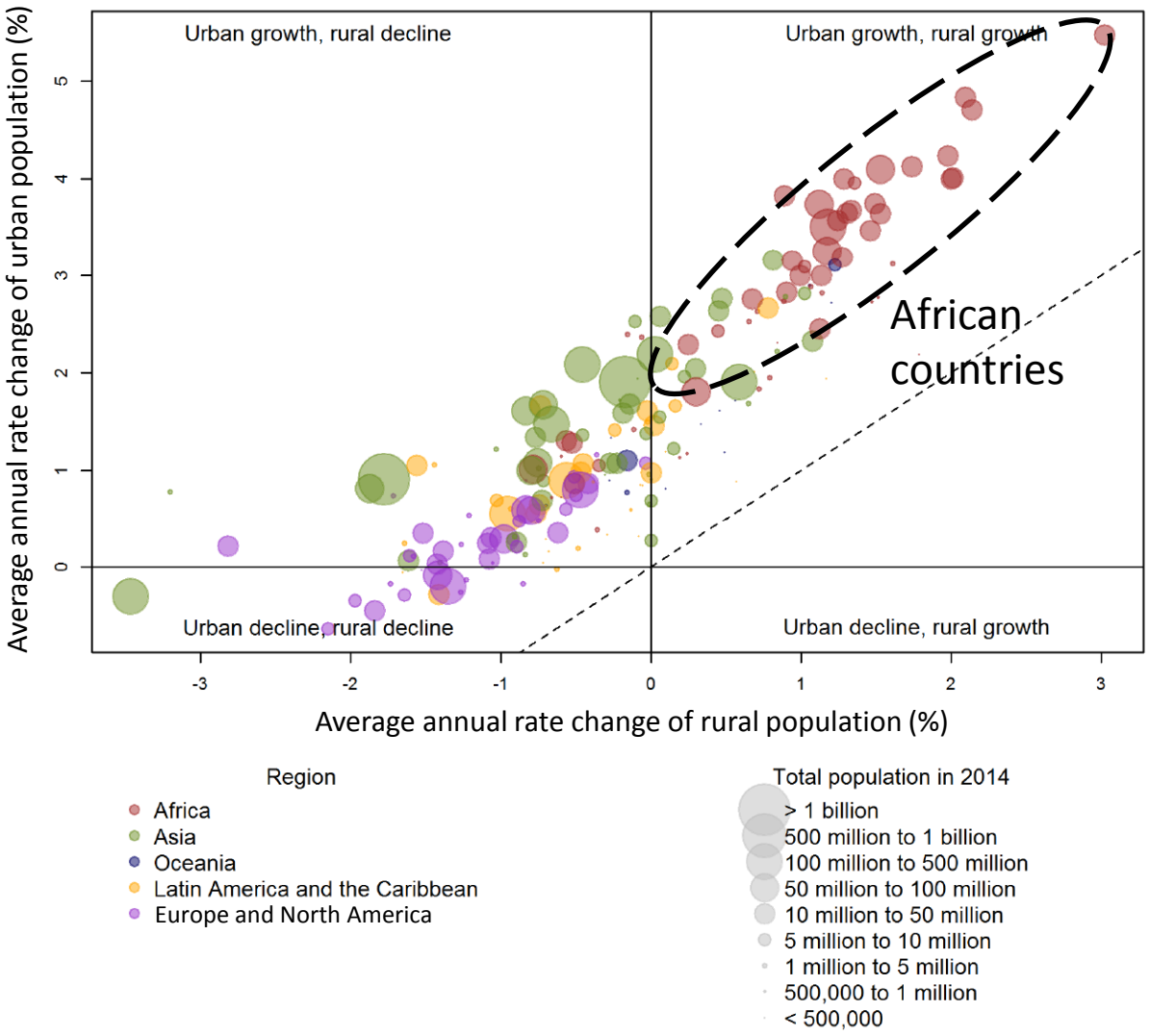
- Summary of the information provided by the 1st ACCP Meeting in April 2017 in Maputo; questionnaire survey, workshops, and discussion
- Interpretation on situation and challenges of municipal SWM in African cities
- A springboard for the discussion in the 2nd ACCP Meeting

Average annual rate of population change by major area, estimates, 2000-2015, and medium-variant projection, 2015-2100



Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). *World Population Prospects: The 2015 Revision*. New York: United Nations.

Population growth rate in urban and rural areas by country (%).

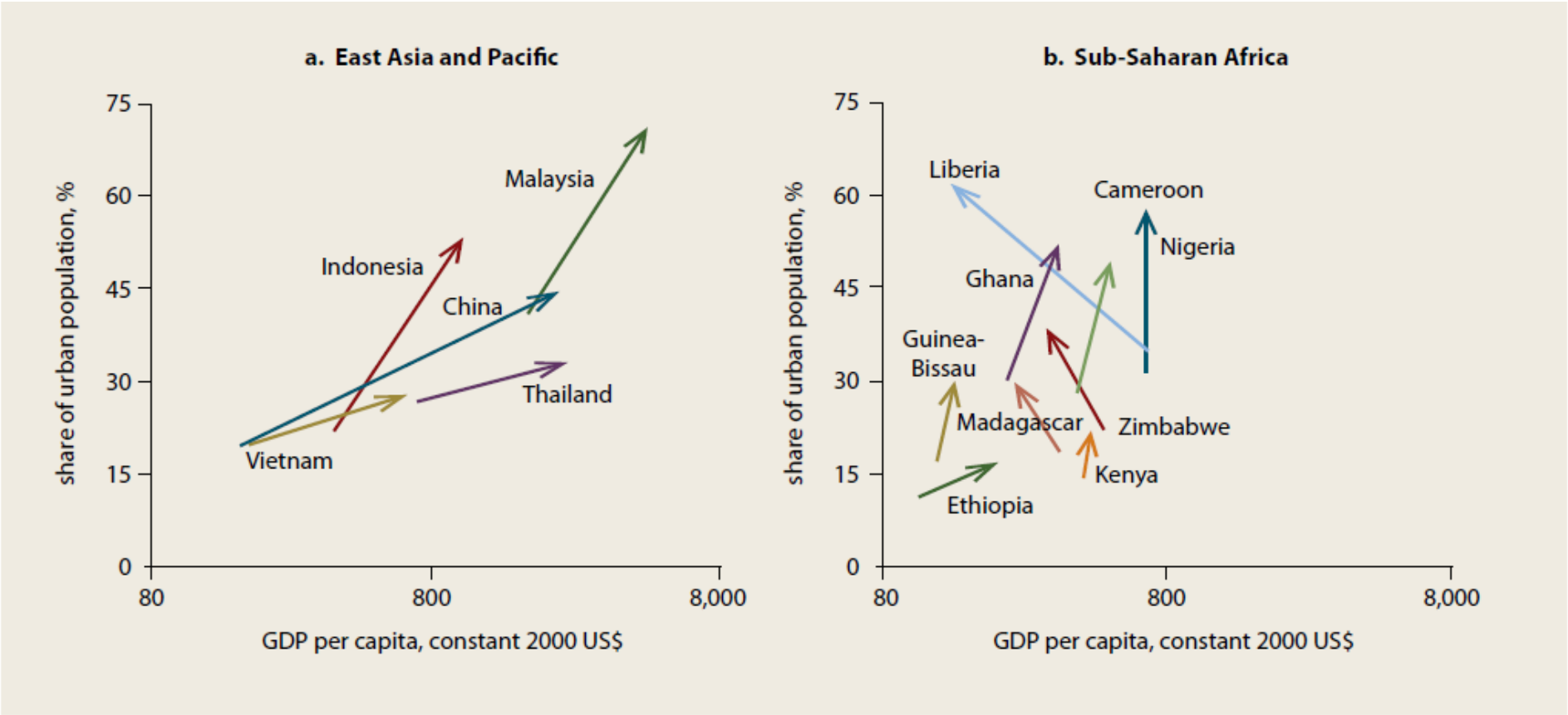


* For countries or areas with 90,000 inhabitants of more in 2014

UN Department of Economic and Social Affairs UNDESA(2015) World urbanization prospect 2014 Revision

Paradox in African Urbanization

Urbanization and Economic Growth (1985-2010)

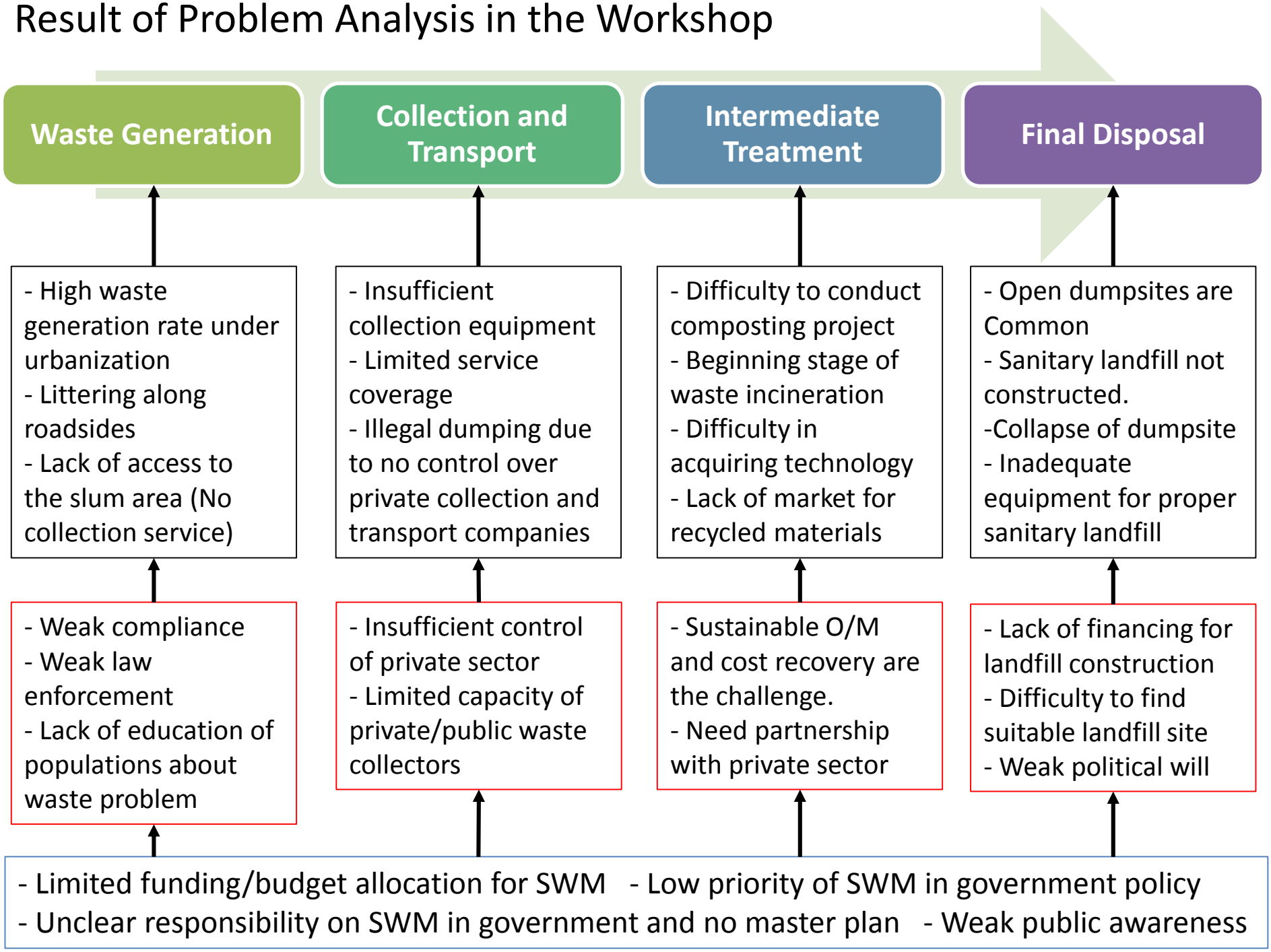


Source: World Bank (2012) World Development Report
Note: Data correspond to changes between 1985 and 2010.

