Bahria University
Discovering Knowledge

SIL Research Institute for Smart Integrated Logistics

Azfar Wasim
10th of March 2022

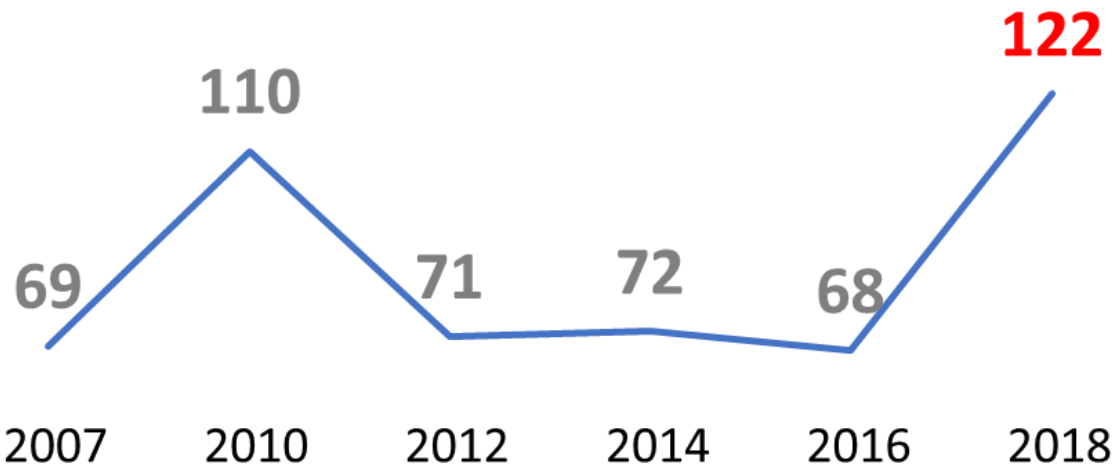
MLC22
1ST MULTIMODAL LOGISTICS CONFERENCE 2022

Pakistan has major challenges in providing efficient and integrated logistics to industry

Global Perspective

1. Global and regional demand on efficient and integrated logistics is at its highest
2. Logistical processes are more complex
3. Comprehensive interdisciplinary knowledge is required
4. Ensure quick ramp-up and growth in the sector

Pakistan's Challenges



On logistics performance index, Pakistan is at 122th rank whilst Iran at 64th, India at 44th, and China at 26th

Germany is number One since the conception of 2007

https://lpi.worldbank.org/ Customs, Infrastructure, International Shipment, Logistics Competence and Quality, Tracking and Tracing

Pakistan has major challenges in providing efficient and integrated logistics to industry, specially within CPEC

Global Perspective

1. Global and regional demand on efficient and integrated logistics is at its highest
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Pakistan's Challenges

Pakistan is in dire need of developing capacities and capabilities and to deliver on efficient and integrated logistics to its industry

Biggest challenge is **CPEC**, where there is a dire need among the stakeholders to bridge the gap between the Industrial working and deep understanding of Integrated Logistic mechanisms.

