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Towards an Integrated National Information System

AMIR II Achievement of Market-Friendly Initiatives and Results

September 2006

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JORDAN AMIR II

Achievement of Market-Friendly Initiatives and Results

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Table of content

1	Background	4
2	Trade and Investment Information System.....	5
2.1	Business and Technical Inefficiencies Encountered.....	7
2.1.1	Business Inefficiencies Encountered	7
2.1.2	Technical Inefficiencies Encountered.....	10
2.2	TIIS Capabilities and Expendabilities	12
3	Transforming the Trade and Investment Information System into an Integrated National Information System.....	14
4	Integrated National Information System Initial Components.....	15
4.1	Business Register	15
4.2	Labor Information System	16
4.3	Demographic and Social Information System	16
4.4	Tourism Statistics.....	17
4.5	Other Progressive Sectors Statistics.....	18

1 Background

Currently, one of the greatest obstacles to effective policy-making (and subsequent performance) is the fact that relevant information is difficult to obtain and often inaccurate. A variety of different entities collect data relevant to trade and investment, labor, employment, businesses information and companies registration, demographic and social information and tourism as well as other relevant economic areas and indicators. There are a number of significant problems; however, with using this data, First, the quality of the data collected within some of the entities is poor. Second, the entities collect data for their own individual purposes in isolation from one another, resulting in a lack of standardization and consistency across the entities, as well as lost synergies and increased cost for administering the information across and among entities. Finally, the databases of the various entities are not linked in any way, making it difficult to exchange information.

Realizing the pressing need for coherent, standardized, and timely data, AMIR, a USAID funded program has developed a project that proposes the optimal solution for trade and investment data, simply put, the project developed a single on-line Trade and Investment Information System (TIIS) to host dependable, verifiable, unified, and timely, information on Jordan's trade and investment related indicators.

2 Trade and Investment Information System

The Trade and Investment Information System (TIIS), was developed by local and international business and technical consultants, under the USAID funded program AMIR. The TIIS is now a live online single data source for selected trade and investment indicators. It is hosted at the Department of Statistics (DOS) and co-championed by the Ministry of Planning and International Cooperation (MoPIC) and the Ministry of Industry and Trade (MIT). The TIIS can be accessed through the website of DOS by clicking on the link "Trade and Investment Information System".

The Trade and Investment Information System (TIIS) provides interactive tool that allows the user to custom-design reports on trade and investment in Jordan. The system is designed to automatically compile data from eight participating governmental entities, the system then standardizes and publishes some of the most updated national statistics on trade and investment according to internationally and nationally recognized standards.

The development of a TIIS was a core recommendation of a scoping study that was undertaken in 2003. Realizing the pressing need to actually establish the TIIS, as per the scoping study's recommendations, the development of the TIIS was carried out in two phases:

Phase I – Data Governance of the TIIS, December 21, 2004-October 31, 2005: This phase dealt with the business aspects of the system, which include, but are not limited to, the following: forming a TIIS Task Force that encompasses participating entities, surveying technical and business data at entities, developing metadata, researching best practices and international standards, and developing a governance structure and pertinent operational procedures.

Phase II – TIIS Development, November 2005-August 2006: The major accomplishment out of this phase is the actual development of the TIIS. Guided by the business requirements and needs, the second phase of the TIIS was able to solve a great deal of imperfections in data, reporting mechanisms, and classification standards at the entity level. The limited time of delivery was a constraint in dealing with all issues related to trade and investment data at entities, however, one of the main outcomes was the provision of a detailed list of the areas that need improvement in the future. The end of this phase resulted in an up and running TIIS.

The TIIS presents an ideal model for future development endeavors on standardization of collection, classification, and publishing methodologies and mechanisms. TIIS flexibility and long-term needs were highly considered during the system development phase in order to ensure that it can accommodate future expansions. Ultimately, the TIIS can accommodate as much as the full datasets of national economic indicators in Jordan as it matures.

The following are the key benefits of the TIIS, as it stands today:

- Improved accessibility: On-line single data source that can be easily accessed and available to the public. This source includes the best indicators available in Jordan.
- Improved depth and breadth of data: Offers multi-dimensional datasets.
- Better understanding: Provides common data definitions and features through "metadata development."