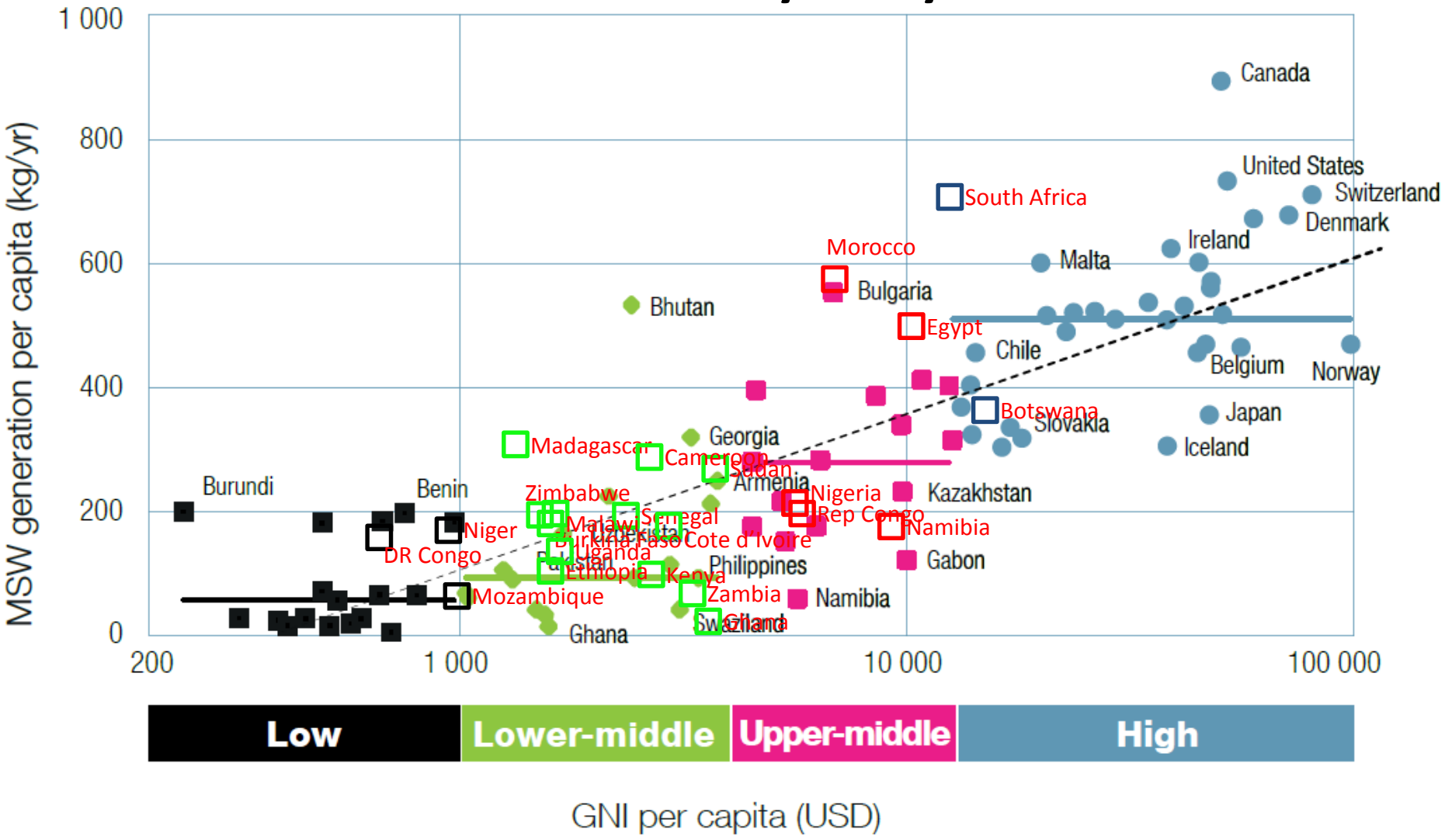
Population movements away from agriculture were indeed associated with rapid economic growth in East Asia; much less so in Sub-Saharan Africa.

World Bank. 2012. World Development Report 2013

Result of Problem Analysis in the Workshop



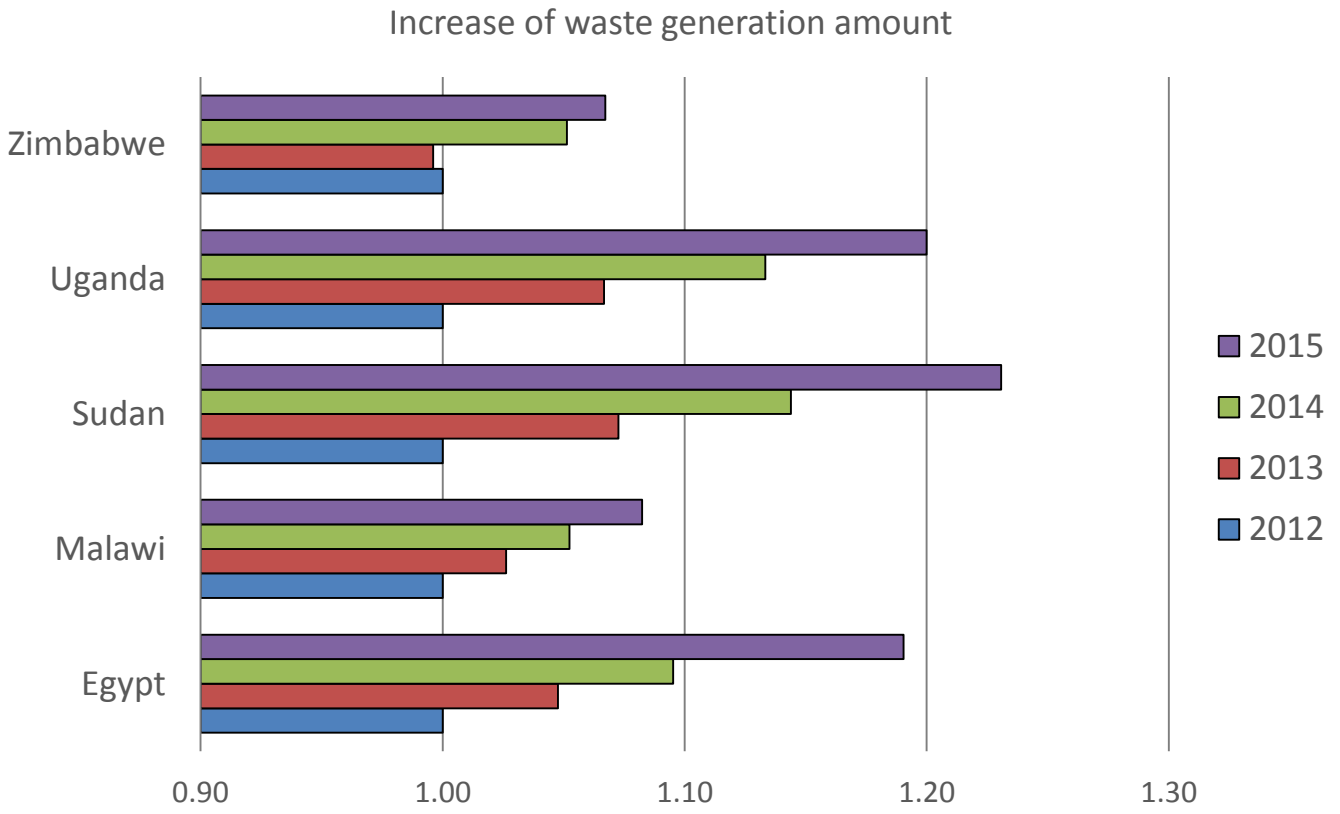
Waste generation vs. income level
A Cross-country analysis



Based on data from 82 countries using the latest available data within the period 2005-2010. For 12 countries, the latest available data was older than 2005. Open symbols show 2012 data based on World Bank (2012).

UNEP-ISWA(2015)

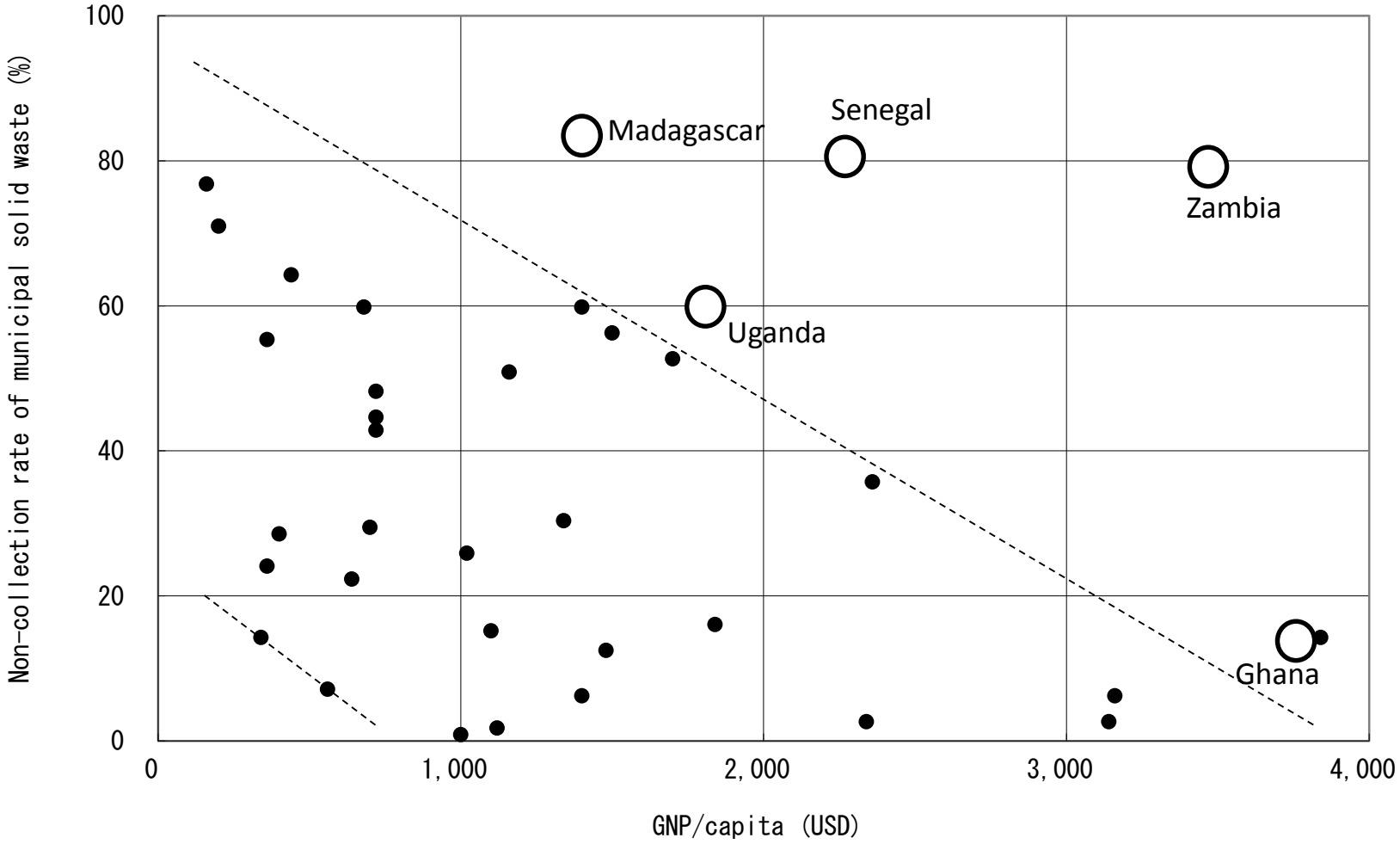
Increase of Waste Generation Amount



The amount of waste generation in 2012 is set as 1.0 for each country.