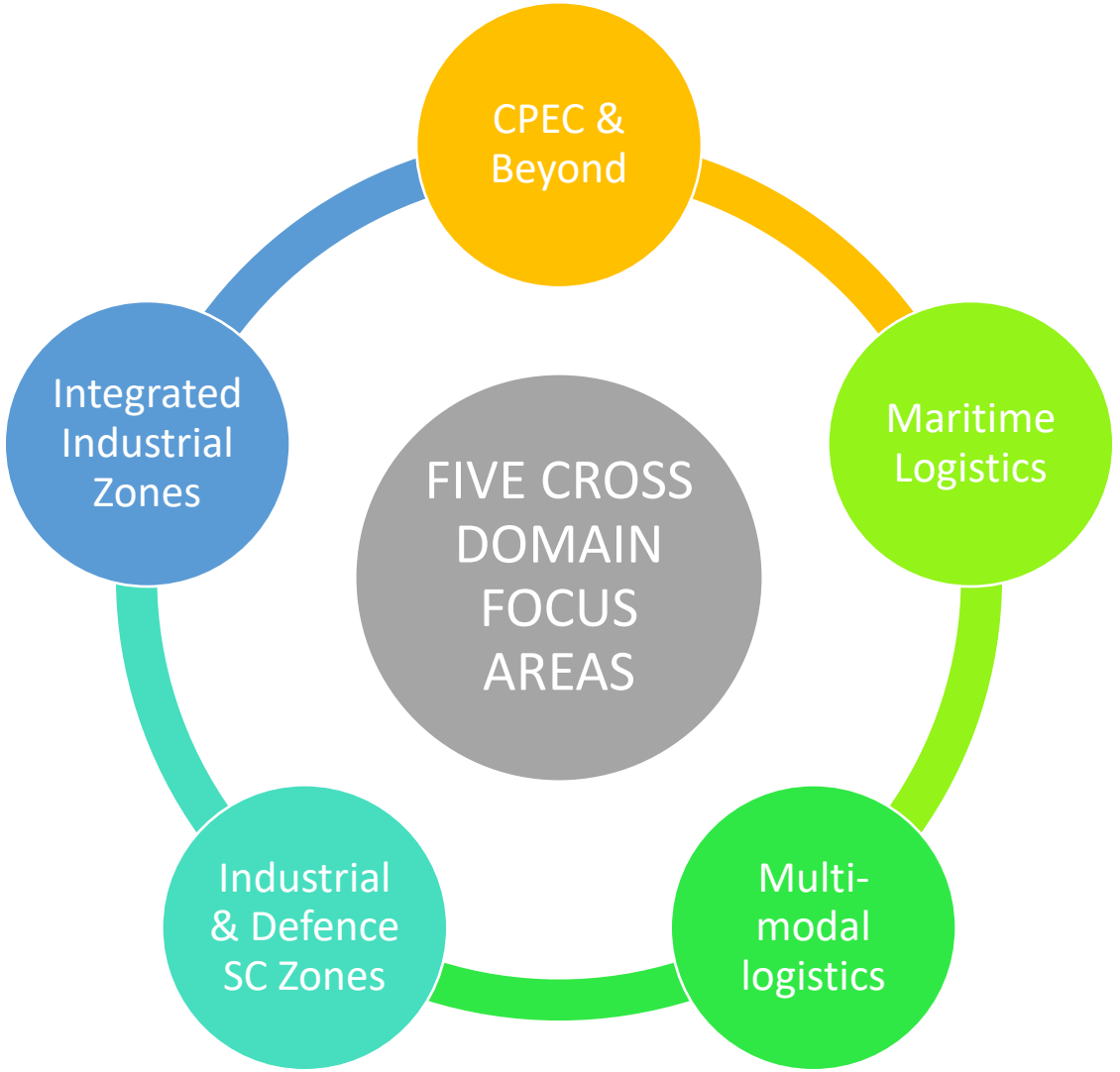
Aim and Objectives

SIL aims to conduct advance applied research and effectively engage industry in the field of Integrated Logistics

Objectives:

- To converge relevant ongoing and future research efforts
- To conduct industry focused applied research
- To ensure collaborative and inclusive approach
- To produce research and consulting solutions for industry and policy makers

Five Cross Domain Focus Areas



Holistic tackling of logistic challenges ensures optimal results

Academia

A platform for Researchers based on needs of new academic world

Industry

A collaborative platform to drive organizational solutions based on upcoming industrial challenges

Governance

A platform to research and develop policy leadership and sustainable execution

Some of the Cross domain areas

CPEC and Beyond, Maritime excelience, MultiModel logistics Harmonization, Industrial & Defence Supply Chain Management

Set the targets of SIL

Salient features of SIL

- Converge relevant ongoing and future efforts
- Conduct applied research
- Ensure collaborative structure
- Produce research and consulting solutions for industry and policy makers

Initial focus areas, including **CPEC and Beyond,** clustered under:

- Research areas under SIL
  - Strategy, Organizations, Operations and Systems
- Industry driven Living Labs and Centers, initially
  - Center for Logistics and Mobility
  - Center for Maritime Logistics and Services
  - Living Lab Cellular Transport Systems
  - Transport Capacity Utilization
  - Transport Infrastructure and Equipment

SIL has large number of Internal and Network of cross discipline resources to covered cross discipline studies

→ Industrial cases and adoption

Major role of identifying, packaging and executing the industrial solutions and their take-up, and to ensuring economic, business and social impact

→ Software simulations and solutions

Main role is to develop and enhance and deployment of intelligent and adaptive platforms and systems with and for industry

→ Hardware prototypes and solutions

Main role would be to research and develop hardware enabled based solutions, with key focus on imbedded IoT, and ensuring industrial readiness

SIL offers a wide array of possibilities to its prospective clientelle

Core competencies

1. Service Development
2. Service Management
3. Logistics Management
4. Supply Chain Design
5. Information and Technology Management
6. Order Management
7. Maintenance Management
8. Document Management
9. Network Integration
10. IT System Selection
11. Business Transformation

Some sample projects and partners

- Route tracking and dynamic navigation
- Mobile and Fixed value added services strategy
- Service design and delivery for CPEC route
- IT System Selection and customizations
- Warehouse operations management
- Project audits and controls
- Optimisation and integration of SBUs
- Human Resource skill development
- Warehouse operations optimisation (order picking)
- Integrated tracking ID
- MultiModal logistic analytics

SIL collaborates and provides research, academic and industrial services to public and private institutes

Our Service Offerings

- Research
- Trainings
- Consulting & Advisory
- Solution Development
- Incubation/ Accelerator

Our Clients and Collaborators

BIBA Bremer Institut für Produktion und Logistik

MIT Center for Transportation & Logistics

Fraunhofer IML

RESEARCH & SERVICES PORTFOLIO

Karachi and Gwadar Ports' Optimization to 4th Generation Operations:

Exploring new business avenues with Port efficiency in context of China Pakistan Economic Corridor (CPEC) and growing national requirements. The research project aims at developing new methods for planning, designing, controlling and optimizing Pakistani Ports. Benefits for the clients (exporters/importers) are short transportation time, better service and low cost. All together the expectations are to gain substantial societal and economic benefits compared to the overall investment. Advances in the field of Business Value Analytics provide an opportunity for a completely fresh and new application of optimization at a very large scale.

