Summer Training Report

By

Dr Pragya Mishra

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PART 1- Report on Work from Home (assigned by mentor)

ABSTRACT

Human Immunodeficiency infection is a worldwide general medical problem, claimed 32 million up until now. By the end of 2019 there were 38.0 million individuals suffering from this disease and 690000 demised. In 2019, 68% adults and 53% youngsters bearing this disease in low-and middle-income nations were undertaking long lasting antiretroviral treatment.[1] Information, education and communication is the most widely recognized techniques executed to battle against HIV/AIDS. The essential objective of such IEC program is to inspire and teach individuals about prevention, care as well as treatment of HIV/AIDS. Expanding access to such materials through a composed circulation organize and legitimate use of broad communications are indispensable step in improving in general HIV-related information on a network which will assist with building an increasingly positive social condition. As researches have shown positive impact of IEC materials. This research report is conduct to show how the IEC material change the behaviour of a general population and PLWHA .

LIST OF ABBREVATIONS

IEC: Information Education and Communication

BCC: Behaviour change communication

PLWHA: People Living With HIV/AIDS

HIV: Human Immunodeficiency virus

ART: Anti Retroviral Treatment

STI: Sexually Transmitted Infections

MSM: Men having Sex with Men

AIDS: Acquired Immuno Deficiency Syndrome

IDU: Injecting Drug User

WHO: World Health Organization

ICTC: Integrated Counselling & Testing Centre

FSW: Female Sex Worker

NGO: Nongovernmental organization

OBJECTIVE

- To assess the effect of communication intervention related to HIV/AIDS on high risk about HIV/AIDS.
- To determine how IEC material is helpful in creating awareness among population (PLWHA & general population).

INTRODUCTION

- IEC is a way to deal with change or strengthen behaviour of a target audience group in regards to a particular issue in a predefined timeframe. It consolidates techniques approaches and systems empower people, families, association and networks to assume dynamic job in accomplishing, supporting and ensuring their own wellbeing.
- HIV is a disease that affects the body's immune system, extraordinarily white platelets CD4 cells. It expanded susceptibility to a broad range of contaminations, malignant growths and variety of infections that person with strong safe health can fight off. There is no remedy for this disease. However anti retro-viral drugs (ARVs) show effective response in preventing further transmission of infection to others.
- The effectiveness of IEC materials to a great extent relies upon importance, readability, appeal, uniformity, language, precision of data, length of the material, accessibility and in which form its is distributed for example, banners, recordings, leaflets, handouts, booklet, boards, hoardings, flip book, and relational correspondence.
- Designing and creating explicit IEC materials focusing on specific groups like pregnant ladies, young people, all inclusive community, connect population like school dropouts, truckers, other high hazard bunches like IDU, MSM, FSW, PLWHA and their relatives and furthermore basic to change network disposition.

METHODOLOGY

- The data taken for the study is from the secondary sources. All the figures that shown are collected from primarily researchers, all listed in the bibliography.
- Report provides board overview on the objective that such IEC program me is to inspire and teach individuals about prevention, care as well as treatment of HIV/AIDS.
- The search for literature review is done using database Goggle scholar & Researchgate.net with the search terms- impact of IEC on PLWH, effectiveness of IEC on population, behaviour change of PLWHA from IEC and Pubmed wit search term usefulness of IEC material AND HIV/AIDS. These studies were in English and referred to human.
- All the studies conducted are in relevance of IEC material for awareness of HIV/AIDS.

LITERATURE REVIEW

The literature review was conducted on 13April 2020.

OVERVIEW OF THE STUDIES

TITLE/ YEAR	SETTING/ AUTHOR	SAMPLE SIZE	STUDY DESIGN	OUTCOME
Preferred Sources of Information on AIDS Among High School Students From Selected Schools in Zimbabwe[2] 1992	Mashonaland region and Matabeleland region, Zimbabwe R J Ndlovu , R H Sihlangu[2]	478 students from 4 sub-urban coeducational schools	Interventional study-Randomized control trial. Questionnaire is distributed	20% cited health professions, 49% newspaper, 36-45% television radio and magazines, 25% booklets and 20% said first source of information for them are classmates.
Awareness of AIDS Among School Children in Haryana[3] 1996	Haryana, India A K Aggarwal , R Kumar	Three rural and three urban schools in Haryana State's included. 336 students participated	Descriptive study Questionnaire is distributed	The most knowledgeable source was textbooks (51%), television (50%), and newspapers (34%). Urban students were significantly more informed about AIDS than their rural counterparts.
Community based HIV/AIDS education in	12 parishes (administrative unit around 10	Semi structured interview (n=37) and	Interventional study Semi-	85% seen at least one video or drama, 80% of had seen the leaflet, channels may work