Historical data on solid waste generation rate is available only from nine countries. Those data show that the waste generation is rapidly increasing in Africa.
The rate indicates the waste amount will be double in coming 10-15 years.

Improvement of Waste Collection with Economic Growth

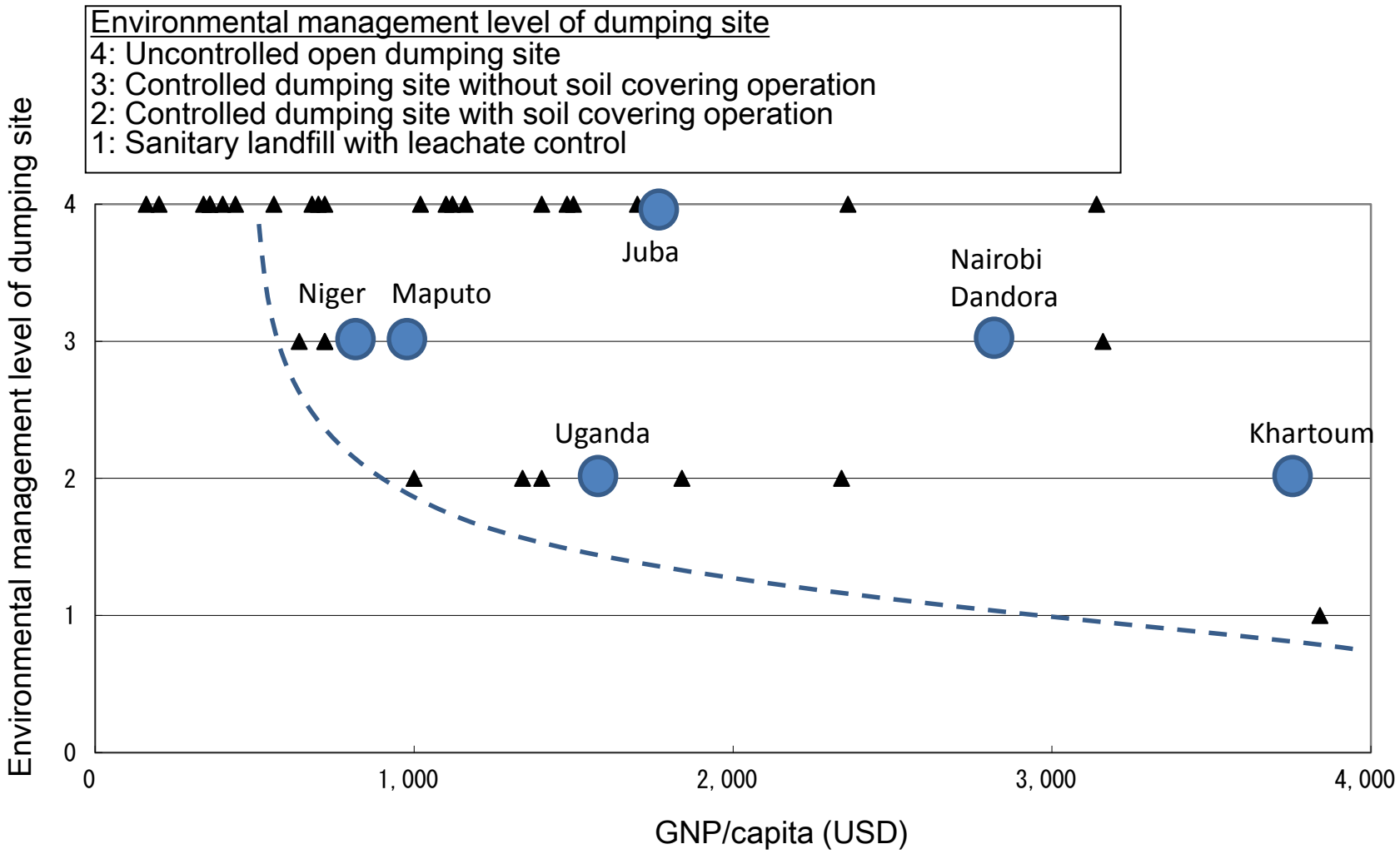


The non-collection rate of municipal solid waste rapidly improves according to the economic growth up to around USD 4,000 (GNP/capita). •Asian cities ○ African countries

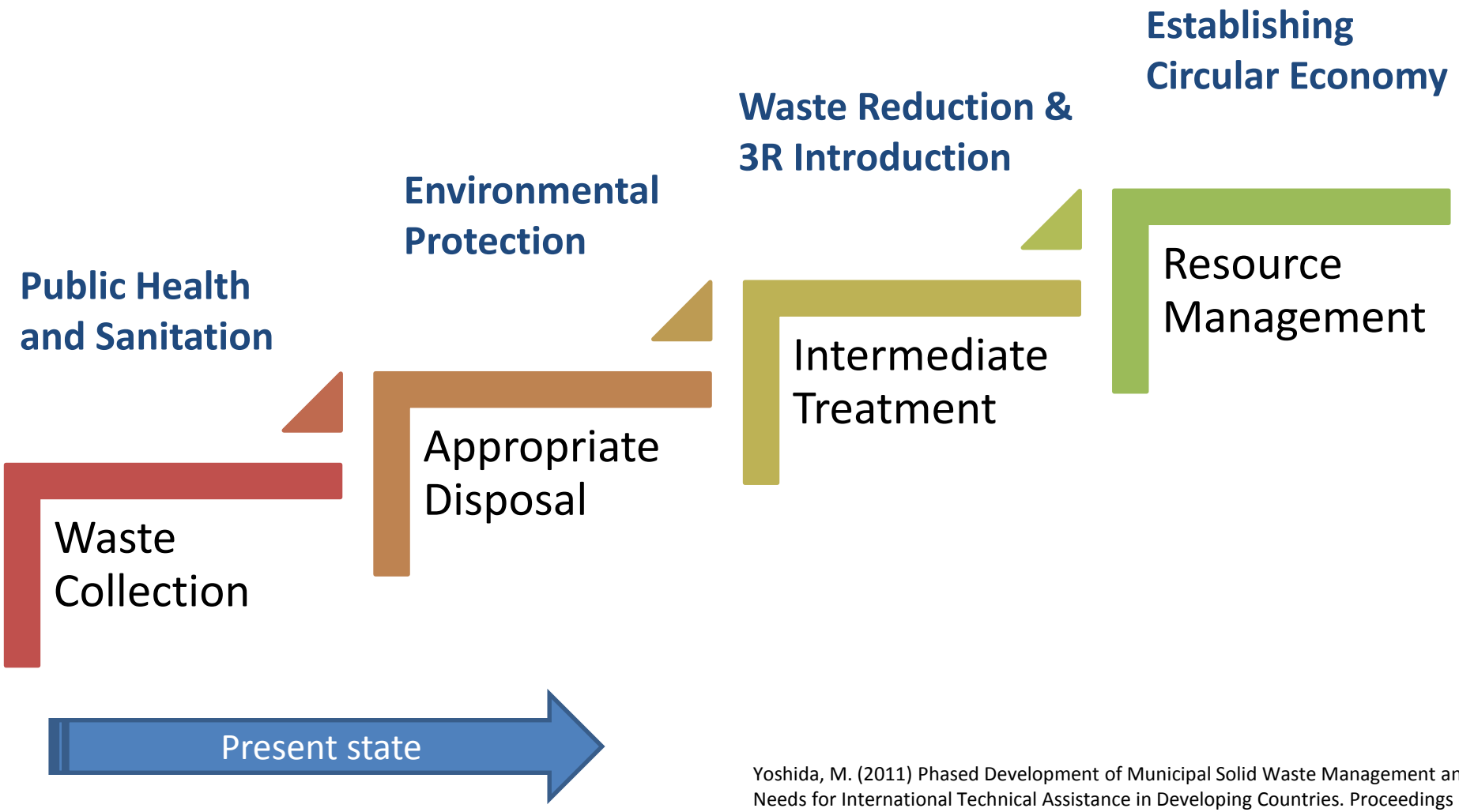
Yoshida(2011), JICA(2015)

Improvement of Final Disposal Site

Correlation between level of disposal method and economic growth

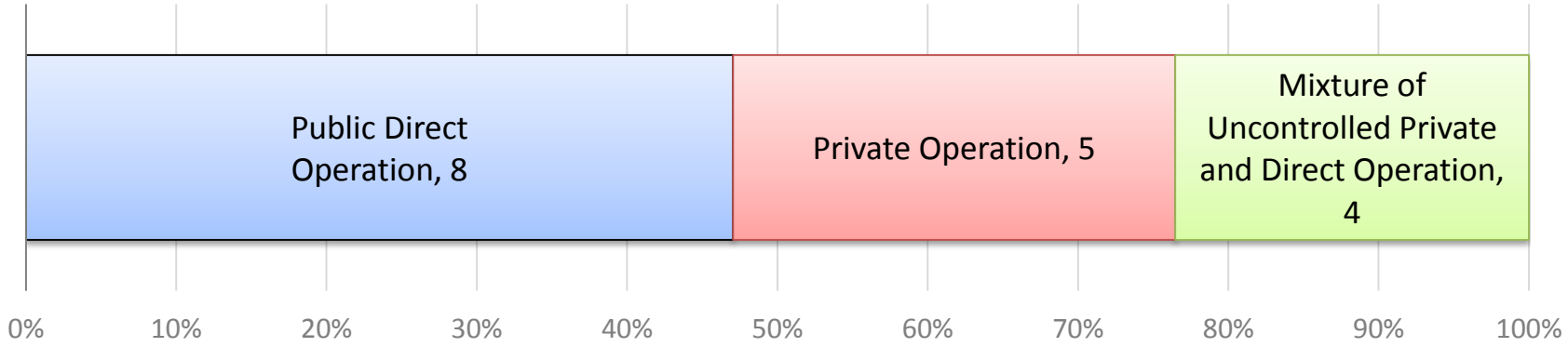


Development of SWM



Yoshida, M. (2011) Phased Development of Municipal Solid Waste Management and Needs for International Technical Assistance in Developing Countries. Proceedings of 2011 World Congress of International Solid Waste Association (ISWA), 485–495.