Railway Freight Transport Growth, Optimization and Planning:

Exploring new business avenues with Port – hinterland railway freight transport connectivity in context of China Pakistan Economic Corridor (CPEC) and growing national requirements. The research project aims at developing new methods for planning, designing, controlling and optimizing Pakistani railway freight transport. Benefits for the clients (exporters/importers) are short transportation time, better service and low cost. All together the expectations are to gain substantial societal and economic benefits compared to the overall investment. Advances in the field of Business Value Analytics provide an opportunity for a completely fresh and new application of optimization at a very large scale.

Active Fleet Management and Autonomous Tracking and Routing

Transport industry has gradually realized the importance of modern technologies in the practice of management and conduct of business. Drivers and fleet managers are continually striving to improve safety and productivity. Based on this, SIL has initiated research activities to introduce technology adoption frameworks for Pakistan's trucking and fleet management.

SCM Human Capital Development and Training platforms

Being complacent to gradual change is not an option. A well thought-out holistic, comprehensive and localized approach is needed to leap-frog ahead of the SC skill challenge and to deliver on CPEC and beyond.

Smart Industrial Zones and Logistic Linkages

Under CPEC there are a number of industrial zones being established. These zones are being considered under Smart and light industrial networks with complementary industrial services that require intelligent and integrated logistics of holistic mapping of synergies. This initiative aims to research on the potential of smart logistic linkages across industrial zones

Swarm Intelligence for Energy Efficient Logistics

To study the efficient capability of physical cooperative swarm systems and their several sub-domains, such as, swarm robots and sensor swarms, unmanned vehicle swarm, swarm rescue robots. The outcome is to define a framework of physical sensor networks that consist of various sensor nodes, which have the capability to sense, process, compute, and communicate. The derived framework shall present the guideline to apply sensor nodes in different applications and highlight various hindrances during implementation in sensor networks.

Mobile and Fixed Assets Tracking

Most organizations face significant challenges related to tracking location, quantity, condition and the depreciation status of their fixed assets. Ordinarily fixed assets are recorded and maintained in a spreadsheet, fixed asset register (FAR) or an ERP system. These records at this point are periodically verified through audit activities, such as physical inventory. To overcome all these ambivalent processes, SIL is investigating and proposing simple, consumer grade mobile solution that to automate and streamline mobile and fixed asset inventory and reconciliation.

Projects underway at SIL

Logistics solution center – V2V Comms Platform

An open platform to research and develop autonomous vehicle to vehicle communications platform in order to boost transparency and security of goods

Autonomous Identification
(openID Center)

An open platform with the aim of researching logistics software and auto-identification systems

Packaging Laboratory

Laboratory for examining loading units, large load carriers, transport packaging and pallets

Swarm Intelligence
(LivingLab Cellular Transport Systems)

“Swarm intelligence” for logistics to design supply chains in a more energy-efficient way and be able to react more flexibly to unforeseen occurrences

Research Institute for

SMART INTEGRATED LOGISTICS (SIL)

In SIL, interdisciplinary teams conduct industry-specific logistics research and, deliver strategies, planning, management and execution solutions around the focus areas:

- CPEC and Beyond
- Maritime Logistics and Services Excellence
- Multimodal Logistics Harmonization
- Industrial and Defense Supply Chain Management

Based on the German model, Research Institute of Smart Integrated Logistics (SIL) is uniquely positioned ahead of any Research body in Pakistan.

SIL with its network is positioned to bridge the gap between the industrial operations and advance research solutions.

We are currently in the phase of connecting and on-boarding strategic industrial and research partners for joint integrated project

SIL Core Team

Dr. Ali Imtiaz
Head of SIL
Lead of research cluster
Integrated Enterprise Logistics

Mr. Azfar Wasim
Lead Analytics – SC
Digital Transformations

Dr. Saleem Aslam
Lead of research cluster
Digital Logistics Systems

Dr. Sabeen Husain Bhatti
Lead Systems Engineering

Mr. Farrukh Mahfooz
Maritime logistics

Dr. Yilmaz Uygun
IoT & Swarm Intelligence

We have to collaboratively build the capability to **“Leap Frog”!**

LET’S DO IT!

THANK YOU

You can reach our team at:

