CONSTRUCTING AN ECOSYSTEM FOR A SUSTAINABLE INNOVATION CULTURE USING TRIZ TOOLS

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Rohaya is an associate professor at the Faculty of Economics and Business, UNIMAS. Currently, she holds the position of Director of UNIMAS Leadership Centre. Rohaya obtained her BSc Degree in Management with MIS, from Purdue University, US. She holds a Master of Information System from Melbourne University, Australia and a PhD degree, specializing in MIS, from Imperial College London, UK. Rohaya is also a certified TRIZ Level 2 practitioner.

Prof Dr Narayanan Kulathuramaiyer
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Narayanan is currently the Director of the Institute of Social Informatics and Technological Innovations (ISITI), Universiti Malaysia Sarawak (UNIMAS). His academic background spans over three decades in the field of Values-based Artificial Intelligence, ICT for Development and Systematic Innovation. He continues to impact changes at the national and international levels through his work with remote rural communities across the country, strategic shaping of ICT education and innovating learning technology to serve disadvantaged communities. As a certified MATRIZ Level 3TRIZ practitioner, he is currently leading the Borneo Triz initiative for promoting Systematic Innovation programs throughout the region.

Prof Datuk Dr Mohamad Kadim Suaidi
Vice Chancellor
Universiti Malaysia Sarawak

Kadim currently is the Vice Chancellor of Universiti Malaysia Sarawak (UNIMAS). He has been instrumental in championing strategic change in the education and life long learning scene for both UNIMAS and Sarawak.
SARAWAK
Land of the Hornbills

Area: 124,450 km²
Population: 2.79 million (2018)

More than 40 sub-ethnic groups, each with its own distinct language, culture and lifestyle. A magnet for researchers and nature-lovers alike, its opulent biodiversity and natural resources spell a uniqueness which cannot be found elsewhere.
Vision
A leading global university for a sustainable future

Mission
To enhance the social and economic impacts on the global community through the pursuit of excellence in teaching, research and strategic engagement
Kuching City Life
Area: 431.01 km²
Population: 702.7 thousand

The Cat City, as it is affectionately known, offers diversity in an unrivalled melting pot of ethnicity, languages, and culture.
NICHE AREAS

- Biodiversity & Environmental Conservation
- Sustainable Community Transformation
- Information, Communication and Creative Technology
UNIMAS students are dynamic, dedicated and determined, and are ready for the world.
CONSTRUCTING AN ECOSYSTEM FOR A SUSTAINABLE INNOVATION CULTURE USING TRIZ TOOLS

ABSTRACT

In a previous publication, we described an innovation ecosystem designed for an institute of higher learning, Universiti Malaysia Sarawak (UNIMAS) using TRIZ ways of thinking and tools. In this presentation, we share the extensions to our proposed conceptual framework in addressing challenges faced by the innovation ecosystem of Malaysian public sectors. We draw on our experiences in working together with multiple groups of stakeholders in the unique geo-locality of Borneo. In this study, we demonstrate the application of TRIZ tools in analysing selected problems facing by our stakeholders, namely rural community, professional groups and students. Based on our research, we put forward an innovation system model for sustaining an innovation culture by emphasizing on the four roles that must co-exist in the system: innovation strategist; innovation tactician; innovation practitioner; and innovation champion. The three-pronged change management strategy adopted is showing early signs of a significant shift in organisational culture.
2010
• Intel Malaysia Team & MDeC Team trained UNIMAS lecturers
• 20 UNIMAS lecturers (Level 1 & 2)
• Open Triz Education introduced in Sarawak

2014
• UNIMAS team engaging with Ministry of Education Malaysia for the proposed inclusion of TRIZ into the national secondary school curriculum

2016
• On-going TRIZ training activities in Sarawak with the support of MyTRIZ
• SEB L1 Training

2019
• UNIMAS staff attained Level 3 International TRIZ Association Cert
• On-going TRIZ training activities; 70 UNIMAS managers
• Embed TRIZ in teaching curriculum

2020 & Onwards
• Enrolling all the managers in the program
• Staff innovation portfolio
• Research clusters
• UNIMAS Centre for Product Innovation based on TRIZ
• Annual UNIMAS TRIZ competition
Leading in a VUCA world

Upskilling & Reskilling for IR4.0

The Changing Landscape of Education Sector
What sorts of leaders that we want to develop and have for UNIMAS?