Operation

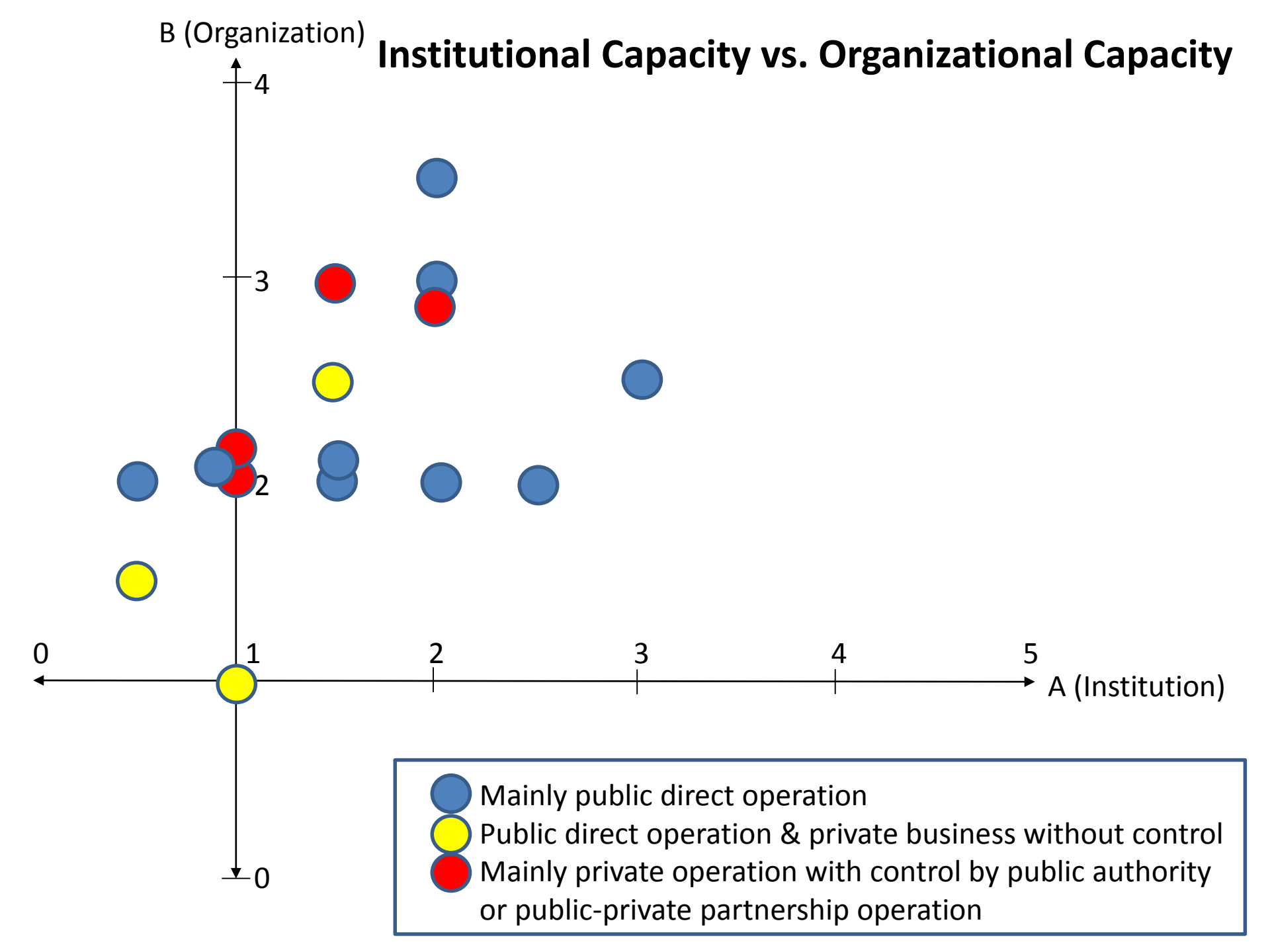


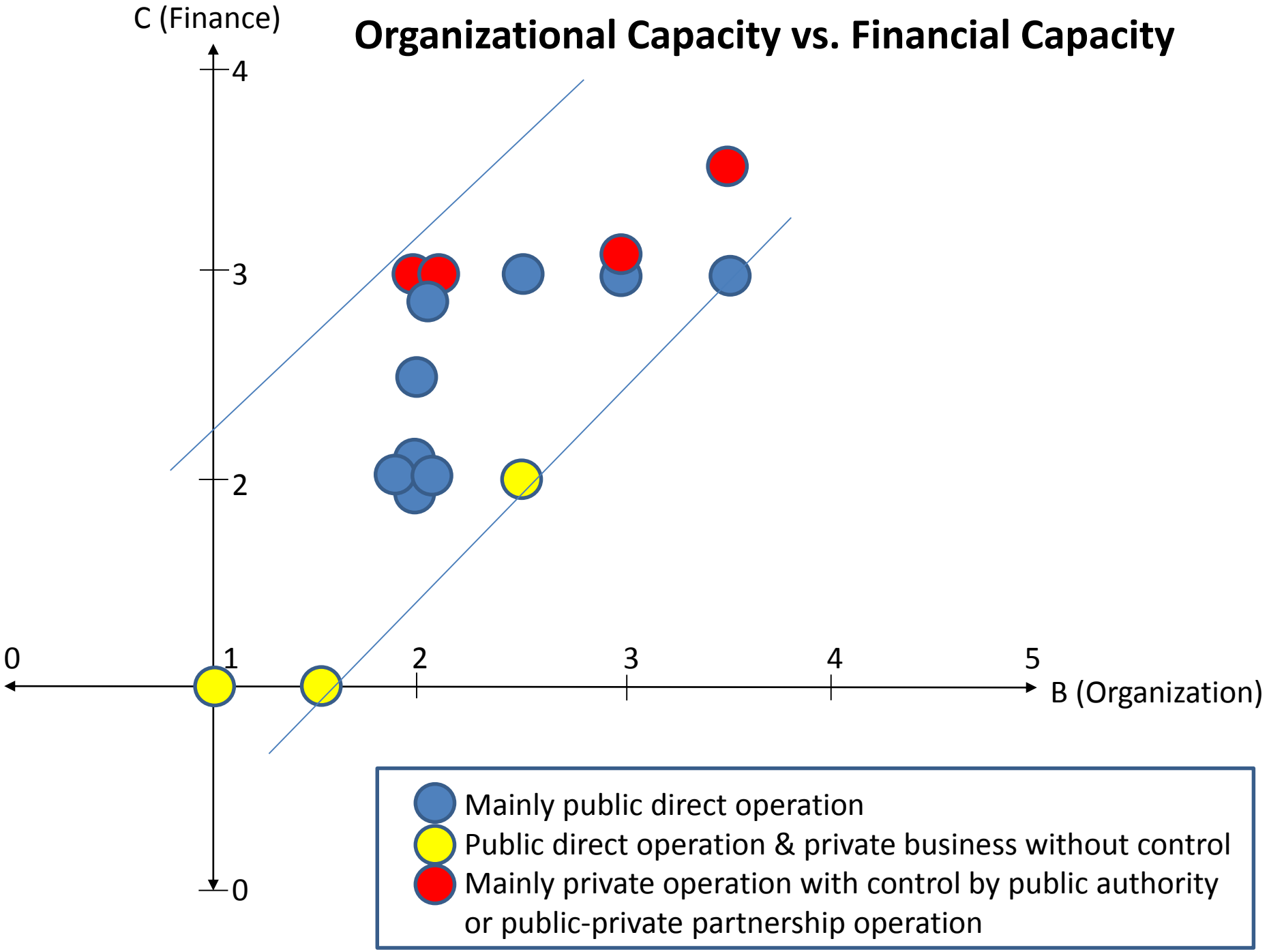
1) Mainly undertaken as a direct publicly-owned business (directly managed)

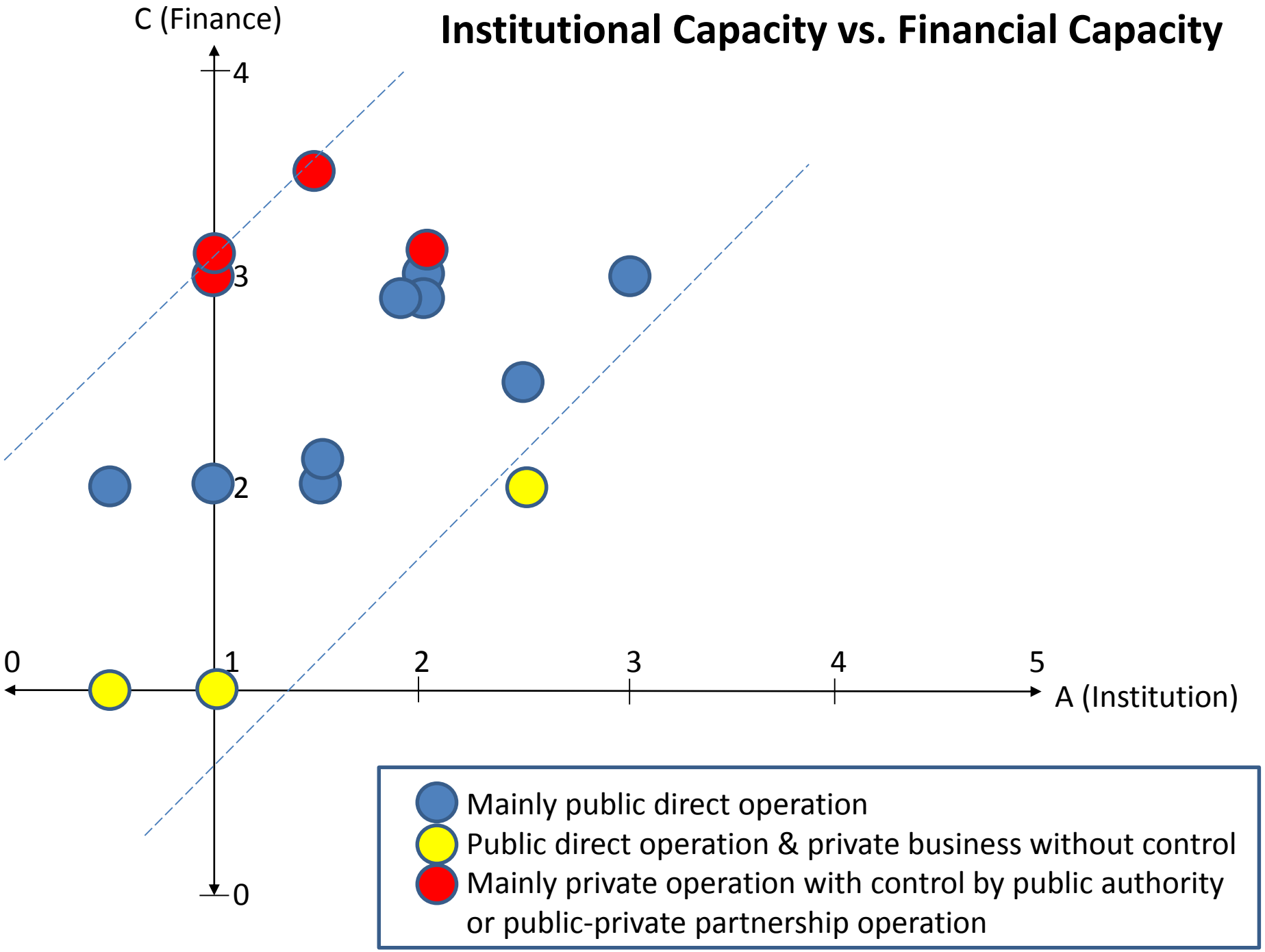
2) Entrusted to private enterprises or licensed and implemented in private (privatized)

3) Disorganized waste management businesses, both conducted by public and private firms without administrative supervision and coordination (mixture of uncontrolled private and public direct operations).