Ph: +92-331-5567437

Email: managersil@bahria.edu.pk

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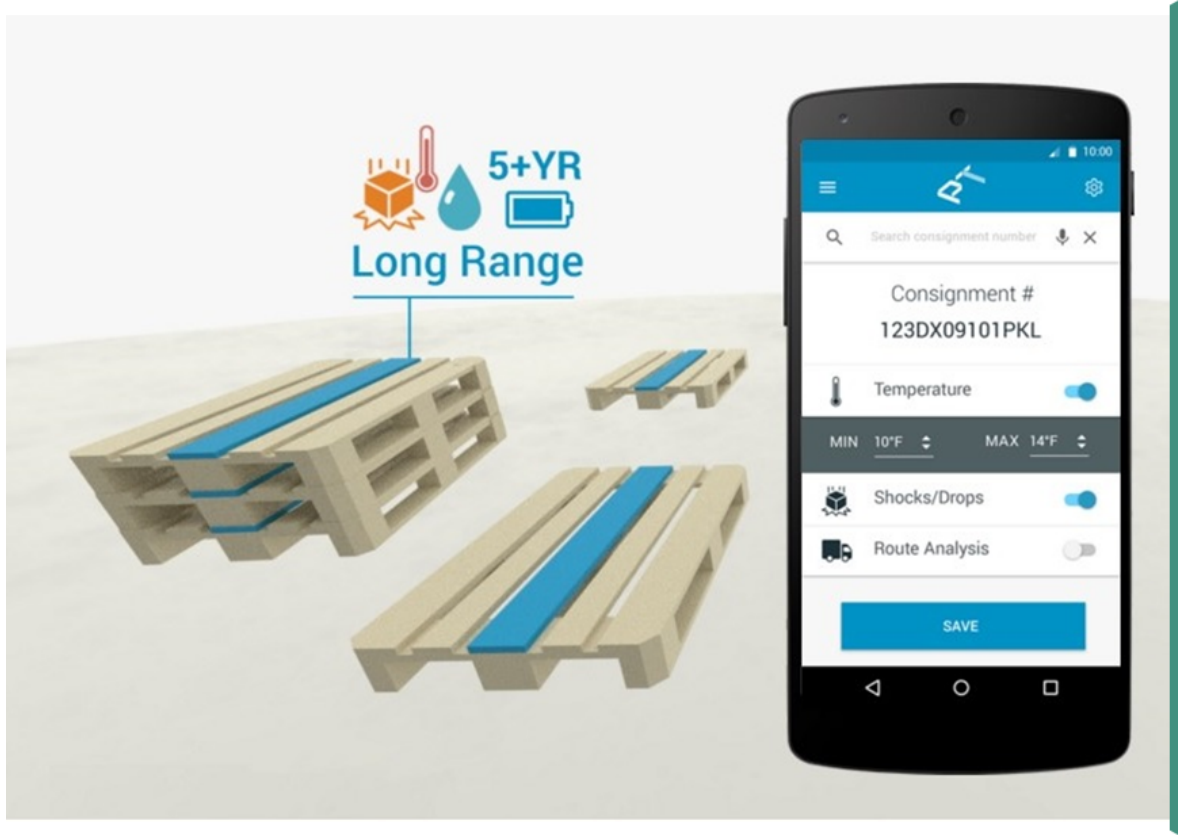
Current SIL Projects

Package Tracking & Monitoring System

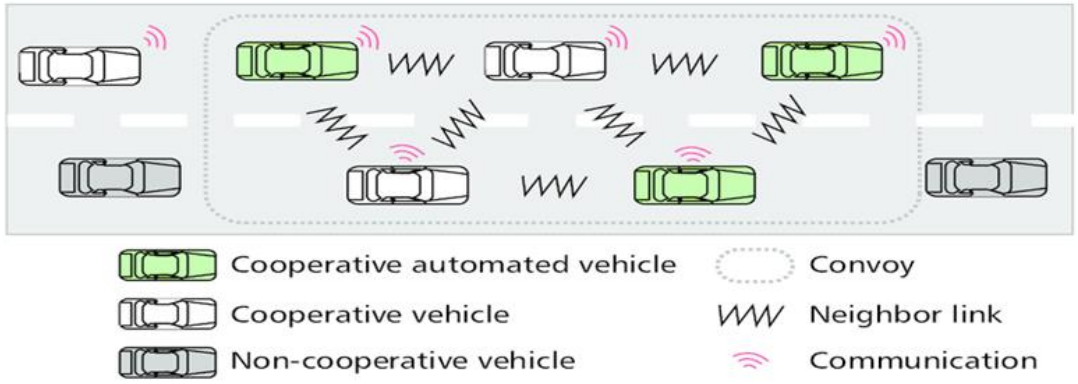


Embedded sensors placed on the planks of the pellet that will provide clients with real-time information regarding temperature, location, humidity, shock, vibrations, time etc. This leads to improved inventory management, condition monitoring and asset tracking and security.

Globally, value of counterfeited and/or lost cargo in the pharmaceutical industry alone amounts to $60 Bn. Our solution aims to provide an innovating and cost friendly solution to mitigating financial as well as physical losses.

Current SIL Projects

Vehicle to Vehicle Communication



In order to improve efficiency of convoys and long haul deliveries, SIL proposes the solution of autonomous Vehicle to Vehicle Communication systems to be installed aboard trucks and other vehicles alike. These would enable drivers and/or control operators to receive information seamlessly from any vehicle in the convoy, to the rest of the vehicles. Thus allowing a faster, more synchronized decision support system. For instance, if there's an accident, or blockage further down the route, the primary vehicle can alert the rest in the convoy for correction of route.

Current SIL Projects

Single-Deep Palletized Rack Storage with an aim to efficiently engage with industry

- Single-Deep Pallet Racking is most common rack based storage system in Pakistan
- Currently a preferred system for both FMCG products and retail sectors.
- Agility logistics uses Pallet Racking to manage high throughput and deliver on service levels

SIL consulting services provide research, academic and industrial services to small, medium-sized and large businesses

SIL's consulting motto is: **"Analysing and Optimising"**

Core competencies

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4. Supply Chain Design
5. Information and Technology Management
6. Order Management
7. Maintenance Management
8. Document Management
9. Network Integration
10. IT System Selection
11. Business Transformation

Our clients and partners Some possible projects for NLC

- Over 5000 staff with ~200 staff yearly from SCM and Logistics fields alone
- Route tracking and dynamic navigation
- Mobile and Fixed value added services strategy (CPEC)
- Service design and delivery for CPEC route
- IT System Selection and customizations
- Warehouse operations management
- Project audits and controls
- Optimisation and integration of SBUs
- Human Resource skill development

Some possible projects for TCS

- Warehouse operations optimisation (order picking)
- Integrated tracking ID
- MultiModal logistic analytics

External collaborators and linkages is a must!