- Improved representational consistency: Provides a consistent representation of data, through using an ETL mapping tool to group different codes into unified common codes.
- Ensured timeliness: Provides an automatic generated data, retrieved at frequent refresh rates to ensure timeliness
- Standardization: Collects transfers and manages data to a central repository that is then used to generate needed reports and provide accurate, consistent information.
- Clear and detailed identification of data shortcomings: throughout the project lifetime, several data shortcomings were encountered. Although the TIIS provides a cleansing mechanism, it was found that a lot of housekeeping is needed at the data source. A detailed documentation of entity-specific data shortcomings were reported for future consideration.

To ensure that the TIIS is well-maintained, the consultants' team worked on the following sustainability factors that were discussed, developed, and modified over the course of the project. They are:

- The championship and support of the project in terms of management and funding
- Implementation of an automated data generation processes; in order to ensure that human intervention is minimal.
- Development of governance structure and operational procedures to ensure a smooth and efficient communication between participating entities as well as clear division of roles and responsibilities between them is facilitated
- Assignment of TIIS management body and staff: included the assignment of contact points at the participating entities as well as the staffing of the TIIS unit. The TIIS unit is tasked with maintaining the TIIS as well as ensuring that it follows the operational procedure among other tasks.

2.1 Business and Technical Inefficiencies Encountered

The following section outlines the technical and business difficulties that were encountered in the development of the nucleus information system (the Trade and Investment Information System).

2.1.1 Business Inefficiencies Encountered

- Manual systems were used in several entities for some datasets (e.g. foreign direct investment¹ and trade in services as reported by the Central Bank of Jordan; Gross Domestic Product, Gross Fixed Capital Formation and Gross Capital Formation as reported by the Department of Statistics; and the QIZ trade and investment statistics as reported by the Ministry of Industry and Trade's – QIZ Section). These systems took minimal processing of information, thus, the trade and investment data lacked the timeliness and consistency targeted. Moreover, data loss vulnerability was a significant point of concern. Thus, throughout the life-time of the TIIS Project, these entities were urged to construct simple databases in order to automatically generate specific datasets. The TIIS consultants' team played an advisory role in the development of these internal systems in order to ensure maximization of benefits to the respective entities and to the TIIS as well.
- Initially, it was thought that most of the datasets should be available in a relatively good quality, but in a fragmented manner across the various stakeholders, and in need of consolidation in order to be of use for policy makers. However, certain data from certain stakeholders were deemed to be either non-existent or of poor quality such as Jordan's exports broken down by trade agreements.
- Other inefficiencies pertinent to data collection methods and data access were also noted. Examples of these are:
 - Customs department fields are sometimes not filled completely by the customs officers making some datasets incomplete and unreliable. Additionally, DOS access to the Customs Department's database is limited which prohibits any data editing efforts by DOS to take place.
 - QIZ export data are accurately available from MIT, however, prior to 2004 data is available in aggregation only for all QIZ's and not broken down by QIZ, or commodity, which if available could make them even more relevant for policy-makers. The QIZ's themselves have inaccurate export data.
 - Private IEs data are only available by the private IE operators which are also inaccurate and unreliable.

¹Foreign Direct Investment (FDI) figures are only collected for Balance of Payments (BOP) purposes, being the best measure of FDI in Jordan. FDI statistics by sector or by country are not available for Jordan. However, reports by the International Monetary Fund (IMF) and the United Nations' Economic and Social Commission for West Asia (ESCWA) have identified major problems in Jordan's FDI statistics in terms of their unavailability, inconsistency, lack of accuracy and thus limited reliability. Based on IMF and ESCWA findings, a project to collect Jordan's FDI indicators was initiated in the year 2005, on which the TIIS project aimed to build depending on its progress and achievements.