rural Uganda: which channel is most effective?[4] 2001	villages) in Masaka and SSembabule districts, situated 150 km south west to the capital Kampala. K.Mitchell, S.Nakamanya, A.Kamali& J.A.G Whitworth	focus group (n=3) were held in the community members working as a field staff. In addition two questionnaire survey (n=105 and n=69) and 8 focus groups were conducted with target community.	structured interview, two questionnaire survey is used for data collection.	collaborative manner to reinforce message and overcome weakness built in individual channels.
Effectiveness of various IEC in improving awareness and reducing stigma related to HIV/AIDS among school going teenagers[5] 2004	7 schools of Jamnagar City, Gujarat. Neeraj Raizada, Chitra Somasundaram, JP Mehta, VP Pandya	1000 students from class XI and XII from 7 schools	Interventional study Semi-structured interview, two questionnaire survey used in data collection	Reduction in stigma in the respondents after the intervention
Does Swaziland have enough IEC material	Conducted by ULARN	488 children	Descriptive study Sets of	Older age group display higher knowledge compared to younger, 87% know about

on HIV/AIDS targeting children[6] 2004			questionnaire and focused group discussion	transmission of HIV/AIDS and 95.9% know that it is not curable
Perceived Sufficiency & Usefulness of IEC Materials and Methods Related to HIV/AIDS among High School Youth in Addis Ababa, Ethiopia[7] 2005	High School Youth in Addis Ababa, Ethiopia Amsale Cherie, GetenetMitkie, Shabbir Ismail and Yemane Berhane	901 students	Descriptive study Self-administered questionnaire and focus group discussions are done for data collection.	Increase knowledge about HIV/AIDS by 456(51%), acquire safer sexual practices by 382 (42%) and influence attitude by 357 (40%) of respondents.
Effectiveness of IEC interventions in reducing HIV/AIDS related stigma among high school adolescents in Hawassa, Southern Ethiopia[8] 2008	4 high schools of Hawassa, Southern Ethiopia Alemayehu Bekele and Ahmed Ali	Total 404 students (101 from each school) were recruited and 373 students enrolled in study	Interventional study Questionnaire is distributed	Notable change in attitude is noticed related to misconception, discrimination and stigmatization.

Fiji Red Cross Society's HIV and Blood Advocacy IEC Materials Evaluation: An Analysis of Quality & Effectiveness [9] 2010	Suva, Fiji	Those interviewed included villagers who attended workshops, villagers who did not attend workshops, village leaders, church leaders, village nurses, Peace Corps volunteers and Red Cross Branch health volunteers.	Quasi-experimental study In- depth interview is done	The current material has positive effect on the population but there is need of improvement, planning and proper implementation in future.
Study the effect of information, education and communication on risky behaviour among people living with HIV/AIDS in KHARTOUM STATE, SUDAN[10] 2013	Khartoum State, SUDAN Dr. Mohamed Osman ElaminBushara, Prof. Hatim Rahimtalla Mohamed2 Dr. Fatima Fadul, Dr. Ahmed Abdella	25 out of 250 people living with HIV/AIDS selected randomly	Quasi-experimental study	Increase in knowledge after the intervention (HIV) infection from76- 100%, change in isolation feeling 84-60%, use of condom 68-96%, knowledge about mode in transmission84-100%, change in feeling of discrimination from community 100-84%.

	Mohammed Osman			
Relevance of HIV IEC Materials-A study among PLHIVs[11] 2014	Tirunelveli District (TAMIL NADU). Ms. PratheepaC. Mand Ms. Nithya. K	122 people living with HIV/AIDS	Descriptive Study	97.5%received IEC materials,86.9% read the material, 64.8% adopted few matters they read in their life, 81.1 %IEC materials easy to understand, 91.8% wish to continue IEC materials
The Use of Posters in Disseminating HIV/AIDS Awareness Information within Higher Education Institutions[12] 2014	University of Johannesburg, South Africa Jenni Gobind, Wilfred I. Ukpere	739/970 responses recorded	Quasi experimental study Semi structured interviews and self administered survey questionnaire	67% academics, 75% administrative staff and 70.6% students respond that HIV/AIDS poster visible
Creatively Empowered: The Role of a Creative Concept and IEC Materials in Influencing Decision-Making to	Wits Reproductive Health and HIV Institute, Johannesburg, Gauteng, South Africa; National Department of Health,	260/299 responses	Cross sectional observational study	87% (260/299) heard of PrEP, 78 %(202/260) seen We Are the Generation that Will End HIV, 90% (148/181) liked it and 82%(148/181) said it was empowering. 88% said the IEC materials had influenced their decisions to initiate oral PrEP and 92%of current users said the