Some industrial and research entities, local and international for collaboration in SIL

Projects Undertaken (1/8)

1. Indigenous Applied Research Undertaken

SIL team developed an in-house Warehouse Optimization Tool with an aim to efficiently engage with industry

- Tool is developed using mathematical modeling and static 3D projections
- Initial result show potential to improve space utilization up to 25%
- Initial testing has been conducted using input data from Agility and Haidri Beverages, and Ufone test environment is being planned
- Currently focus on Single-Deep Palletized Rack Storage
- Tool is developed by voluntary members of SIL team

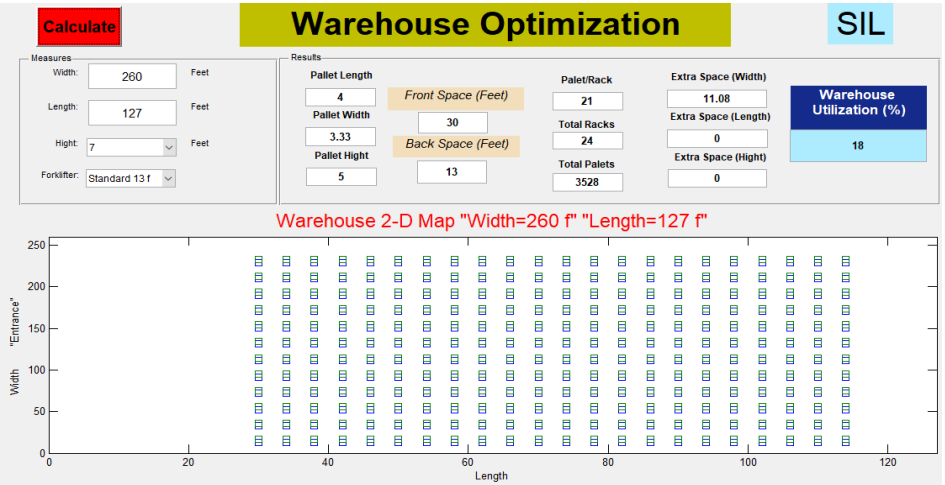
PART 1

Projects Undertaken (3/8)

1. Indigenous Applied Research Undertaken

Warehouse Optimization for Single-Deep Pallet Racking System

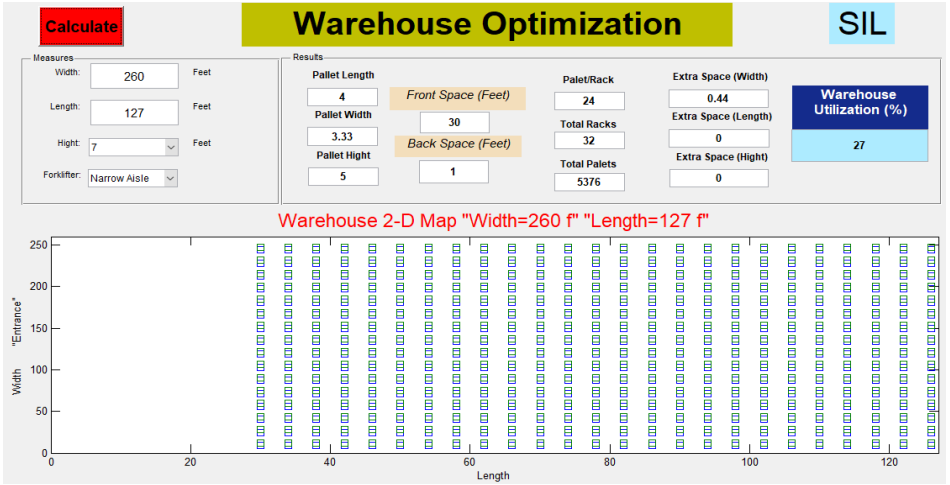
Current configuration



Warehouse Storage Capacity Utilization

18%

Optimized configuration



Warehouse Storage Capacity Utilization

27%

Projects Undertaken (4/8)

1. Indigenous Applied Research Undertaken

Significant inefficiencies in the pallet racking exist in the warehouse industry in Pakistan. Main causes are:

- Lack of knowledge on proper calculation of space
- Lack in the capability to select proper racking system, including positioning of racks and bays
- Non-guided picking order and marshalling of goods

With additional resources and using advance solutions we plan to further develop and enhance our warehouse optimization tool for effective interaction with the industry.