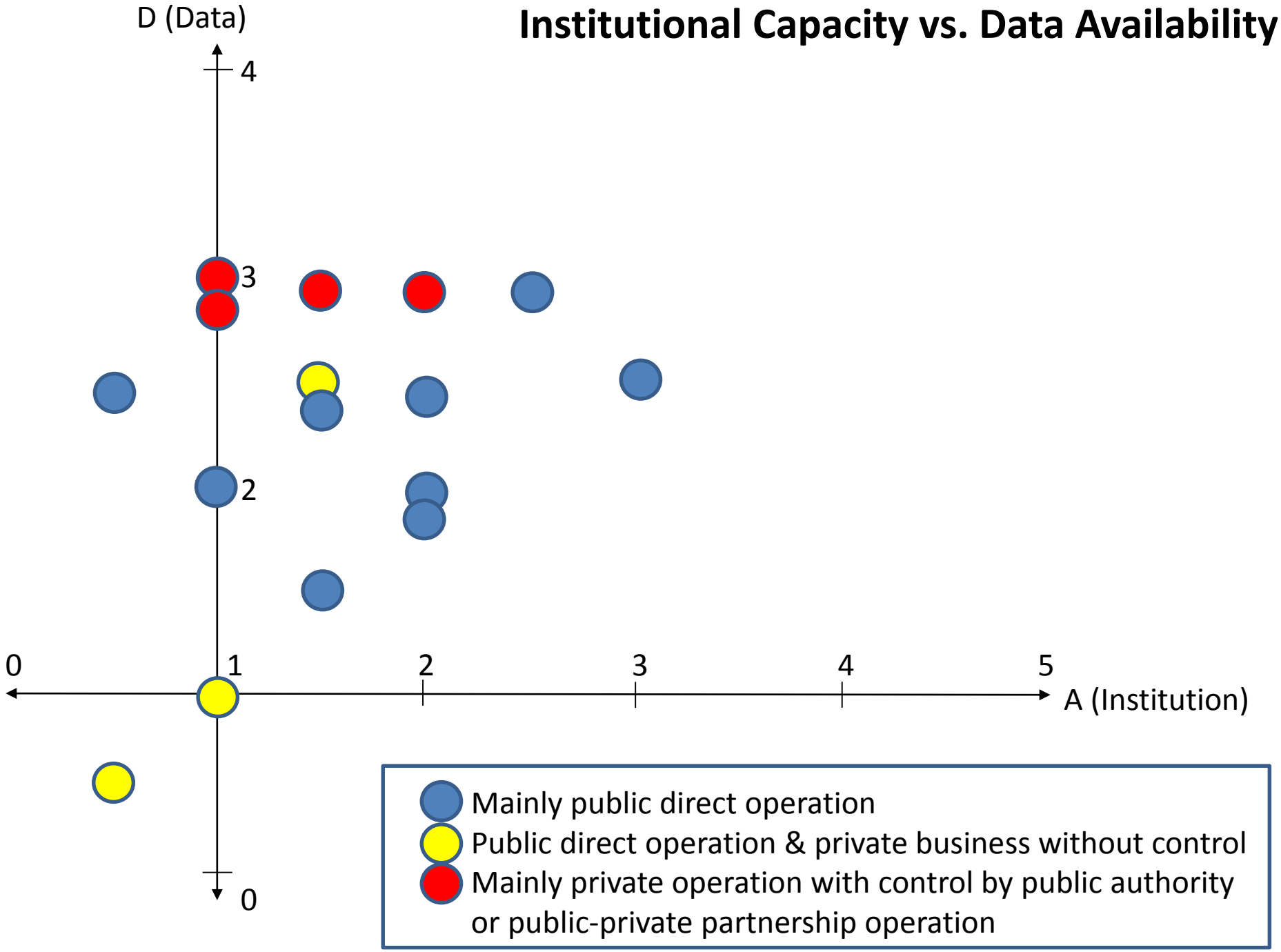
Country	Population	GNI	HDI	W(t/d)	Rate	W2025	A	B	C	D	Operation	Collect %
Djibouti	560,979	3,216	0.473				3.0	2.5	3.0	2.0	Direct	
Namibia	2,303,000	9,770	0.640	356	0.50	1,103	2.0	3.5	3.0	2.5	Direct	
Senegal	14,500,000	2,240	0.494	2,438	0.52	7,643						21%
Kenya	45,500,000	2,881	0.555	2,000	0.30	10,171	1.0	2.0	3.0	3.0	Private	
Zimbabwe	14,600,000	1,588	0.516	2,356	0.53	5,277	2.0	2.0	3.0	2.0	Direct	
South Africa	53,100,000	12,087	0.666	53,425	2.00	72,146						
Cote d'Ivoire	20,800,000	3,163	0.474	4,356	0.48	10,974						
South Sudan	11,300,000	1,882	0.418				0.5	1.5	1.0	0.5	Mix	
Sudan	38,800,000	3,846	0.490	10,000	0.79	32,467	1.5	2.0	2.0	2.5	Direct	
Ethiopia	96,500,000	1,523	0.448	3,781	0.30	19,690						
DR Congo	80,000,000	680	0.435	9,425	0.50	36,735	1.0	1.0	1.0	1.0	Mix	
Rep. Congo	4,600,000	5,503	0.592	1,096	0.53	2,759						
Burkina Faso	19,034,397	1,537	0.402	1,288	0.51	5,174	3.0	2.5	3.0	2.5	Direct	
Niger	17,138,707	889	0.353	1,068	0.49	4,127	1.5	2.0	2.0	1.5	Direct	
Morocco	33,500,000	7,195	0.647	23,014	1.46	44,389	3.0	3.0	4.0	3.0	Mix	72-100%
Zambia	15,000,000	3,464	0.579	842	0.21	3,774	2.5	2.0	2.5	3.0	Direct	20%
Malawi	13,066,320	1,073	0.476	1,151	0.50	4,926	1.5	2.5	2.0	2.5	Mix	
Uganda	38,800,000	1,670	0.493	1,179	0.34	6,313	2.0	3.0	3.0	3.0	Private	39%
Egypt	92,897,000	10,064	0.691	40,822	1.37	83,583	1.5	3.0	3.5	3.0	Private	
Nigeria	177,155,754	5,743	0.527	40,969	0.56	101,307				2.5		
Ghana	26,900,000	3,839	0.579	1,000	0.09	9,857	1.0	2.0	3.0	3.0	Private	85%
Madagascar	24,430,325	1,320	0.512	3,734	0.80	12,485	1.0	2.0	2.0	2.0	Direct	18%
Cameroon	22,800,000	2,894	0.518	6,082	0.77	17,194						
Botswana	2,000,000	14,663	0.698	890	1.03	2,227						
Mozambique	28,000,000	1,098	0.418	1,052	0.14	7,247					Private	

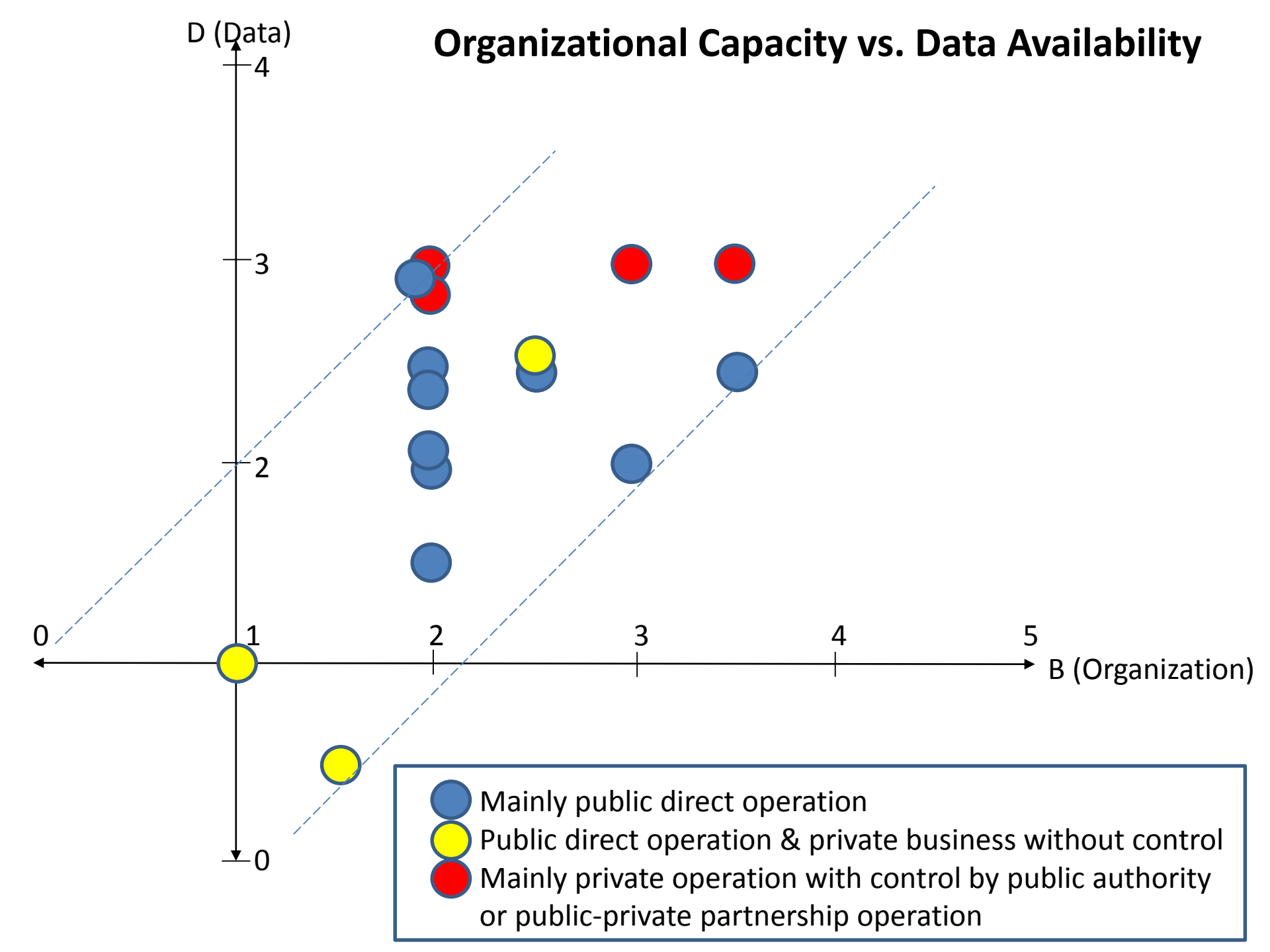

Institutional Capacity vs. Organizational Capacity
B (Organization)
A (Institution)
0
1
2
3
4
5
0
2
3
4
Mainly public direct operation
Public direct operation & private business without control
Mainly private operation with control by public authority or public-private partnership operation

