Computerized LMIS in Health Supply Chain

Survey Report

Igor Novykov, MD
VirtuStores Project

Acknowledgement

Preamble

Logistics management information systems (LMIS) are, probably, a fundament, on which reliable supply chain is based. The importance of proper management of information related to movements of the pharmaceuticals within a supply chain cannot be overestimated. Its output is millions of dollars of saved funds on account of rational requisitions and procurements, prevention of losses, and protection from malicious manipulations and abuses with pharmaceuticals. The outcome – millions of human lives saved thanks to timely delivered and affordable essential drugs to the patients, and presence of essential medical supply in the health facilities.

It's not surprisingly therefore that the interest to quality LMIS is growing steadily during last years, more so, the new robust IT technologies allow development and wide implementation of such systems.

However, while modern computerized systems are already implemented in developed countries widely during a number of years, the countries with developing economies, and especially their non-commercial institutions are generally far behind in their use.

VirtuStores Project (VSP) is an attempt of an initiative group of public health, health logistics and IT experts to develop a universal, easily adjustable, simple in use, but comprehensive LMIS, which would be proposed for free use to any organization, or governmental institution engaged in non-commercial management of health supply.

VSP has conducted brief survey on use of computerized LMIS in health supply chain in developing countries. The purpose of this survey was figuring out what systems are used in developing countries for informational support to supply chain operations in health sector, who do use these systems, and how these systems match the needs of practitioners at all levels of their supply chains.

Methodology

The survey was conducted via Internet through responding a questionnaire of 10 questions, placed on SurveyMonkey website. The link to the questionnaire was distributed among IAPHL members along with the request to answer the following questions:

1.   If   your   organization/institution   currently   implement   a   large   health   supply delivery/distribution project, what electronic LMIS do you use to manage your supply chain?

2. What type of supply chain management system does your organization operate?

3. What of listed business processes of logistics management does your LMIS support?

4. How many distribution levels does your supply chain have? (Central, regional, district, etc., until the supply reaches end user or customer; please, indicate the maximum number of what you have.)

5. How many distribution levels in your supply chain are fully computerized?

6. Is your LMIS a standalone application, or a network, where different levels can communicate each other?

7. If you consider your LMIS needs some improvements, please, tick the points of your greatest concern in the list.

8. Please indicate one major challenge of operational (field) environment, which on your opinion, must be addressed in better way, than your LMIS does.

9. What category does your organization belong to?

10. Please, tick geographical regions, where you do operate the LMIS you told about.

The obtained data was processed with the SurveyMonkey tools and calculations of the researcher.

Findings

1. Respondents

64 respondents from at least 28 countries have submitted their answers. The countries were determined by IP addresses of the respondents, and geographical spread of answers is as following:

Table 1

| Country	Number of respondents	Country	Number of respondents
Australia	1	Rwanda	6
Botswana	1	Saudi Arabia	1
Cameroon	1	Senegal	1
Cote D'Ivoir	1	Sierra Leone	2
Ethiopia	3	Solomon Islands	1
Ghana	2	Sudan	1
Grenada	1	Swaziland	1
India	2	Tonga	1
Kenya	1	Tuvalu	1
Liberia	2	Uganda	1
Mozambique	1	Vietnam	1
Namibia	1	Zimbabwe	1
Nigeria	15	Undefined, Northern Africa	1
Pakistan	5	Undefined, Sub-Saharan Africa	6
Papua New Guinea	2		

Total number of the respondents from the countries of Sub-Saharan Africa is 45, which constituted 70.3%. 6 respondents, or 9.4% are from South Asia, and the same number from the Pacific. Other regions constituted 10.9% (7 respondents).

The respondents have identified themselves as representatives of:

	Table 2

Categories of respondents	Number of respondents
Governmental institutions	26
International NGOs	21
National NGOs	6
Consulting firms	6
International organizations	3
Other	2

Chart 1

40,6%
32,8%
9,4%
9,4%
4,7%
3,1%
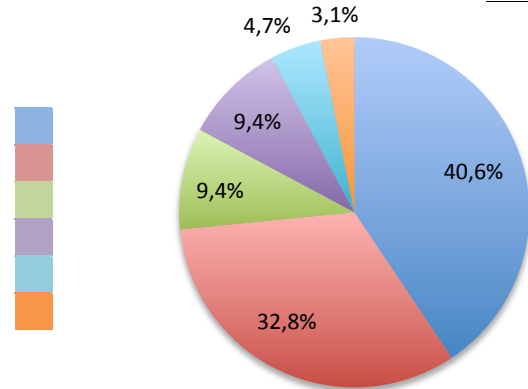
All respondents are supposed to currently run a large health supply delivery or distribution project in their respective countries.

2. Supply chains

Only 3 respondents identified their supply chains as of push-type, based on allocations; 28 – as of pull type, based on requisitions, and 33 – as of mixed type, using both approaches.
It should be noted, however, that 3 respondents, who identified their supply chains as of pull type, didn't list requisition as a business-process supported by their LMIS.