use Oral Pre Exposure Prophylaxis (PrEP)[13] 2018	Pretoria, Gauteng, South Africa; Clinton Health Access Initiative, Pretoria, Gauteng, South Africa; FHI 360, Durham, North Carolina, USA ElmariBriedenhann, Diantha Pillay, Mercy Murire, Patience Shamu, Hasina Subedar, LulamaLunika, Kayla Stankevitz, Kathleen Ridgeway, Michele Lanham, SaiqaMullick			materials motivated them to continue using oral PrEP.

GREYS LITERATURE

So here are some information that are produced outside any traditional publication called GREY'S LITERATURE .It includes reports, policy literature, working papers, news letter, speeches, urban plans, government documents, and white papers so on.

TITLE	OBJECTIVE	CONCLUSION/ FINDING
IEC material and caring for PLWHA a partnership between Program for Appropriate Technology in Health and Family Health International[14] 2004	• To define the needs of PLWHA and their families, as well as of caregivers, in urban and rural areas affected by HIV (Ha Noi, Hai Phong, and Quang Ninh). • To identify existing home and community care activities in Vietnam and to determine what materials were available that had been developed for home care. • To conduct a community-based consultation with international NGOs, international organizations, PLWHA, community-based caretakers, peers, and informal groups involved in home care for PLWHA. • To summarize the results of the consultation in the	• Give more resources to communication programs for PLWHA. • Support positive behaviours among PLWHA. • There is need of finding the difference between clinic based care and self care so that population can understand the proper balance between them. • Strengthen interactions between public services and PLWHA. • Devote information and choices regarding possibility for living. • Support the needs of caregivers. • Focus on reducing social stigma. • Get support from policymakers for scale

	context of strategy and program development.	up. • Dialogue with public officials and community leaders. • Link IEC materials to program outreach.
Communication Framework For HIV/AIDS (UNAIDS/ PENNSTATE Project)[15]	• Review existing theories models, frameworks and strategies for their potential effectiveness in communication programmes for HIV/AIDS prevention and care in Africa, Asia, Latin America and the Caribbean. • Propose guideline for developing national and regional communications strategies for HIV/AIDS. • Advice on dissemination and implementation plans to activate more effective regional and national communication strategies.	• Government policy, socioeconomic status, culture, gender relation, spirituality are the five domains of context are virtually universal factors in communication for HIV/AIDS preventive health behaviour.
Priority Interventions HIV/AIDS prevention, treatment and care in the health sector (World Health	• Describe the priority health sector interventions that are needed to achieve universal access to HIV prevention, treatment and care. • Summarize key policy and technical recommendations developed by WHO and its	• Develop and implement "a package of HIV prevention, treatment and care" interventions, with a view to achieving universal access for all those in need. This document also responds to a long-

Organization HIV/AIDS Department)[16] 2009	partners and related to each of the priority health sector interventions. • Guide the selection and prioritization of interventions for HIV prevention, treatment and care. • Direct readers to the key WHO resources and references containing the best available information on the overall health sector response to HIV/AIDS, and on the priority health sector interventions, with the aim of promoting and supporting rational decision-making in designing and delivering HIV-related services.	standing country need expressed by national authorities. • Countries are expected to prioritize those interventions that are best adapted to their realities on the ground, including the epidemiologic situation, level of the health system, socio-cultural context, and availability of human and financial resources. • Priority interventions are designed to be a 'living' document that will be regularly updated with new recommendations based on the rapidly-evolving experience of health sector scale up.