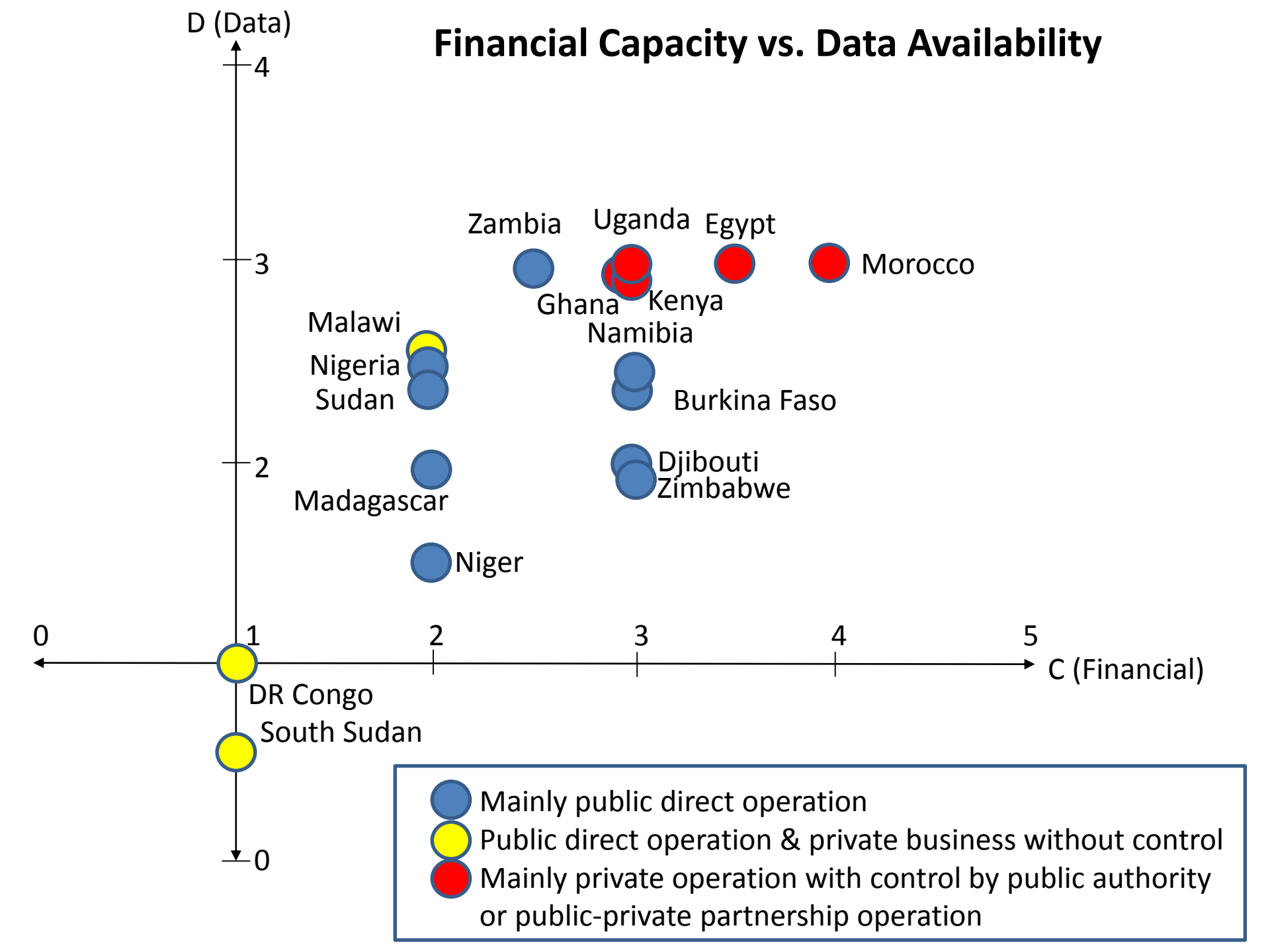

Organizational Capacity vs. Financial Capacity
C (Finance)
4
3
2
0
0
1
2
3
4
5
B (Organization)
Mainly public direct operation
Public direct operation & private business without control
Mainly private operation with control by public authority or public-private partnership operation

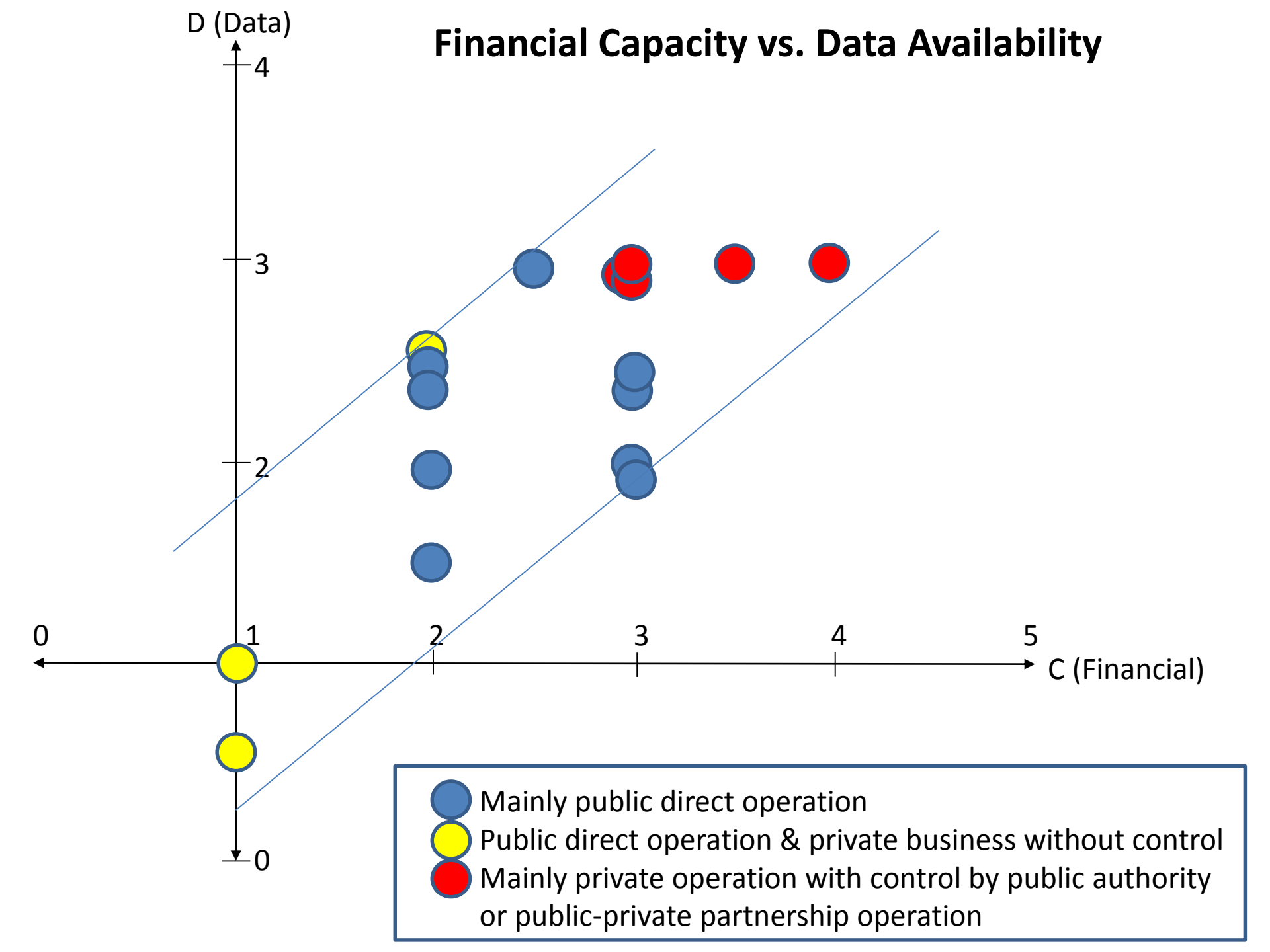

Institutional Capacity vs. Financial Capacity
C (Finance)
4
3
2
0
0
1
2
3
4
5
A (Institution)
Mainly public direct operation
Public direct operation & private business without control
Mainly private operation with control by public authority or public-private partnership operation

Institutional Capacity vs. Data Availability




Organizational Capacity vs. Data Availability
D (Data)
4
3
2
1
0
0
1
2
3
4
5
B (Organization)
Mainly public direct operation
Public direct operation & private business without control
Mainly private operation with control by public authority or public-private partnership operation

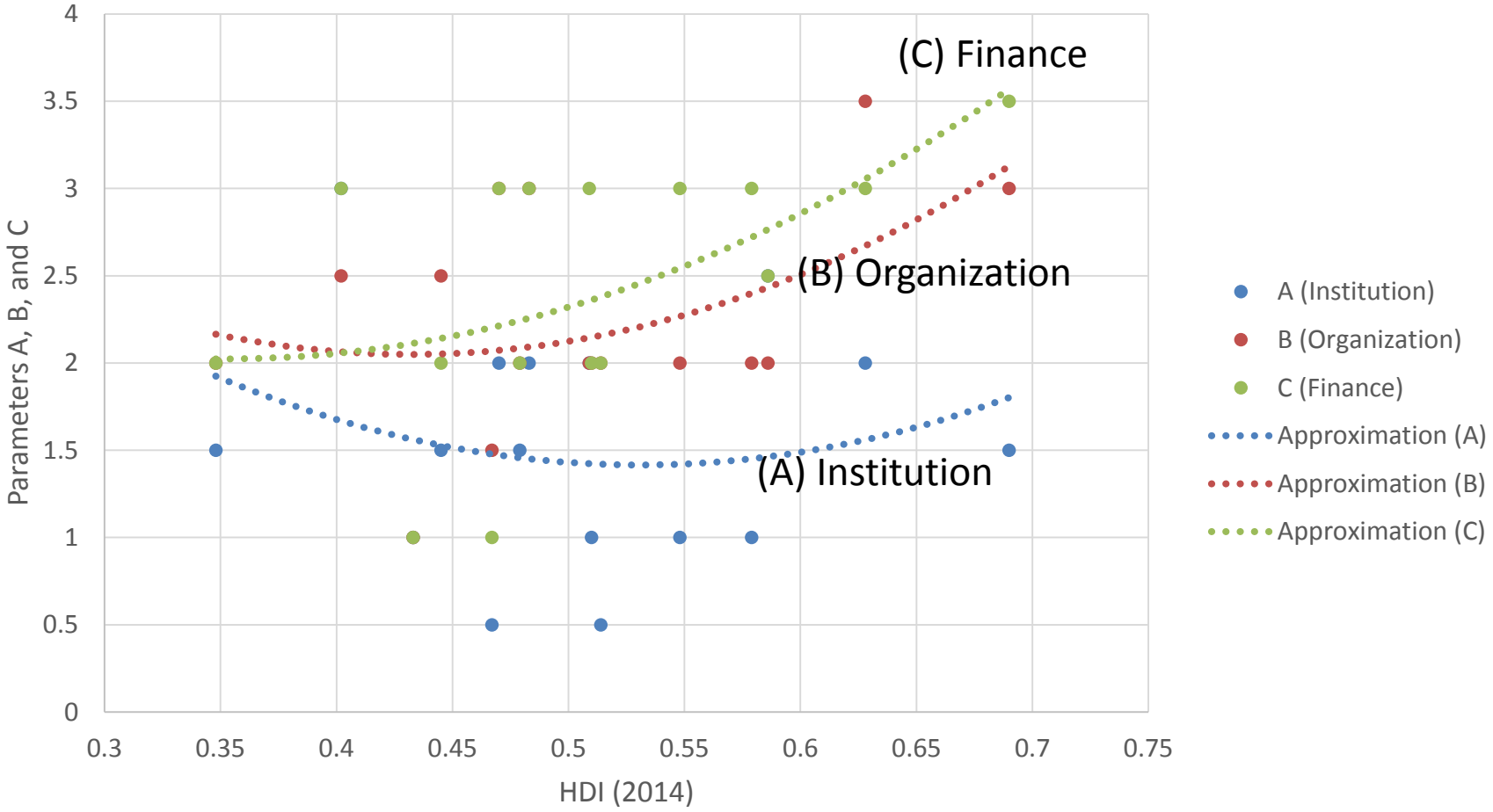

Financial Capacity vs. Data Availability
D (Data)
C (Financial)
0
1
2
3
4
5
Zambia
Uganda
Egypt
Morocco
Ghana
Kenya
Namibia
Malawi
Nigeria
Sudan
Burkina Faso
Djibouti
Zimbabwe
Madagascar
Niger
DR Congo
South Sudan
Mainly public direct operation
Public direct operation & private business without control
Mainly private operation with control by public authority or public-private partnership operation