"Countries that now have well-trained staff at the lower levels of the distribution system have started to implement a true pull distribution system based on stock status and consumption at the health facility."[1] Without explaining why it is occurring, since this is a separate important issue, which is not a topic of this survey, we shall focus on supply chain systems of pull type on one simple reason: LMIS designed for pull systems can successfully be used for supporting operations of push systems, while the contrary is unlikely possible.

11 of 27 (40.7%) identified pull type systems are run by governmental institutions; 10 (37.0%) – by international NGO (INGO), 6 (22.2%) – by other entities.

38 respondents (59.4%) have identified their supply chain as three-level, consisting of central, intermediate and end user's levels.
13 (20.3%) – as two-level, when distribution is performed directly from central to the end user's level, and same number (20.3%) indicated that their systems have four, or more levels.

At the same time, only 6 respondents (9.4%) stated that the end user's levels in their supply chains are computerized. Besides, it was discovered from the answers of 23 respondents that their supply chains have more than one distribution level having no computers. In other words, 90.6% of supply chains have end user's levels without computers, and 35.9% – have no computers on more, than one distribution levels.
44.3% have the only central levels computerized. Share of governmental institutions among those managing their supply chains with not fully computerized levels is 39.7%; INGO constitute 27.6%.

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[1] The World Medicines Situation 2011, page 15, *WHO, Geneva 2011*

3. LMIS

Tables 3, 4 and charts 2, 3 demonstrate what kind of LMIS are used for health supply chains by the respondents (questions 1 and 6 respectively).

Table 3

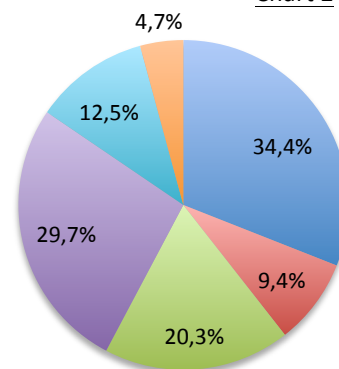| LMIS software	Number of respondents[2]
MS Excel tables, or similar	22
MS Access database of own design, or similar	6
Specialized software of own design	13
Commercial software	19
Open source software	8
Not defined	3

Chart 2

Table 4

LMIS type	Number of respondents
Standalone database	37 (38)
Web-, or cloud-based network	12
Network, other than web- or cloud-base	13
Not defined	2

Chart 3
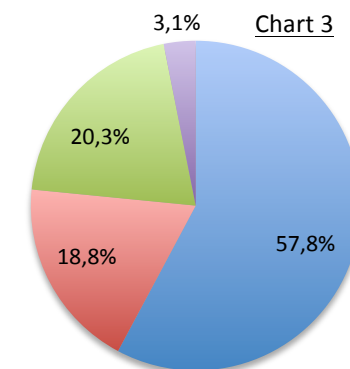
It was discovered that one of the respondents has defined its LMIS as a network, while it is based on MS Excel tables and supports a supply chain with the only one (central) computerized level. More likely, it is a standalone database, and thus the number of such LMIS should apparently be 38, or 59.4%.

As it was shown before, 61 respondents identified their supply chains either as of pull, or mixed (push/pull) type. It would be reasonable to suggest that they should have the LMIS supporting operations related to pull supply chains. However, 10 of 61 didn't indicate that their LMIS support **requisition** business process, which is determinative for pull supply chain.

Nine business-processes were listed in the questionnaire, and the respondents are asked to indicate, which of them are supported by their LMIS. These business processes are: requisition, receipt, storage, distribution, dispatch, transportation, dispense, forecasting, procurement.

The most supported by LMIS business processes are **receiving** (79.4%) and **requisition** (77.8%). The less supported – **dispense** (33.3%) and **transportation** (38.1%).

It was noted that average number of business-processes supported by commercial off-the-shelf (COTS) software is 5.79, when the same indicator for all other applications is 4.98.

The two largest groups of respondents – governmental institutions and INGOs gave their preferences to commercial and non-commercial products in the following way:

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[2] Some users indicated more, than one software used for LMIS

Table 5

Respondents	Using COTS	Using other than COTS
Governmental institutions	42.3%	57.7%
International NGOs	18.2%	81.8%

The respondents identified the following software/frameworks, which their LMIS are fully or partially based on:

Table 6

Application's name or framework	Application's type	Application's category	Country/Region
Acrine Pandora	Network[3]	COTS	Rwanda
CHANNEL	Standalone	Free	Sierra Leone, Nigeria
CMIS	Network	Own design	India
Comm Track	Web based	COTS	Sub-Saharan Africa
(USAID Deliver)	Web based	Free	Pakistan
DGFP	Web based	Own design	Ghana
Tally ERP	Network	COTS	Sudan, Nigeria
MS FoxPro	Standalone	Own design	Papua New Guinea
HCMIS FE (USAID Deliver)	Standalone	Free	Ethiopia
Inventory Manager + SCM (MS Access)	Standalone	Free	Nigeria
Medicines LMS (MS Access)	Standalone	Own design	Pakistan
MS Excel	Standalone	Own design	Northern Africa, Sub-Saharan Africa, South-Eastern Asia, Middle East
mSupply	Web based	COTS	Northern Africa, Sub-Saharan Africa, Pacific
OpenLMIS	Web based	Open source	Sub-Saharan Africa
OpenWeb	Web based	Open source	India
Orion	Standalone	COTS	Grenada
Pipeline (USAID Deliver, MS Access)	Standalone	Free	Liberia
Sage	Network	COTS	Rwanda, Cameroon
SAP	Web based	COTS	Nigeria
SysPro	Standalone	COTS	Namibia
TopUp	Network	Own design	Liberia