FINDING

- IEC is essential ordnance in shortening the fast approaching increment in HIV/AIDS spread.
- Real goal of IEC material is advancement of knowledge and dissemination of truth.
- Increase in treatment seeking behaviour. Availability and source of of treatment, self care, responsibility to manage the life.
- Interventional study is most effective in changing the behaviour of respondent, create awareness, increases knowledge, moves people to change, maintain their changed and desired behavior.
- Health promotion activities relays on variety of IEC materials. It is a significant component in a health communication programme. It is a mix of social message and entertainment.
- It reaches almost 90% of the population at a time and cost effective when link with health care service delivery.
- Basic and justifiable words help the readers to pursue the reading.
- IEC helps in learning and making decisions by modifying their behaviour
- Through IEC material children came to know now about nature of HIV transmission, and it is not curable. The older age groups displayed higher knowledge compared to the younger age group. School going children display more knowledge compare to those who were out of school.
- Focused group discussion carried out with Local Care Facilitators has a significant job in developing and supply the IEC materials to PLHIVs.
- To prevent transmission of disease and opportunistic infection ART adherence and pursuing safe practices are most featured practice.
- There is high community acceptance and low self stigma through message distributed by IEC material.
- Pretesting of the questionnaire is done to know that it is easily understandable by the respondents.

DISCUSSION

- The message in IEC material ought to be concrete, prompt and explicit relevance to the crowd for it to be internalized and attended.
- Poster plays a crucial job in creating alertness among individuals of various strata. Through art and text poster has ability to disseminate. Posters are significant source of mindfulness data. Posters in hospitals, emergency department, sitting areas present as a productive source of wellbeing instruction on a few subjects, for example, family planning, AIDS avoidance and antismoking efforts.
- Print media demonstrated to be adequate in expanding information, influencing social norms, developing habit to utilize condoms, expanding the measure of relational correspondence and raising responsiveness of wellbeing administrations. Print media, contacts numerous individuals, passes on data rapidly and urges them to make a move. The benefits of utilizing printed materials are the convenience, cost effective, graphics to portray concept and portability.
- PLWHA are usually poor people, earning periods of their life is unfavourably affected, less educated and limited job opportunities, seen mostly in daily workers. The socioeconomic situation of PLWHA gets worsen from the time of infection. Illiteracy increases their unsafeness to HIV/AIDS.
- IEC material effectively increase knowledge concerning the mode of transmission, securing from HIV/AIDS by refraining from sexual relations, immensity of the problem, making relationship with uninfected persons, feeling of discrimination and isolation from the community, use of condom appropriately every time they have sex and disclosing HIV status in healthcares.
- The aim of IEC is to impact the psychomotor, feeling and psychological territory of the collector.
- Interpersonal communication can only move to individual action while mass communication can create awareness. s
- Parents are the first accessible source and socialising agents in time and spot, using this potential has a valuable and more prominent accomplishment in taking care of the issue.
- The religion following leaders, family and health professionals play a effective role. Many of them considered as reliable and credible.

CONCLUSION

- IEC materials are more relevant and people friendly.
- Message appeal head and heart of the audience.
- People attitude/behaviour doesn't get affected even after gaining knowledge from the society.
- The large numbers of people were aware of this disease before getting infected.
- The IEC materials provide necessary life skills to the individuals that are essential for avoiding HIV infection.
- IEC remarkably rise in knowledge, significant refinement in the perception towards the disease or community and there was outstanding improvement in the sexual practices also.
- Misconceptions on HIV prevention, stigmatization, transmission and discriminatory behaviour were prevalent among the adolescents. Confusions were seen as indicators of HIV related shame and separation.
- Programmes utilizing joined IEC mediations should be strengthened to disperse the overall misguided judgments in transmission and counteraction of HIV/AIDS and the related disgrace and segregation.
- Oral PrEP proceeds to different population, it is imperative to know how the material strikes the mind of population. Extra topics should be included in the materials so that population will get familiar with oral PrEP take-up, adherence and continuation.
- Pairing of distribution of IEC materials with educational program.
- Self discrimination and social discrimination reduced.
- The individuals having disease show a refusal attitude for the clinic-based care provided by the government sector and they want to take care of themselves.