- It was noted that in most cases, investment data broken down by sector and nationality simultaneously was not readily available despite it being more useful for policy makers.
- Business data surveys showed that only few stakeholders adhere to international standards. TIIS consultants team resorted to international best practices and standards (ISO, SNA, UN Statistics Division), in order to enlighten data providers on international standards pertinent to the collection, validation, processing, storage, and dissemination of data. In the future, it is hoped that the Government of Jordan will take the initiative to work with public entities on adherence to international standards and best practices in order to improve quality, eliminating errors and incoherencies
- National standards are not standardized across entities. Each entity creates its own classification (e.g. different sector segmentation across entities, different legal statuses classification, different countries' listing, etc.)
- Lack of standardized definitions of data items across government entities (for example “investment” as reported by MIT doesn’t necessarily have the same definition of “investment” as reported by ASEZ). Thus, following the identification of the data sets to be included in the TIIS, comprehensive metadata sheets were developed, containing unified definitions and data features, aligned with both local and international standards.
- Duplication and lack of consistency in coding and recording of data within the same entity. Examples:
 - ASEZ’s establishments’ lines of production(s) were registered randomly in either one of the ISIC digits available within ASEZ’s database (i.e. chapters, 2-digits, 4-digits, etc.); resulting in largely inconsistent and incoherent data. Consequently; ASEZ’s team were asked to record all establishments according to their own line of production(s) within the chapter level solely of ISIC classification.
 - Entities such as ACI and ASEZA record companies, with more than one line of production, under more than one ISIC code which results in an inflated number of companies and registered capital. Ideally, when compiling statistics, only primary activity of the company (by looking at sales by activity) should be included (other activities are considered secondary).
- Other weaknesses include: representational weaknesses and accessibility weaknesses: i.e. data is not easily available or obtainable

The table below identifies the data quality dimensions that have been evaluated, the solutions offered by the TIIS and future possible solutions that are built on the TIIS structure and quality standards.

Table 1: Data Quality Dimensions

Dimension	Description	"as-is" current scenario	TIIS Project Solutions	Future Possible Solutions
Accessibility	Data must be easily and quickly accessible	Limited accessibility to data	On-line single data source that can be easily accessed and available to the public	-
Systemized	Data must be processed and stored with the least human interaction possible to reduce human error	Lack of automatically generated data in some entities for specific datasets	Highlighted the importance of automatically generated data and facilitated the development of three databases at three different entities.	Work with other entities on transforming manually generated data to automatically generated data.
Accuracy	Data must be correct and reliable	Certain data sets were deemed to be either inexistent or of poor quality.	Used the best measure available to date and pointed out gaps for future improvements.	Work on improving data availability and quality at the data source. If need be, suggest new datasets that should be collected regularly.
Completeness	Data must be available in sufficient depth and scope	Limited data gathering procedure	-	Ensure adherence to procedures of data collection and compilation.
		Lack of segregated data sets among certain entities.	Offers multi-dimensional datasets.	Urge data providers to provide more depth and breadth to data as needed.
Ease of Understanding	Data must be in appropriate language and units, and the data definitions must be clear	Lack of common data features and data definitions	Provides common data definitions and features "metadata development"	Build on the TIIS metadata
Representational Consistency	Data must always be presented in the same format and compatible with previous data	Lack of adherence to international standards	Educated participating entities on international best practices and standards	Ensure adherence to international standards and best practices in order to eliminate errors and incoherencies.
		Lack of common national classification and presentation standards	Used an ETL mapping tool to group different codes into unified common codes.	Establish common national standards, codes.
Timeliness	Relevant data must be up to date to help in the planning process.	A considerable time-span between collection and release	Provides an automatic generated data, retrieved at frequent refresh rates to ensure timely data	-
Reputation	Data must be trusted or highly regarded in terms of their source or content	Different sources for the same datasets and sometimes with different figures.	Single source that is offering users with the best indicators available in Jordan. Only trust-worthy data were included.	Develop a mechanism to collect data from "less-trusted" sources to trusted governmental entities.

2.1.2 *Technical Inefficiencies Encountered*

This section provides a summary of a technical gap analysis between the current and required data, infrastructure, and information requirements of the different Trade and Investment entities (MIT, JIB, JIEC, ASEZ, Customs, and DOS). The analysis was done in several site visits, carried out by the project team, which focused on collecting and documenting the gaps and issues discovered at each of the involved entities. The documented gaps and issues mainly discuss the discrepancies and inconsistencies among the different entities that will prevent them from benefiting from, and participating in, the envisioned TIIIS. Each entity should tackle and resolve these gaps and issues for it to be an active member/user of the system.

Gaps and issues are mainly related to the following areas:

1. Network Infrastructure/Architecture
 - a. Network Infrastructure.
 - b. Data Clients.
 - c. Relational Database Management Systems (RDBMS).