How to develop and produce leadership talents to sustain UNIMAS excellence?

How do we equip our staff with strategic leadership skills, particularly those in the first line management?
The Ideal Campus Dream

UNIMAS Innovation Agenda

Research Clusters & Innovator’s Circle
- TRIZ-based Research Clusters
- Research Benchmarking
- Inventive Knowledge Bases
- Product Innovation

Creative TRIZ Leadership
- Innovative Leader Profiling
- Creative CVs
- Problem Solving Portfolios
- Community & Industry impact

UNIMAS-wide Innovation Campaign
Research Clusters/Innovation Circles

UNIMAS Innovators’ Expo

Certification For:
Design Innovation
Technology Warriors
Knowledge Managers
Researchers
Graduate Student

UNIMAS as a Hub for Problem Solving
- Management & Professional Staff Training
- Problem Solving Laboratories

100 Patents
2000 Students
50 Trainers
50 Products
500 Publications

UNIMAS TRIZ Academy
- Systematic Innovation Course
- Train the Trainers Program
- Final Year Inventive Projects
- Break-through research

UNIMAS Innovators’ Expo
2000 Students
50 Trainers
50 Products
500 Publications

The Ideal Campus Dream

UNIMAS TRIZ Academy
Self-driven, self-sustainable, organically grown, balanced, integrated as a fully dynamic system, capable of helping each one rise to challenges, allowing us move into the big league alongside the major players in the world.
OUR CHANGE JOURNEY WITH TRIZ

Environment
Current Position Interactions
Knowing where we are

UNIMAS Action
Current Resources
Efforts in Mapping

Departmental Action
Lets do our part &
Lets Work Together
Define at each PTJ level!

Innovative projects
One cluster one Patent
Target Inventions for
Awards Innovative Spaces

Promote in all PTJs
Games to stimulate interest
Benchmarking Activity
Improve Interaction
Empowered Focus Group

Enterprise Account need
to be dynamic
Incentive for Creators

Problem-> Value
Knowledge-based Activities
Optimised Resources= Zero Waste

Mechanisms & Support for
Value Creation
System for Users to be
Responsible

VISION
101 in World
Benchmarked Research
Innovation Ecosystem
World Class TL Facilities

ILLUSTRATION OF ADAPTATION USING TRIZ VISUAL WAY OF THINKING
Table 1: Mapping Strategic Skills to TRIZ-based Tools using VUCA Directed Strategic Skills by Shoemaker, Heaton and Teece (2018)

<table>
<thead>
<tr>
<th>VUCA directed strategic Skills</th>
<th>Using TRIZ to strengthen our staff problem solving skills</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anticipate</strong></td>
<td><strong>Challenge</strong></td>
</tr>
<tr>
<td>Explore Game Changer initiatives</td>
<td>Frame Problems to identify Root Causes</td>
</tr>
<tr>
<td>Go Beyond Current Boundaries</td>
<td>Change Beliefs and mind-sets</td>
</tr>
<tr>
<td>Build wide networks to scan horizon</td>
<td>Uncover mis-alignments &amp; biases</td>
</tr>
<tr>
<td><strong>Interpret</strong></td>
<td><strong>Decide</strong></td>
</tr>
<tr>
<td>Understand Data from multiple points</td>
<td>Carefully frame decisions and approach</td>
</tr>
<tr>
<td>Participatory in Gathering Insights</td>
<td>Balance speed, rigor, quality and agility</td>
</tr>
<tr>
<td>Explore Multi-faceted constructive Decision Making</td>
<td>Handle uncertainty and information challenged scenarios</td>
</tr>
<tr>
<td><strong>Align</strong></td>
<td><strong>Learn</strong></td>
</tr>
<tr>
<td>Uncover hidden parameters in effectively align pathways to strategic visions</td>
<td>Stay agile in steering organizational direction</td>
</tr>
<tr>
<td>Capacity to overcome misalignments to address though issues</td>
<td>Celebrate success and continue learning from failures</td>
</tr>
<tr>
<td><strong>Problem Solving Laboratories</strong></td>
<td><strong>Problem Modelling Tools</strong></td>
</tr>
<tr>
<td><strong>Cause and Effect Chain Analytics &amp; Charts</strong></td>
<td><strong>40 Principles &amp; MATCHeMiB</strong></td>
</tr>
<tr>
<td><strong>Learning through Dialectics</strong></td>
<td><strong>Case Study Collections</strong></td>
</tr>
<tr>
<td><strong>Problem Solving Levels</strong></td>
<td><strong>Trends Analytics &amp; Directed Pathways</strong></td>
</tr>
<tr>
<td><strong>Inventive Trigger Cards</strong></td>
<td><strong>Resource Maps</strong></td>
</tr>
<tr>
<td><strong>S-Curve Analysis</strong></td>
<td><strong>Engaging Expert Networks</strong></td>
</tr>
<tr>
<td><strong>Innovation Roadmaps</strong></td>
<td><strong>Function Oriented Patent Search</strong></td>
</tr>
<tr>
<td><strong>Directed Evolution</strong></td>
<td><strong>Knowledge Discovery Workshops</strong></td>
</tr>
<tr>
<td><strong>Computer-Aided Innovation Tools</strong></td>
<td><strong>Collective Knowledge Maps</strong></td>
</tr>
<tr>
<td><strong>Problem Solving Laboratories</strong></td>
<td><strong>Flexible Learning &amp; Dynamic Certification</strong></td>
</tr>
<tr>
<td><strong>Cause and Effect Chain Analytics &amp; Charts</strong></td>
<td><strong>Institutional Knowledge bases</strong></td>
</tr>
</tbody>
</table>