RECOMMENDATION

- The font size of the IEC material should be bigger and easily visible. It should not be overloaded with the messages. There should be availability feedback mechanism. The message should get noticed and stand out in clutter. Complex messages on IEC materials are difficult to remember.
- Utilization of government scheme.
- There should be inclusion of topics related to HIV/AIDS in the curriculum and update time to time so that youth may develop learning skills like conflict management, assertiveness, decision making, problem solving and effective communication.
- Other topics such as STIs, condom, teen pregnancy, HIV testing should be included to change behaviour of population.
- Straightforward and obvious recommendation from funders, international and national NGOs, government agencies, and local governments have to increase the resources require for communicational needs for PLWHA and their caregivers.
- Printed material used should be updated time to time. It should be developed in concern with age, culture and gender appropriate. To strengthen school based IEC materials teachers should be properly trained.
- Strengthening of Anti AIDS club programme and peer educators. Programme for youth and the IEC material used in that is designed by students.
- For maintaining safer practices and attitudes parents need to talk to their children's with the help of resources available.
- A user oriented BCC material would help to unwrap the difficulties faced by clinical staff in treating PLWHA and fears of PLWHA about visiting clinics.
- The staffs should ensure that all the PLWHA received material, read and acknowledge the content of it. There should be follow up visit by staffs.
- The PLWHA not only pursue the IEC but also put forth attempts to share materials to their companions and neighbours. So that they could encourage consciousness of social stigma and assemble network support.
- The persons who are literate should help to educate the virus infected illiterate persons. These peoples should be made aware so that they do not transmit these diseases further.

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PART 2- Report on Online Course

Operations Management: Analysis and Improvement Methods

University of Illinois by Udatta Palekar

COURSE DESCRIPTION

Welcome to the world of operations management. This course is demonstrated by Udatta Palekar professor in the Department of Business Administration in the Gies College of Business at the University of Illinois and he is the Executive Director of the Supply Chain Management program. Operations are the repetitive processes used to create and deliver products and services. This course introduces to tools, techniques and technologies used in operation management. It introduces us to a process view of operations and study the different metrics used to measure their performance. Calculation of process capacity under different process configuration and the effect of variability on process capacity will be discussed. It helps in learning the role of inventories play in operations and some common methods for calculating economic order quantities and re-order times. We will learn about supply chains and the important factors to consider in sourcing decisions. The bullwhip effect in supply chain will be introduced and ways to mitigate it through information sharing will be discussed. Finally we look at continuous improvement techniques such as lean management and the six sigma methodology. This course intended as a two-part series on operation management.

COURSE GOALS AND OBJECTIVES

- Analyze operations and processes, select appropriate process type and calculate performance metrics for processes.
- Recognize the role of inventories in operation and their connection to other process metrics and calculate performance metrics for inventory system.
- Design an inventory management policy by calculating optimal quantities, safety stock and re-order point.
- Demonstrate an understanding of the issues associated with managing supply chain and explain the bullwhip effect in supply chain and how it can be mitigated.
- Apply transaction cost economics, strategic risk and economic criteria to make outsourcing decisions.
- Demonstrate an understanding of how Lean management and six sigma methodologies used to continually improve operations.
- Reorganize operation through continuous improvement method to reduce waste.

COURSE METHODOLOGY

- Lecture videos
- Readings
- Quizzes
- Peer assignment

COURSE CONTENTS

WEEKS	CONTENTS
Week 1-Module 1 Reading: 60mins Lecture: 70mins Quiz: 30mins	Process Analysis 1. Process View of Operations (part 1) 2. Process View of Operations (part 2) 3. Process Flow Analysis 4. Capacity and Utilization 5. Little's Law
Week 2-Module 2 Reading: 120mins Lecture: 70mins Quiz: 30mins	Inventory Management 1. Inventory Basics 2. Economic Order Quantity (part 1) 3. Economic Order Quantity (part 2) 4. Re-Order Point (part 1) 5. Re-Order Point (part 2) 6. Re-Order Point (part3)
Week 3-Module 3 Reading: 90mins Lecture: 100mins Quiz: 30mins	Supply Chain 1. What is a Supply Chain? (part 1) 2. What is a Supply Chain? (part 2) 3. Sourcing Decisions (part 1) 4. Sourcing Decisions (part 2) 5. Bullwhip Effect
Week 4-Module 4 Reading: 90mins Lecture: 135mins Quiz: 30mins Peer assignment: 120mins	Continuous Improvement 1. History of Continuous Improvement? 2. Lean Management (part 1) 3. Lean Management (part 2) 4. Six-Sigma Methodology (part 1) 5. Six-Sigma Methodology (part 2) 6. Six-Sigma Methodology (part 3) 7. Six-Sigma Methodology (part 4)

KEY LEARNINGS

➢ Module1

▪ Process View of Operations

Operations are composed of a collection of activities that are purposeful planned and coordinated.