To successfully participate and use the Trade and Investment Information System, it is essential for the member entities to standardize on a number of lookup data, such as Country Codes, Commodity Classification (Harmonized System Codes), Trade Sector Classification (International Standard Industrial Classification - ISIC), and Investment Sector Classification.

This can be achieved through the implementation of a mapping logic that maps existing lookup data to another standardized version that follows the classifications mentioned above. This approach will minimize the impact of standardizing this data on the existing systems and databases currently in use at the involved entities.

2. Entity-to-Entity Data Exchange

After closely investigating the existing network, database servers, and client applications, it became evident that the current infrastructure used at the different entities should undergo a series of substantial changes to be able to participate in, and use, the envisioned Trade and Investment Information System. Additionally, representatives from the different entities advised that changes to the existing systems must be kept to a minimum, if not eliminated. This is justified by the fact that the amount of time and resources invested into these systems is substantial enough for the entities to reject any changes to these systems, even if it is imposed by the implementation of the Trade and Investment Information System.

3. Data Management/Governance Standards

The Data Governance Model defines a set of guidelines and rules for managing the overall TIIS data network including data standards, protocols for data exchange, procedures for maintaining and improving data quality and integrity. A sub-set of these guidelines and rules were investigated during the site visits. These include:

- **Database Attribute Naming Standards**
Standardize the Database (entities and attributes) naming conventions throughout the enterprise. The importance of such standards is recognized when the different data sources are integrated together to provide consolidated Trade and Investment data.
- **Data Management Strategy**
The Data Management strategy is a function that defines the standards and rules for maintaining and standardizing corporate data. This includes the definition of the corporate data standards, the review of application data models, and the maintenance/expansion of the Metadata Repository.
Data Management is dedicated to the IT department of an organization. It is also known as Data Administration, but includes data stewards and other representatives drawn from the organization's business (both business and technical metadata needs to be collected and maintained).
- **Software Developers Guide**
It is essential to have a well defined set of standards application developers should follow when developing, maintaining, or extending different functionalities of the entity. These standards should be adhered to in case of in-house or out-sourced development initiatives.
- **Other Data-related Standards**
This includes other forms of standards and policies that affect the data (such as Backup policies).
It was found out in the visits that not all the entities are adhering to defined strategies, guidelines and policies for the above mentioned points.

4. Data Mapping Rules

In order to consolidate and aggregate Trade and Investment data originating from different data source, it is necessary to apply a series of data mapping rules against the raw data. These rules will map data originating from different data sources into a standardized format that will help answer Trade and Investment enquiries. There were several gaps, discrepancies and inconsistencies that exist between the different data sources (entities). At the time the envisioned TIIS implementation, the existing discrepancies and inconsistencies should be resolved, thus eliminating the need for using workarounds.

2.2 TIIS Capabilities and Expendabilities

The Trade and Investment Information System proposed for the Government of Jordan addresses and fix some fundamental business issues that are causing considerable difficulties for the public and private sector stakeholders to make enlightened and informed decisions. Among those are:

- Data is not readily available
- Data is of poor quality
- Data lacks standardization and consistency
- Value added information derived from the data is not readily available

The above business requirements translate into several functional requirements dealing with data transformation and consolidation, metadata (data about data) creation and maintenance, built-in and ad-hoc reporting, system accessibility, analytics and business intelligence, and support for data governance and management. They also imply non-functional requirements relating to flexibility, applicability to other industries, maintainability, and on-going support.

Taking into consideration the complex business and technical requirements stated above, the decision to build the application from scratch or buy it “off the shelf” is for the latter option based an exhaustive study of the following factors:

- Functionality.
- Flexibility.
- Maintainability & Support.
- Initial and running cost.
- Time needed.

The above business requirements translate into several functional requirements dealing with data transformation and consolidation, metadata (data about data) creation and maintenance, built-in and ad-hoc reporting, system accessibility, analytics and business intelligence, and support for data governance and management. They also imply non-functional requirements relating to flexibility, applicability to other industries, maintainability, and on-going support.

Taking into consideration the complex business and technical requirements stated above, the decision to build the application from scratch or buy it “off the shelf” is for the latter option based on the following reasoning.