Financial Capacity vs. Data Availability
D (Data)
4
3
2
0
0
1
2
3
4
5
C (Financial)
Mainly public direct operation
Public direct operation & private business without control
Mainly private operation with control by public authority or public-private partnership operation

Determination Coefficient (r^2)

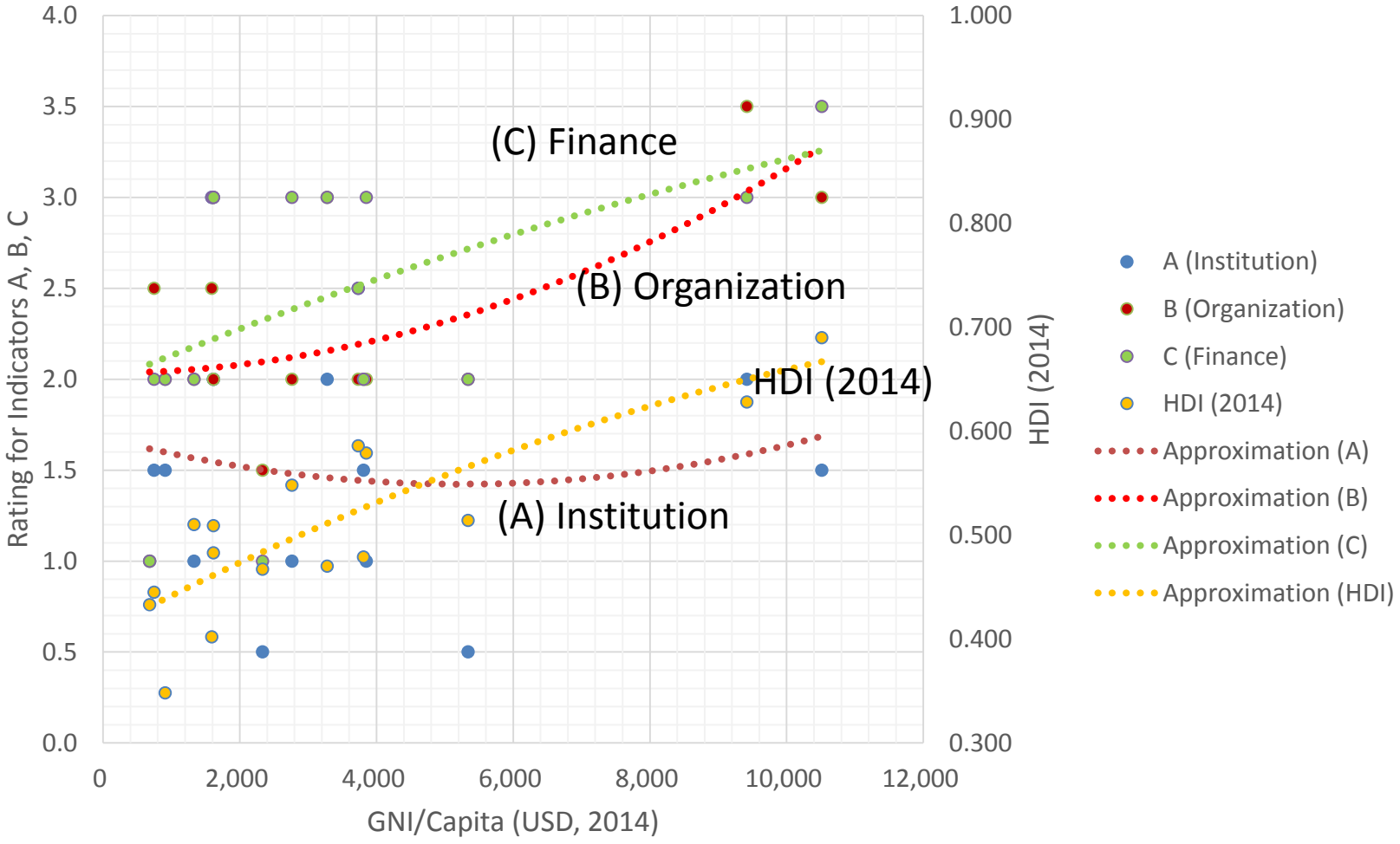
DLIs	A	B	C	D
A	-	0.2993	0.3939	0.1656
B		-	0.5704	0.3945
C			-	0.6335
D				-

Correlation between Human Development Index (HDI) and three parameters of Capacity in SWM



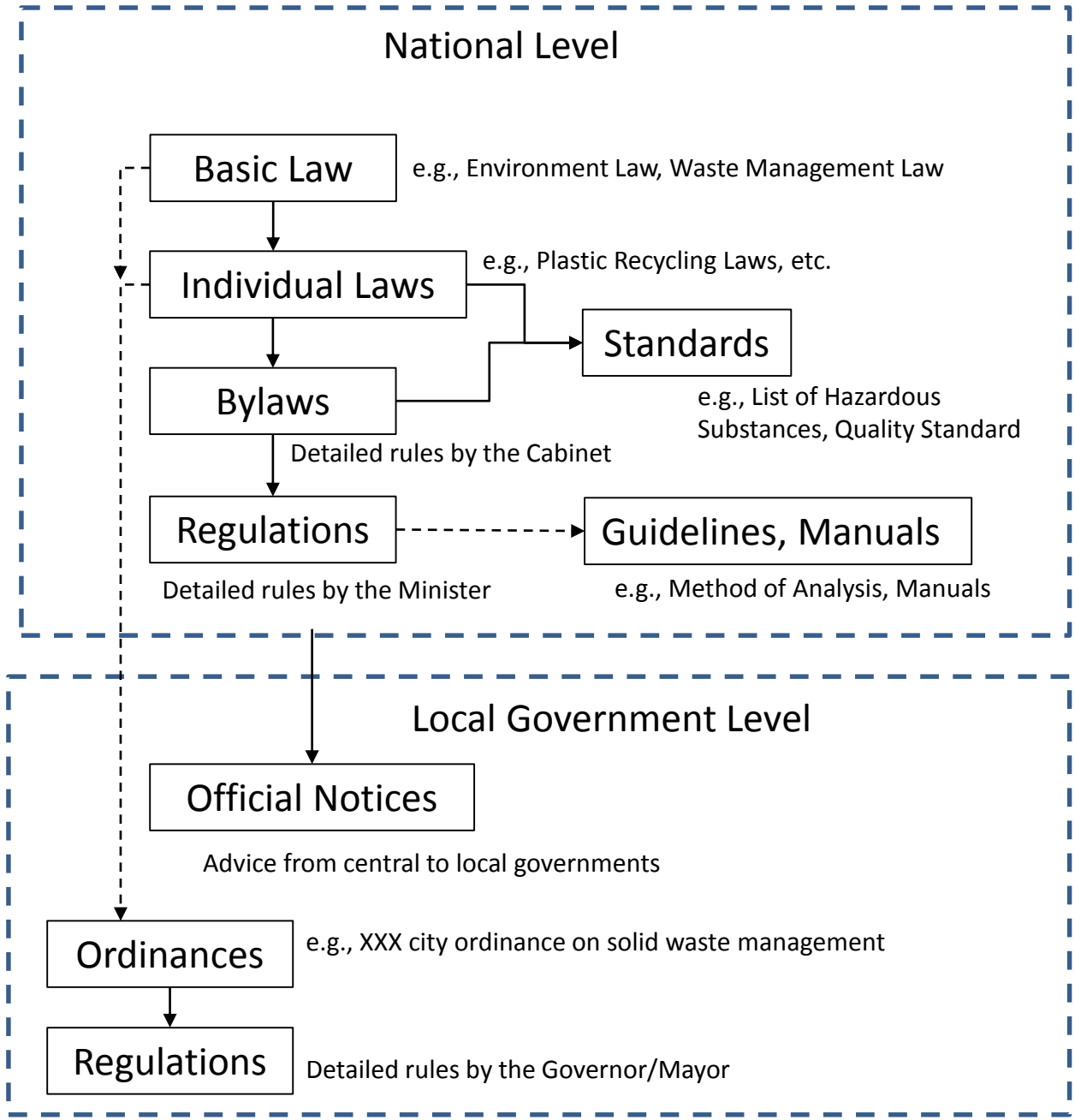
There is a weak positive correlation between the HDI (2014) and the Parameters B (Organization) and C (Finance). No clear correlation can be observed with the Parameter A (Institution).

GNI/capita and Capacity parameters



There is a weak positive correlation between economic growth (GNI/capita) and Parameters B (Organization) and C (Finance).
No clear correlation can be observed with the Parameter A (Institution).

Institutional Building



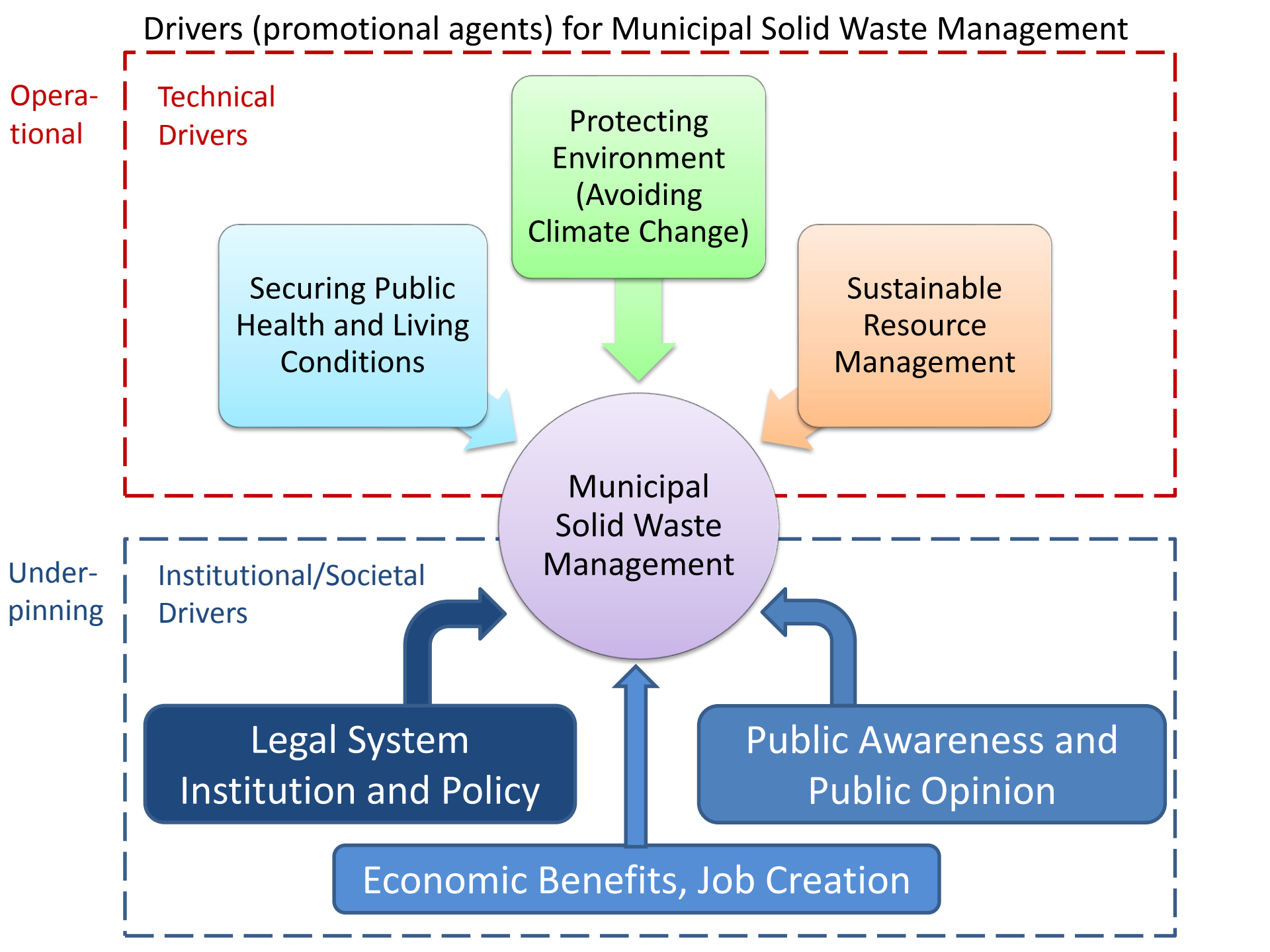
Implementation by Government Administration