Process View: Processes are structured activities that transform inputs to outputs (and are usually repetitive). The process view shows how an organization uses resources to coordinate activities.

Process Flow Units: The basic unit of flow at which we wish to study a process

Process Representation: Processes can be represented as a connected network of activities.

Product Focused Operations: Resources and activities required for a "product family" or customer type is grouped together.

Process Focused Operations: Similar skills or technologies are grouped together in specialized departments.

Layout Characterization: Linear - flow units move sequentially form one activity to the next in a fixed sequence. Eg- getting your food at Chipotle and car assembly.

Jumbled or Job-Shop - Flow unite may have different sequence of activities. Eg- patient flow in a clinic.

Batching: Processes can also be characterized based on how flow units move between activities through the process**.** There are**-** Continuous Flow, Single Unit and Flow Batch Flow**.**

Reasons for Batching: Economy of Scale and shared Resource with changeover.

Process Type Selection

Project - One off (very low volume), very expensive, unique, very flexible

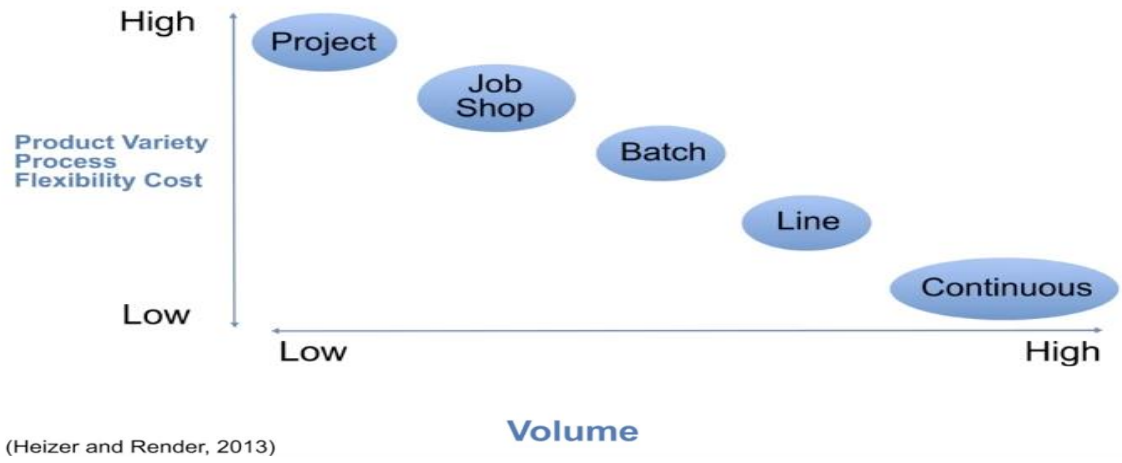
Job Shop - Multiple Products, low volume, and moderate flexibility

Batch - Many products, moderate volume, low flexibility

Line - few products, high volume, very low flexibility

Continuous - Very few products, very high volume, very low flexibility

Product-Process Matrix



(Heizer and Render, 2013)

Process Flow Analysis

Process Flow Metrics:

- Cycle time- Time between two consecutive units departing the process.
- Flow Rate = 1/(Cycle Time)
- Flow time or throughput time- From the time it enters to the time it departs the processor time taken to travel whole process..
- The longest path from start to finish is called flow time.
- Flow rate, cycle time and flow time can be defined for any contiguous sub-process we want to study down to an individual activity.
- For an individual activity the cycle time is simply the processing time for that activity if one flow unit is worked on at a time.
- Cycle time of an activity = Processing time/number of stations.

Bottleneck Activity: The activity with the smallest flow rate is called the bottleneck activity. The bottleneck is the activity with the longest cycle time.

Capacity and Utilization

Activity Capacity: The activity is capable of producing the flow rate.

Setup Times and Activity Capacity: Effective Flow Time = Processing Time + waiting times

Process Capacity The capacity of a process is equal to the capacity of its bottleneck activity

Capacity Utilization = Actual Production Rate/Available Capacity

Implied Utilization= Demand Rate/Available Capacity

Little's Law: Little's law says that I = R × T (I = Inventory, R = Flow rate, T = Flow time

➢ Module2

▪ Inventory Basics

Inventories are good or material that are in any stage of readiness that are being held for future sale

Types of Inventories:

- Based on stage of completion- raw material goes through process to provide finished goods.
- Based on reason for keeping- Cycle inventory due to batching, anticipation inventory for seasonality, safety stock to buffer against uncertainty, pipeline inventory that is on-order or in-transit and strategic inventory to position for better negotiation.