	Buy	Build	Notes
Functionality	Covers all functional requirements	Covers all functional requirements	There is much more risk that the build solution will not cover some functionality due to insufficient testing.
Flexibility	More flexible	Less flexible	COTS solution is much more configurable and applicable to other industries.
Maintainability & Support	More maintainable and stronger support	Less maintainable and weaker support	Industry standard COTS applications are more maintainable and come with more capable and lasting support from the tool vendor.
Initial Cost	Approx. JOD 350,000	Approx. JOD 900,000	
Running Cost	Approx. JOD 42,000	Approx. JOD 125,000	Per year.
Time	Approx. six months	Approx. three years	
Other	Approx. 40% better ROI. Vendors continuously enhance and support their products according to the collective requirements of their user base.	Harder to modify and require a lot of efforts as it involves substantial programming and coding in most cases.	

3 Transforming the Trade and Investment Information System into an Integrated National Information System

In light of the Government of Jordan’s current development approach, and in alignment with its detailed transformational phases, and in comparing the previous status of Trade and Investment data in Jordan with other areas such as employment, labor, Business and Companies Information, demographic and social statistics, and tourism statistics, the TIIS offers a very good grounds to be expanded to include other economic and national indicators as they suffer from the same previous status of trade and investment, more specifically fragmented data, poor data quality, non-standardized classifications across the different entities.

The following section suggests some of the initial areas necessary for policy makers to make accurate and timely decisions on a national level.

It is recommended that the government of Jordan take a staged approach through which the TIIS can be expanded into a National Integrated Information System. It is also worth mentioning that by integrating the use of administrative records such as Tax Department and Social Security Corporation and other entities records with the Department of Statistics surveys and census, the government of Jordan can leap forward in building a National Integrated Information System that offers accurate and timely national information to policy makers and users in Jordan and outside Jordan.

The Integrated National Information System includes the following elements:

- Offers more use of administrative records from relevant entities
- Improves the data quality at the administrative records entities
- Integrates administrative records and surveys and census
- Uses Information and Communications Technology to integrate the data from the various entities.

4 Integrated National Information System Initial Components

Following are some of recommended initial areas necessary for policy makers to make accurate and timely decisions on a national level including employment, labor, demographic and social indicators, Businesses and companies' identification and registration, and tourism statistics.

4.1 Business Register

The Business Register is the central collection, storage and verification system for businesses, corporations and establishments identity information; it will play a key role in improving data quality, minimizing duplicates data and effort and provide fuller coverage of Businesses in Jordan by providing an accurate frame for businesses operating in Jordan.

The Business Register includes information about the business entity, including business location, organization type, classification of their activities, and more importantly a unified organization ID number that serves as the organization reference across Jordan. The Business Register needs to be continuously updated with the latest information from the different government systems and survey censuses by DOS in order to be the single comprehensive and accurate source of information about Businesses.

The unified organization ID provides a set of services to government agencies that assist to streamline dealings with businesses and reduce the overall number of transactions businesses must make with government. It does this by allowing government agencies to access the information on business identities stored in the Business Register and re-use it in their own interactions with businesses.

In order to establish the Business Register, a comprehensive data governance model needs to be established including a steering committee and a working team that includes DOS, SSC, Tax Department, MIT, and Municipalities (Greater Amman Municipality and Ministry of Municipalities if possible). The working team will be responsible for setting the Business Register standards, classifications and unified numbers across the different government agencies and establishing the business register information system and connecting it to the different data sources, the steering committee will be responsible to ensure adopting the Business Register standards, definitions and numbers by all government agencies.

4.2 Labor Information System

In recent years, Jordan has taken noteworthy strides towards betterment of living standards and provision of social services, particularly education and health. However, efforts towards achieving fuller employment through extensive private-sector investment (being an important element of poverty-reduction measures) so far have not shown expected results. For example, over the last few years, unemployment has remained around the 12-15 percent mark. The policy-makers naturally are anxious to learn the impact of their efforts and find out the extent of economic growth, particularly in terms of number of jobs such created. It appears that, whereas various instruments are in place to measure unemployment, hardly any of these instruments can provide details regarding job-creation and employability statistics in Jordan.