Leading & Managing in VUCA

1. Using TRIZ to strengthen our staff problem solving skills
2. Institutionalize TRIZ ways of thinking in battling inertia
3. Profiling staff competency in leading and managing is important

FIGURE 2. Six leadership disciplines needed for VUCA.

Note: VUCA = volatility, uncertainty, complexity, and ambiguity.
• Embedding of TRIZ into both aspects of strategic leadership as well as operational leadership.

• Substantiating business process management and quality assurance drives, with tool-based methodology and tools.

• Aligning TRIZ-based elements into strategic, managerial and operational business processes.

Sample List of Projects
• Reduce Food Wastage
• Car Parking Dilemma
• Making way for IR 4.0
• Stray Dogs Problems
• Traffic Bottlenecks at Entrance
• Security IT systems
• Ambulance Response
• Pandemic Challenges and Impacts on Training
UNIMAS not fully exploiting IR4.0 yet

- Awareness of full power not well known among staff
- No case studies on IR 4.0 success stories
- No disruptive model

- Masa staff – fire fighting meeting too much dateline,
- Still locked in IR2.0 mindset

- Permintaan dari stakeholder yang banyak
- Bil projek tidak selari dengan bil. staff

- Tiada kepakaran
- Tiada resources diperuntukkan secara khusus melihat perkara ini
- Tiada masa khusus untuk melaksanakan kreativiti

IF
Masa kreatif diperuntukkan,

THEN
Banyak idea kreatif yang menyokong Revolusi Industri 4.0,

BUT
Masa untuk kerja hakiki berkurangan.

CONTRADICTION MATRIX
33 : Ease operation (improving feature)
39 : Productivity (worsening feature)

INVENTIVE PRINCIPLES
1 : Segmentation
15 : Dynamization
28 : Mechanics Substitution

Institutional level – Cause & Effect Chain Analysis
Departmental level – Function Analysis; Cause & Effect Chain Analysis
More than 90 administrative staff obtained TRIZ Level 1 Certification, as of 2020

Building more talent pool for TRIZ practitioners (academic and non-academic staff)
- On-going coaching and mentoring efforts
- Strategic engagement and media publicity
- TRIZ related Publications
How do we integrate our stakeholders, institutionalize innovation culture and build innovation ecosystem through shared vision and values?
TRIZ@UNIMAS
Our Stakeholders

Undergraduate Courses
1. MPU 3422 Systematic Innovation and Problem Solving
2. TRIZ application PBL (Project Based Learning) activity
Oroo’, a visual communication language, is still in use in the remote forests of Borneo. Oroo’ represents signs or clues that are used to convey information about environmental conditions, activities, directions, animals, time periods, warnings and more. There is a close relationship between the Penan community and their natural surroundings which include the forest. All the materials, such as leaves, twigs, bark and roots, used to construct Oroo’ symbols are obtained from forest. 