==Major challenges of the supply chains identified by the respondents, related to functioning of their LMIS== (aggregated and edited data):

- Irregular power supply
- Low level of connectivity and low speed of Internet
- Low computer literacy and/or professional capacity of health workers and logistics personnel
- Low motivation or other obstacles for health workers to report to upper level
- Ignoring data entry, or entry errors result in poor reporting quality

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[3] Other, than web based

- Absence of real time health data management
- Poor infrastructure
- Poor transport planning for distribution
- No integrity with HMIS
- Web-based LMIS is not adapted for off-line operations, when there is no Internet connection
- Identification of budget holder in cases of multiple donations
- Difficulties of forecasting based on demand
- Stock levels determination
- Missing of automated capturing consumption data at SDP
- Safety of LMIS hardware
- Health facilities do not have access to computerized LMIS
- Low supply tracking abilities
- Limited data exchange between the levels of the supply chain
- LMIS' forecasting doesn't consider depletion of stocks during lead time
- LMIS not enough robust to serve multiple SDPs
- LMIS not simple enough for the users with modest technical capacities
- LMIS is not known at SDPs

Top 5 major concerns listed by the respondents related to their LMIS:

Table 7

Description	Number of respondents	Chart 4	
Data entry not enough automated, inconvenient and slow	23		44.2%
Limited networking data exchange	22		42.3%
Doesn't produce some desirable reports	19		36.5%
Some business processes not or low supported	15		28.8%
Low data entry errors protection	15		28.8%
Problems of reports export to other formats (doc, exl, pdf, etc.)	15		28.8%
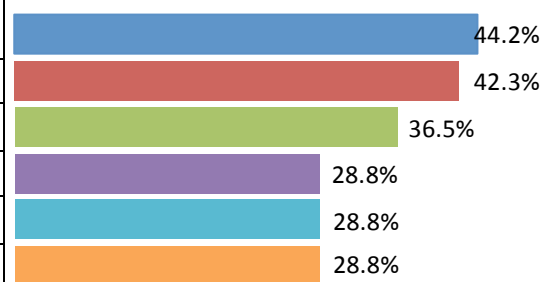
12 (18.8%) respondents demonstrated absolute dissatisfaction with their LMIS, having stated that it should be completely replaced.

Other concerns:
- 10 respondents complained that the system hardly adjustable to operational conditions, adding of new features and options is impossible, and reporting formats are poor or highly paper consumable;
- 8 respondents reported on complicated and not user-friendly interface, and poor formatting of transaction documents;
- 4 respondents stated that their systems are hardly apprehended by users.

Only 10 respondents (15.6%) didn't express any concern regarding their LMIS, and 3 of them (4.7%) have clearly confirmed their full satisfaction with the systems they use.

More detailed study of particular users' complaints related to certain LMIS listed in the Table 6 would be done, if a necessity of such study arises.

Conclusions

The following conclusions could be derived from this brief research, in spite of limited number of the respondents:

1. The most numerous categories of LMIS users are governmental institutions followed by international non-governmental organizations.
2. The largest number of LMIS users participated in the survey is concentrated in developing countries of Sub-Saharan region of Africa.
3. Significant level of full or partial users' dissatisfaction with their LMIS does exist and confirmed with the results of the survey.
4. Users' dissatisfaction with their LMIS is mostly related to not enough automated, inconvenient and slow data entry; limited network possibilities for data exchange between the levels of the supply chain; difficulties in getting some desirable reports.
5. Technical limitations of LMIS causing users' dissatisfaction are particularly crucial in conditions, where users often face such challenges as irregular power supply, instable access to the Internet, low computer literacy of logistic personnel, etc.
6. Technical limitations of a large number of LMIS relate to their frameworks and architecture that do not fully match either performed supply chain operations, or requirements for development of LMIS. As an example, the large shares of LMIS based on MS Excel tables, or standalone databases are in use.
7. LMIS based on COTS software better support supply chain business-processes, than the others; the average number of business-processes supported by them is higher.
8. The share of COTS based LMIS is higher amongst governmental institutions, while non-commercial software is more popular amongst international NGOs.

Overall conclusion

This brief survey on use of computerized LMIS in health supply chain for public sector of developing countries has demonstrated an obvious need in affordable, comprehensive, user-friendly, flexible, but powerful and reliable system for informational support of logistic operations, which would be a network allowing quick and easy data exchange between all its nodes in conditions of limited communication. Such system should be developed in close contact with its most potential users, which are governmental institutions and international (national) NGOs to better respond on their practical demands.