Inventory Metrics: Macro level metrics

- Inventory Turnover Ratio = Cost of Goods Sold ÷ Average Inventory in $
- Periods of Inventory = Average Inventory in $ ÷ Cost of Goods Sold in a period

▪ Economic Order Quantity

Inventory Related Costs: Setup/ordering cost denoted by "S".

Holding Cost = Item Cost × Interest Rate + Storage Cost/Item/Year

Frequency of ordering- If you order more often, you pay more transaction cost but with lower holding costs. If you order less often, you pay lower transaction cost but with higher holding costs.

Annual Cost

Annual cost of ordering = number of orders × ordering cost/order

Annual cost of inventory = Average inventory × holding cost

Total cost = Cost of ordering + cost of inventory

Economic Order Quantity: To minimize the Total Annual Cost we use the Economic Order Quantity.

$$Q^* = \sqrt{\frac{2DS}{H}}$$

With annual total costs = $\sqrt{2DSH}$

Annual ordering costs = $\sqrt{\frac{DSH}{2}}$

Annual inventory costs = $\sqrt{\frac{DSH}{2}}$

Economic Manufacturing Quantity: Suppose we have a known rate of production (R) then the optimal manufacturing quantity is

$$EMQ = \sqrt{\frac{2SDR}{H(R-D)}}$$

- ## Re-Order Point

Order when the amount of inventory on-hand is D × L.

Inventory Position = on-hand inventory + inventory on-order

Demand Uncertainty: To avoid stock-out add extra inventory—Safety stock

ROP = Average demand during leadtime + Safety stock

Order if: Inventory position ≤ Re-Order Point

Period of Uncertainty:

- Continuous review: POU = Leadtime
- Periodic review: POU = Review interval (r) + Leadtime

Safety Stock Calculation:

- Decide your tolerance to stockouts
- Probability of Stockout = α
- Service Level = (1- Probability of Stockout) = (1 — α)
- Find the z-value

  a. using Standard Normal Tables or

  b. using Microsoft Excel NORM.INV(1 — α , 0, 1)
- ROP = mean + z× standard deviation

Uncertainty in Leadtime:

- Mean leadtime = L
- Std. dev of leadtime = *SDL*
- Mean during POU = L × D

$$\text{Std. dev during POU} = \sqrt{L * (SD_D)^2 + D^2 * (SD_L)^2}$$

Order Up To Policy = ROP + EOQ

Order Quantity = Order up to level - inventory position

➢ Module3

▪ Supply Chain

Supply chain is a name given to a complex network of interrelate companies that work in a coordinate manner to transfer raw material and resources into product and services.

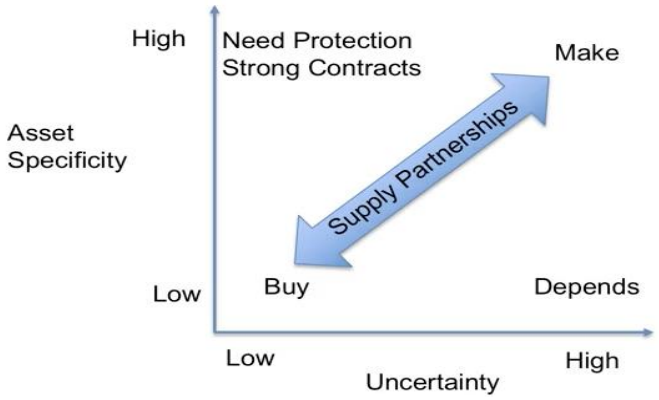
Layers of the Supply Chain: Logistics; Information; Financial; Governance.

▪ Sourcing Decisions

Why do Supply Chains Exist?- Lack of expertise/competence, lower costs and resource constraints.

Outsourcing Risks: Dependence on suppliers; loss of flexibility; loss of core activities; intellectual property loss & supplier financial risk.

Transaction Cost Economics An economic theory that seeks to explain how a firm should be organized based on the attributes of the transactions it undertakes.



Transaction Characteristics: Frequency of Transaction; Asset Specificity; Uncertainty.

Transaction Costs: Apart from the cost of items or services, transactions involve other costs: Identifying suppliers; informational cost of finding prices, quality, durability; transportation costs; legal costs & insurance costs.