(George, Kulathuramaiyer & Bala, 2020: p185)
TRIZ@UNIMAS
Our Stakeholders

Figure 3: Innovation mapping framework.

(George, Kulathuramaiyer & Bala, 2020: p185)
TRIZ@UNIMAS
Our Stakeholders

1. On-going training, coaching and mentoring efforts
2. Strategic engagement with industry and community
3. Media publicity

SARAWAK PRODUCED LARGEST TRIZ PRACTITIONERS IN MALAYSIA (2019)

SARAWAK PRODUCED LARGEST TRIZ PRACTITIONERS IN MALAYSIA (2019)
An innovation ecosystem is the evolving set of actors, activities, and artifacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors. (Granstrand & Holgersson, 2020:p3)

<table>
<thead>
<tr>
<th>Co-evolution/ co-specialization</th>
<th>Activities</th>
<th>Artifacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Co-evolution</td>
<td>Innovation processes</td>
<td>Knowledge/technology</td>
</tr>
<tr>
<td>Co-specialization</td>
<td>Innovation activities</td>
<td>Capital / resources</td>
</tr>
<tr>
<td></td>
<td>R&amp;D</td>
<td>Products / services</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Competition</th>
<th>Actors</th>
<th>Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competition</td>
<td>Firms</td>
<td>Decision principles</td>
</tr>
<tr>
<td>Coopetition</td>
<td>Organizations</td>
<td>Institutions</td>
</tr>
<tr>
<td>Coordinated coherent solution</td>
<td>Agents</td>
<td>Policies / regulations</td>
</tr>
</tbody>
</table>

Modelling Innovation Ecosystem

TRIZ@UNIMAS

Illustration of Adaptation using TRIZ Visual Way of Thinking
Modelling Innovation Ecosystem

**ARTIFACTS**
- Patents
- Project Portfolio
- T&L Portfolio
- Training Portfolio
- Publication Resources
- Success Stories
- Certification Programs
- TRIZ Practitioners
- Idea/Challenge Bank

**ACTORS**
- Our leaders
- Admin Staff
- Academicians
- Students
- Industrial Practitioners
- Community Practitioners
- Youth Leaders
- TRIZ Alumni
- Researchers
- Policymakers

**Activities**
- Innovation circle groups
- Innovation activities & competition
- R&D clusters
- Innovation processes related to TRIZ (T&L, R&D, management, training etc.)

**Institutions**
- Project champions from higher level management
- Certified TRIZ practitioners are decision makers (strategic and operational)
- TRIZ being integrated in the systematic management training program

**Synergize with Stakeholders/ Sharing Vision and Values**
- Co-evolution / co-specialization
- Coordinated coherent solution
- Strategic collaboration
TRIZ Produces Thinkers who constantly Innovate

• Profiling staff, and pick out the champs with a simple measure:
  • Personal Capacity: Creative CV
  • Can systematize Innovation: Innovation Agenda with Evidence of operationalization
  • Recognition from internal/external partners

• We have a way of measuring problem-solving abilities based on TRIZ

• Patent databases used by everyone including students and administrative staffs to benchmark their inventions

• Multi-disciplinary Idea banks will be harnessed to stimulate collaborative projects at all levels
LESSONS LEARNED FROM UNIMAS

• Shared vision and values are important
• The role of agents – innovation strategists, innovation tacticians, and innovation champions
• Integrate Change Management Model (ADKAR Model) and implement effective buy-in strategies
• Recognize product/service innovations, and the business of creation
• Building an ecosystem for nurturing systemic innovation and creativity using TRIZ tools
TRIZ@UNIMAS

Lets Discover the Mystery, Miracle and Magic of TRIZ

Problem Solving Lab
Considering the challenge faced during the pandemic lock-downs and post pandemic situation, specialised problem solving labs can be tailor made to suit a wide range of needs targeted intervention programmes.

Group Activities
We provide both formal and informal training in both face-to-face and online modes. Specialised training can be customised to suit specific needs of your organization.

Life-long Learning
We believe that, powered by TRIZ, you will be able to start seeing problems as opportunity for knowledge discovery and innovation. Learning will become an ongoing process of unlocking potentials and talents to help you along to become accomplished in your pursuits.

Certifications
Certification pathways towards recognition at both national and international levels are available through our multidisciplinary team of experts, associates and advisers.