- Best racking configuration for multiple racking systems
- Provide dynamic simulation for optimized internal logistics
- Integrate technology and control layers

Projects Undertaken (5/8)

2. Research Proposals

a. **BRICA** (Belt & Road Industrial & Commercial Alliance) submitted interest of collaboration within the knowledge consortium

b. **UN-ESCAP** (Economic & Social Commission for Asia and Pacific) submitted proposal as expert of knowledge area of Green Logistics (USD 12,000)

c. **HEC** pre-call proposal being drafted on Logistics 4.0 – IoT integrated Logistics

d. **HEC** pre-call proposal being drafted on the Logistics Services design and development

e. **HEC** level discussion for the funding mechanisms to develop advance Warehouse Research and Training Lab

Projects Undertaken (6/8)

3. Collaboration With Industry

a. **OGDCL**, visited to meet OGDCL's DG to discuss collaboration, draft MoU in progress for collaboration and jobs for BU EE and SCM graduates

b. **Agility**, two visits to assessed processes and discussed further automation and training potentials

c. **Ufone**, collaboration with WH dept. to train & optimize processes

d. **MoPR** in discussion with Maritime Affairs for possible projects as single or consortium member

e. **Dutch** research collaboration in discussion on Maritime Logistics

f. **KPT** short study conducted by SIL voluntary member with Chairman KPT and DGSAPT to learn about the processes and potential to investigate and identify the bottlenecks for optimization and automation

Projects Undertaken (7/8)

4. Collaboration With Pakistan Navy Store Depot

Areas of service proposition being discussed with PN

a. **IT optimization:** Warehouse Management System (WMS) assessment for transparency and efficiency of operations
b. **Depot processes:** Detailed mapping of processes for possible bottlenecks
c. **Inventory management:** tracking, tracing and replenishment within the warehouse
d. **Order processing:** Calculation of integrated client and supplier interface from receiving to issuing to dispatching of goods
e. **Centralized command:** Scenarios Dashboard and centralized control of processes
f. **Training:** Staff level training from Management to Operations

Projects Undertaken (8/8)

5. Trainings And Miscellaneous Activities

a. **Collaboration with PN SLM** initiated to update courses on SCM

b. **Corporate Trainings** – PTCL, Pakistan Post

c. **ERP trainings** on Procurement and Sourcing (SAP)

   i. Already conducted four sessions with a 100% success rate

d. **Professional certifications** planned & developed

   i. SCM research methods 5 days (26 hours)

   ii. SCM&E: Procurement and Sourcing, and IoT - 4 days (32 hours)

   iii. WeBoc training – FBR trading platform 2 days (8 hours)

FLOW OF PRESENTATION

PART 1
Research Institute SIL

- Aim and Objectives
- Five Cross Domain Focus Areas
- Progress Update 13th May 2019

PART 2
Industrial Logistic Solutions and Ventures

- Scope and Four Focus Areas
- Proposed Roles
- Build-up Own Capabilities and Infrastructure
- Deliverables for the Future

Scope and Four Focus Areas

SCOPE of INDUSTRIAL LOGISTIC SOLUTIONS AND VENTURES (ILSV)

ISLV, as front facing entity of BIC and MSTP, to develop own logistics capabilities and also offer industrial solutions to automate and optimize other companies as clients.

Four areas of efficient application of applied research towards industry

- Build-up own capabilities and Infrastructure, eg. warehouse
- Offer solutions for 3PL and 4PL services (Agility)
- Develop customized software solutions
- Provide infrastructure automation and tracking solutions (Autobar)

Proposed Roles

Applied Research		Industrial Ventures	
▪ Research council comprises of Research Cluster heads and research partners ▪ Responsible for approving changes to the research areas for each research clusters	**Research Council**	**Industrial Council**	▪ Industrial council comprises of Industrial partners ▪ Responsible for identifying and facilitating industrial linkages
▪ Research principle are responsible for P&L of the cluster ▪ Define research focus areas and staff RAs ▪ Teach one course	**Research Principle**	**Project Manager and Coordinator**	▪ Leading the developemnt and sustainability of owned ventures ▪ Aquiring and delivering on industrial projects, trainings and consulting
▪ Reporting to the Research cluster head, RAs are responsible for conducting industry focused applied research ▪ Teach one/two courses	**Researcher Consultant/ Associate**	**Project Consultants and Team**	▪ Support indstrial projects

Build-up Own Capabilities and Infrastructure

- Six areas of possible capacity and capability development.
- Recommended to starting with 3PL Warehousing service and VAS

Warehousing	**Transportation**	**Custom Clearance**
Packaging	**Freight Forwarding**	**Value Added Services**

Build-up Own Capabilities and Infrastructure

Warehousing

Warehousing constitutes of multiple functional variants

- **Inventory holding point**
- **Consolidation center**
- **Cross Docking**
- **Sortation center**
- **Trans-shipment point**
- Assembly facility
- Returned goods center
- **Records** (Physical & Digital)

Value Added Services

Value Added Services help to meet customized needs of clients to improve the delivery time and compliance; mainly include:

- Kitting & final assembly
- Product inspection/compliance
- Light assembly / sub-assembly
- Product localization
- Labeling
- Product rework & recycling
- Security

Build-up Own Capabilities and Infrastructure

Warehousing

Recommended Target Market Segments

- White Goods
- Fast Moving Consumer Goods Sector (Regular & Consolidation)
- Telecom Sector (PTCL)
- Oil & Gas Sector (OGDCL)
- Pharmaceuticals
- CPEC Projects
- Container Yards
- General Consolidation Yards
- **Records keeping (Banking and Military)**
- Apparel