▪ Bullwhip Effect

It is effect where small perturbation at one end results in large changes upstream in the supply chain.

Contributing Factors: Demand variability, panic ordering, strategic ordering, batch quantities, quantity discounts, trade promotions, leadtimes, shortages, quality recalls, engineering changes, new product introductions and delivery problems.

Combating Bullwhip:

- Information Sharing: Point-of-Sales information; improved forecasting and analytics; vendor managed inventory &supplier and customer communications.
- Manufacturing Decisions: Batch size reduction; just-in-time ; inventory pooling; delayed differentiation or postponement & leadtime reduction.
- Marketing Decisions: Pricing discipline; rolling sales incentives&trade promotions or quantity discounts.

➢ Module4

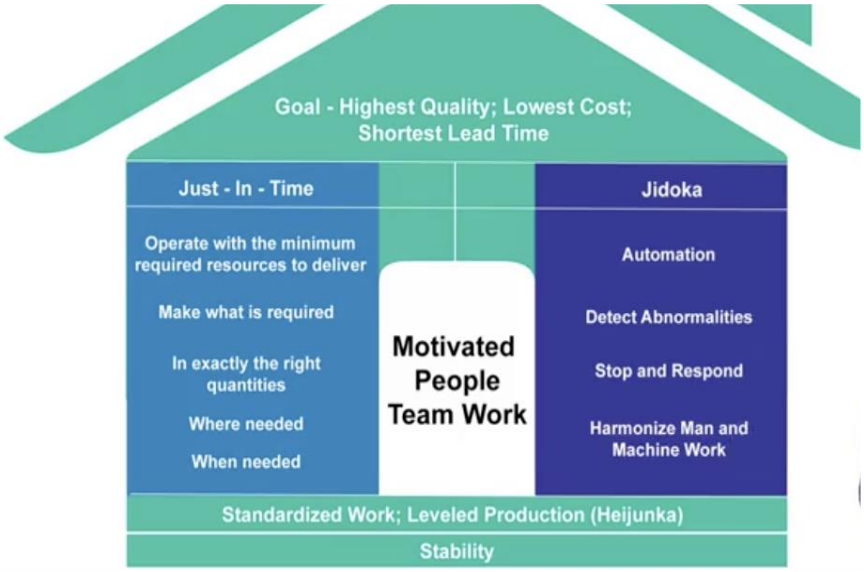
▪ Continuous Improvement

System of Profound Knowledge

P-D-C-A Cycle: Plan, Do, Check and Act

▪ Lean Management

Toyota Production System



Elimination of waste in processes through continuous improvement.

Value: Customer's perspective- quality, delivery, cost

Types of Activities

- Value adding activity
- Essential non- value adding
- Non- value adding

7Types of Waste: W-I-P-C-O-M-M

Waiting; Inventory; Processing; Correction; Overproduction; Motion and Material movement.

Principles of Lean:

- Customer-focused value
- Identify all steps in the value stream, eliminate wasted steps
- Make products flow smoothly
- Let customer pull product
- Create perfection or ideal state with no waste

Lean Tools: 5s

- Sorting or Organizing
- Set in order (Simplify Access)
- Shine (Cleaning or Sweeping)
- Standardize neatness
- Sustain (Self-Discipline)

5 Whys- A simple root cause analysis technique.

Kaizen:

- Small group improvement activity.
- Use the line workers creativity to reduce waste.

Work Cells:

- Create natural groupings of tasks/products and equipment/personnel needed to do them.
- Single piece flow in the cell.

Standardized Work:

- Every process step is rigorously documented.
- Sequence of task steps are specified with cycle times, inventory required, tools, and equipment needed.
- Everyone knows their exact roles and responsibilities.

Six-Sigma Methodology

- Defects per opportunity (DPO)
- Defects per million opportunities(DPMO)

Six-Sigma Infrastructure

- Executive Leadership- Highest level possible in the Organization– Often C-level executives & provide strategic focus to the program.
- Champions and sponsors-Identify individual projects; align to mission and vision & remove roadblocks.
- Master black belts-Trains the Black Belts and Green Belts; helps as a technology/methodology consultant to Black Belts & has a program-level focus rather than project focus.
- Black belts-Expert in six-sigma methodology; DMAIC expertise; statistical training & respected for their expertise
- Green belts-Project managers/leaders & Domain expertise.
- Yellow, white etc. Belts-Have some training in six-sigma methodology; project team members & project champions or sponsors.