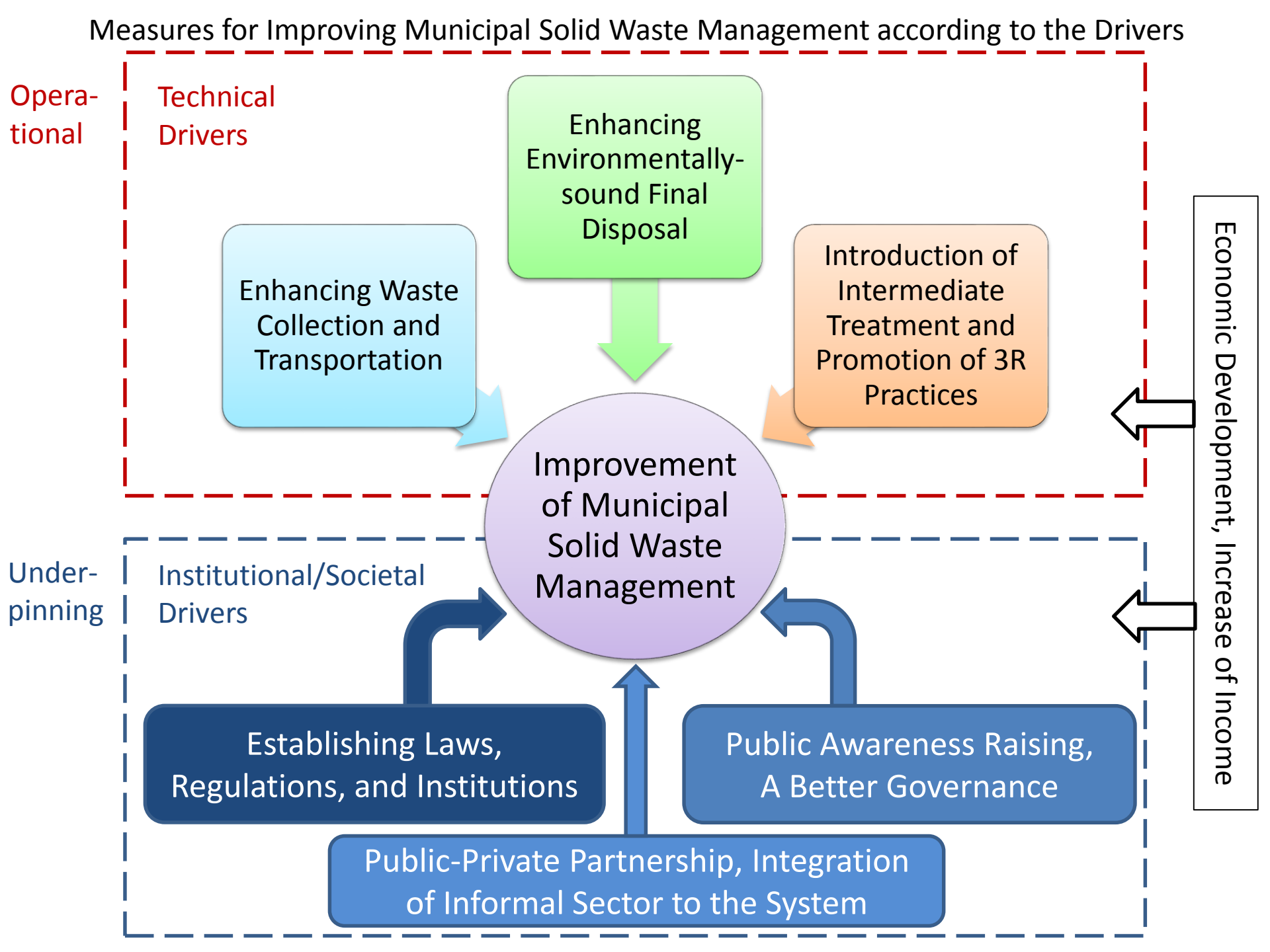
National Policy and Strategy

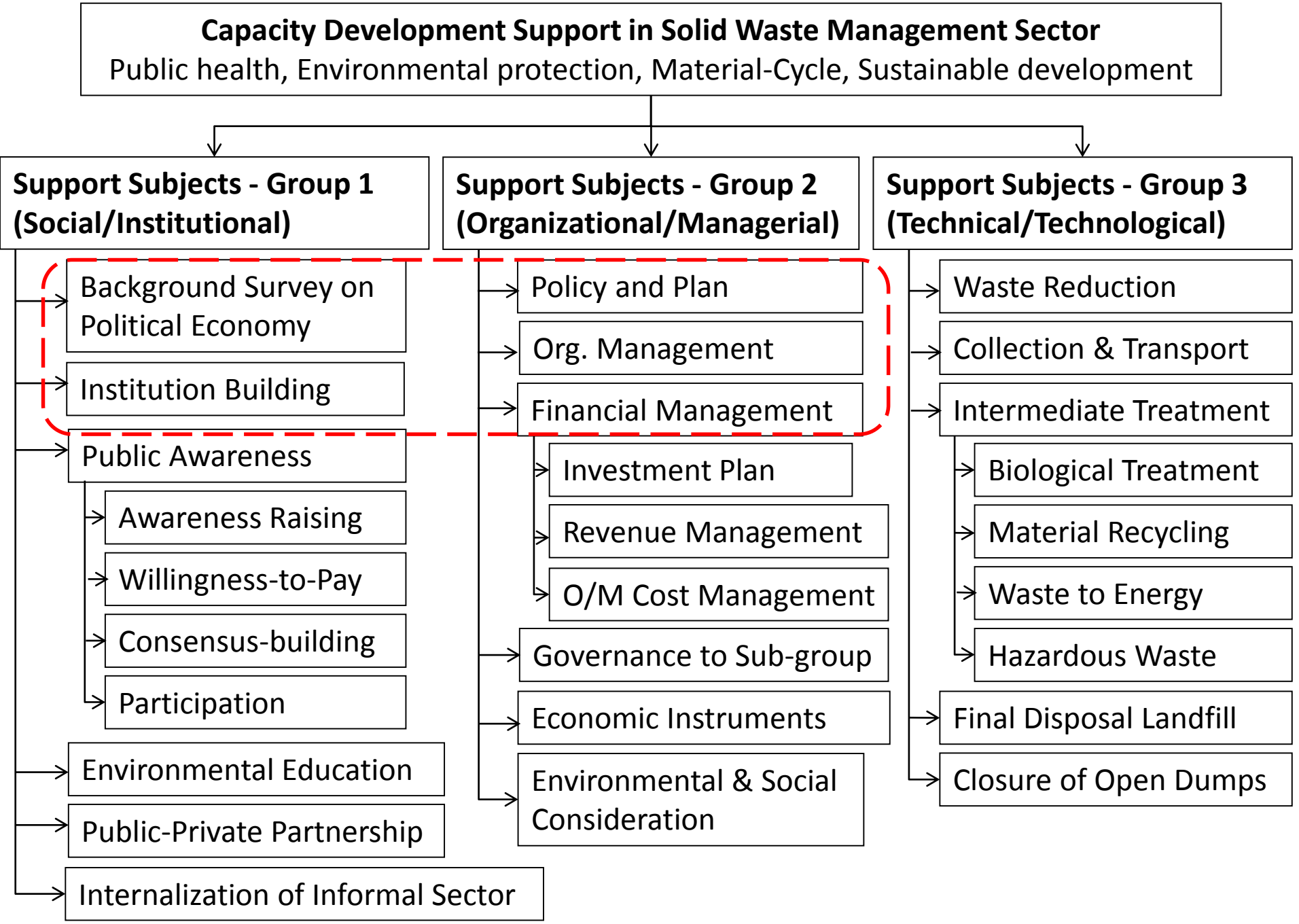
National Plan and Program

Individual Solid Waste Management Plans

Individual Projects


Drivers (promotional agents) for Municipal Solid Waste Management
Opera-
tional
Technical
Drivers
Protecting
Environment
(Avoiding
Climate Change)
Securing Public
Health and Living
Conditions
Sustainable
Resource
Management
Municipal
Solid Waste
Management
Under-
pinning
Institutional/Societal
Drivers
Legal System
Institution and Policy
Public Awareness and
Public Opinion
Economic Benefits, Job Creation


Measures for Improving Municipal Solid Waste Management according to the Drivers
Opera-tional
Technical Drivers
Enhancing Environmentally-sound Final Disposal
Enhancing Waste Collection and Transportation
Introduction of Intermediate Treatment and Promotion of 3R Practices
Improvement of Municipal Solid Waste Management
Economic Development, Increase of Income
Under-pinning
Institutional/Societal Drivers
Establishing Laws, Regulations, and Institutions
Public Awareness Raising, A Better Governance
Public-Private Partnership, Integration of Informal Sector to the System


Capacity Development Support in Solid Waste Management Sector
Public health, Environmental protection, Material-Cycle, Sustainable development
Support Subjects - Group 1 (Social/Institutional)
Support Subjects - Group 2 (Organizational/Managerial)
Support Subjects - Group 3 (Technical/Technological)
Background Survey on Political Economy
Institution Building
Public Awareness
Awareness Raising
Willingness-to-Pay
Consensus-building
Participation
Environmental Education
Public-Private Partnership
Internalization of Informal Sector
Policy and Plan
Org. Management
Financial Management
Investment Plan
Revenue Management
O/M Cost Management
Governance to Sub-group
Economic Instruments
Environmental & Social Consideration
Waste Reduction
Collection & Transport
Intermediate Treatment
Biological Treatment
Material Recycling
Waste to Energy
Hazardous Waste
Final Disposal Landfill
Closure of Open Dumps

Conclusions

1. Under coming Waste Crisis, "improvement of waste collection service for securing public health" and "closure of open dumpsites and construction of sanitary landfills for protecting the environment," are priority issues for enhancing SWM activities in African cities.
2. Present SWM is insufficiently established in African cities and countries, and the capacity development in SWM is urgently required. Capacity strengthening at individual, organizational, and financial levels can be expected through economic growth (GNI/capita) and human development (HDI), but special efforts for institutional-building are required.
3. Trends of private sector involvement in SWM services are common in many cities in Africa. For promoting this movement satisfactorily, public administration authorities are required to appropriately control licensing, authorizing, contracting, supervising, and monitoring private activities.
4. It is necessary to obtain accurate and reliable data on SWM. The present paper is just a preliminary analysis based on very limited data, and future revision based on new data is desired.