Build up Own Capabilities and Infrastructure

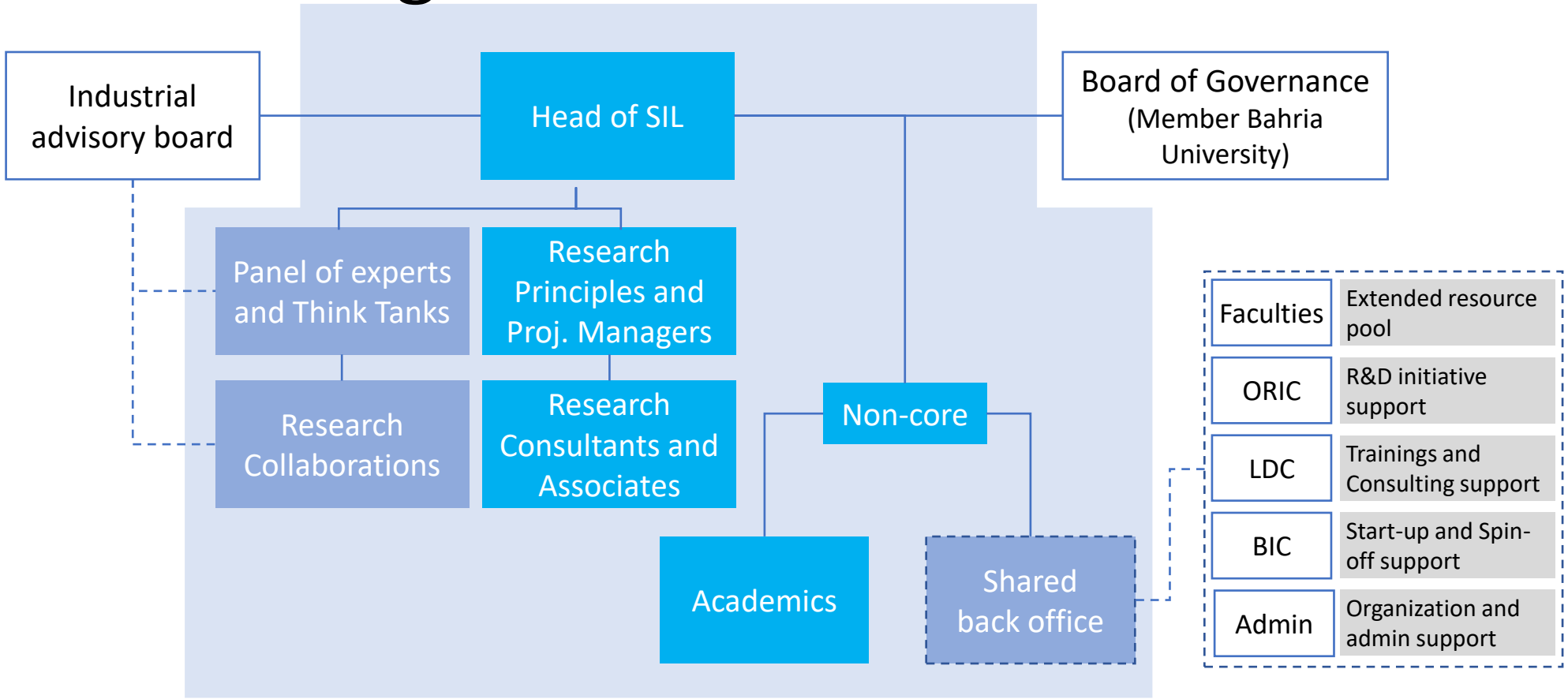
Warehousing

Considerable gap in the market for advance warehousing services

Some Basic Requirements

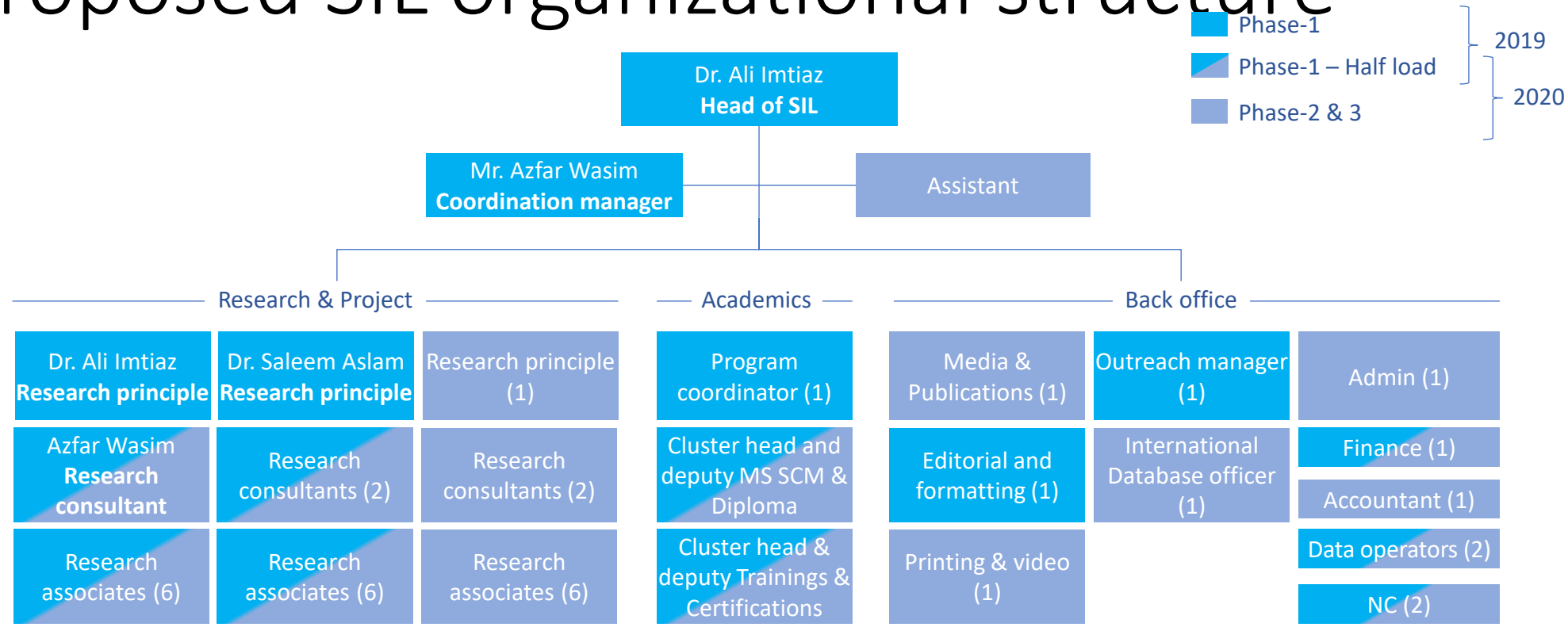
- **ERP/IT:** WMS integrated with SAP, Oracle, MS Dynamics etc
- **Service:** In-house Equipment & Outsourced Transportation
- **Initial study for 35000 sq ft. is being conducted**