The Labor Information System is an integrated system that provides accurate data on job creation, employed labor force, number and distribution of foreign workers, and wages and earnings.

The entities involved in such a system are DOS, MIT, Ministry of Labor, SSC, Tax Department, Ministry of Interior, Civil Service Bureau, Department of Borders and Residency, and Intelligence. DOS is currently running a costly job creation and employment surveys; these can be made more targeted and complementary to administrative data as currently around 50% of workers are covered by the SSC, if SSC coverage can be increased and data at their data can improved, compiled and classified to fit statistical purposes, then accurate and timely information on the bulk of employment can be made available at a lower cost. The system will also include statistics on foreign workers, which is currently not available from a single source and is inconsistent.

In order to establish the Labor Information System, a comprehensive information map and data governance model for labor statistics needs to be established including a working committee and a steering committee, the working committee should be responsible for unifying coding procedures and classifications, making the necessary changes to ensure administrative arrangements and forms are adjusted and data is classified and presented to fit statistical purposes, and establishing the integrated labor information system and connecting to the different data sources, the steering committee will be responsible to ensure buy-in and adopting the standards and definitions by all government agencies.

4.3 Demographic and Social Information System

The Demographic and social information system will unify the information sources for the size and structure of the population, deaths, births, and migration, as well as the ability to slice and dice this information in multiple ways to answer policy and decision makers questions and offer quality information.

A steering committee and a working committee will be formed to map the different data sources and unify classifications and standards among the participating entities, the steering committee will be able also to assist certain entities to improve its data quality and provide more accurate information.

The Steering committee will be in charge of securing buy-in at the different levels and adopting the standards and definitions by all related government agencies.

4.4 Tourism Statistics

By 2010, Jordan hopes to greatly enhance its position in the global tourism market. This requires reliable data to measure industry contributions to the economy and to properly target high-yielding markets.

Published statistics—whether from MoTA or the Central Bank of Jordan (CBJ)—are largely inaccurate. MoTA publishes tourist arrivals (based on data from the Public Security Department) in hard copy, infrequently, and late. It also publishes touring patterns (based on data from hotels and inbound tour operators) in an incomplete and manual format. Cumbersome data entry is required, and reporting is based on an outdated analytical model. CBJ's estimates of tourist receipts are based on a tourist survey dating back to 1997.

Four main public entities collect data: MoTA, the Department of Statistics, the Department of Public Security, and the CBJ. The Jordan Hotel Association also collects data on behalf of the lodging sector, and tour operators submit independent yet mandated reports. Real-time data access is virtually non-existent.

Finally, there are no official GoJ reports on the true contribution of tourism to GDP, employment, the balance of payments, and tax revenue.

The Tourism Statistics project is divided into two phases, the first phase focuses on documenting the reporting requirements for the tourism sector and developing a data governance model for tourism data and getting stakeholders' agreement on the proposed model, the second phase will focus on developing the information system and implementing the necessary tools and functions required in the system. The parties involved are DOS, MOTA, Department of Public Security, Department Borders and Residency, and CBJ.

A steering committee needs to be established to ensure buy-in and cooperation at the different levels, and a working group to establish a comprehensive data model as described above.

4.5 Other Progressive Sectors Statistics

Over the past half decade, Jordan has thrived in many aspects of the economy, society, and progressive sectors that contribute substantially to the overall economy and GDP, such as the Information and Communications Technology sector and other sectors, however many challenges are hindering the competitiveness of such sectors, the absence of dependable, accurate and readily available information and statistics about those sectors is one of the many challenges restricting the growth of these sectors.

The ICT sector suffers from conflicting sector statistics and information, a number of stakeholders collect and publish numbers and information about the sector, among those are the Ministry of Information and Communications Technology, Telecommunications Regulatory Commission, the ICT association of Jordan – int@j, and the Department of Statistics – DOS.

Finally, there are no official GoJ reports on the true contribution of the ICT sector and other progressive sectors to GDP, employment, the balance of payments, and tax revenue.

A steering committee and a working committee needs to be formed to map the different data sources and unify classifications and standards among the participating entities, the steering committee will be able also to assist certain entities to improve its data quality and provide more accurate information.

The Steering committee will be in charge of securing buy-in at the different levels and adopting the standards and definitions by all related government agencies.