Overview organizational structure of SIL



SIL to be an independent directorate with support staff and mandate till the Research Institute is formed. Each research groups will be lead by PhD faculty and supported by PhD scholars as RAs. Each group will be staffed with 3 to 6 FTEs at full setup.

Proposed SIL organizational structure



Research groups will be lead by Senior PhD faculty with up to four Research Consultants (PhD and PhD scholars) and Research Associates (PhD candidates and Master students)

Head of project managers will either be internal or may include external staff, at the discretion of Head of Institute

Dr. Ali Imtiaz

Dr. Ali Imtiaz

Dr. Ali Imtiaz is Associate Professor at Bahria University, head of Research Institute for Smart Integrated Logistics (SIL) and is leading the research cluster of Enterprise Logistics. He has profound experience in Top Tier Strategy and Management Consultancy, and management of large scale international R&D projects

Enterprise Logistics

The focus is on an integrated view of internal and cross-company processes in their interaction with IT, technology, management and finance. We are actively researching and developing innovative solutions for the strategic development, tactical planning and operational control of companies and corporate networks in terms of comprehensive and holistic supply chain management.

- Multimodal Logistic Harmonization
- Value co-creation
- Health Care Logistics
- Retail Supply Chains
- Environmental Logistics
- Management of Mega Projects

Curriculum Vitae

Dr. Ali Imtiaz

He holds a Doctorate in Industrial Engineering from RWTH Aachen Germany, and is a member of Leadership Development Community of Harvard Business School and a member of advisory board of CELL Foundation Maastricht, The Netherlands. He combines knowledge and expertise from both industry and academia based on projects with global clients from private and public sectors; incl. DAX listed companies, GoP and European Commission.

Dr. Imtiaz has also advised several leading conglomerates on developing, transformation and restructure their portfolio strategy.

His research focus is on innovation and disruptions in Supply Chain, industrial adoption of Intelligent Integrated Logistics solutions and value co-creation with customers/users

Dr. Saleem Aslam

Dr. Saleem Aslam

Dr. Saleem Aslam is an Associate Professor at Bahria University, and is leading research cluster of IoT & Swarm Intelligence for Smart Integrated Logistics (SIL) . He has profound experience in wireless sensor networks (WSNs), Internet of Things (IoT) , reconfigurable and adaptive communication systems.

Digital Logistics Systems

The main focus is on the digital transformation in logistics domain that reshapes existing industrial processes or procedures and develops new technology driven business models through the blend of smart communication technologies, ICT and Industrial Internet of Things (IoT). Prime aspects covers:

- Swarm Intelligence in Logistics
- Cyber-Physical systems
- Smart Industrial Zones & Cities
- Cognitive Logistics Systems
- Industrial IoT integration
- Electro mobility

Curriculum Vitae
Dr. Saleem Aslam

He holds a Doctorate in Electrical Engineering from Sejong University , Korea, and has one year Postdoc from Queens University, Kingston, Canada. He is a member of the International Association for Engineers (IAENG) and International Association of Computer Science and Information Technology (IACSIT). He also provided consultancy to Mobile Networks Lab (MNL) Sogang University Seoul Korea on Internet of Things relevant projects. He is a vigorous reviewer of several IEEE, Elsevier and Springer Journals.

His research focus is on innovation and challenges of the fifth generation (5G) cellular, WiFi & LiFi, Internet of Things (IoT), Industrial IoT and Industry 4.o communication. He also developed several energy and spectral efficient solutions for cognitive and adaptive communication networks.

FLOW OF PRESENTATION

PART 1
Research Institute SIL

- Aim and Objectives
- Five Cross Domain Focus Areas
- Projects Undertaken

PART 2
Industrial Logistic Solutions and Ventures

- Scope and Four Focus Areas
- Proposed Roles
- Build-up Own Capabilities and Infrastructure
- Deliverable Within Next Four Months