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Perspectives*

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**National Engineering School of Tunis
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Institute for Transport and Development (ITD)

**Hochschule Bremen
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**Reindustrialization of Tunisia:
Towards equitable and sustainable
development, and further democracy**

**Conference at Tunis/Hammamet, 12-13 February
2016**

Organizer: Professor Jeel Ezzine, ENIT

**Abstracts and Synopses for the Conference from the
Delegates from Universities in Bremen**

Compiled by Karl Wohlmuth, University of Bremen

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Dr. Martin Heinlein, Technologiepark Uni Bremen e.V., BRIDGE, Director UniTransfer

Technology Parks and Reindustrialization in Tunisia: Success Criteria derived from Cases in Bremen and Germany

The Technology Park University Bremen is centred on the campus of the University of Bremen with its approximately 20.000 Students and comprises a workforce of more than 12.000 employed by around 500 enterprises.

The Technology Park is the result of a strategic planning process, starting in the 1960ies and set in place in the time of the foundation of University Bremen in 1971. Regional planning generated a completely new campus in former swamp-land even though quite close to the city centre of Bremen. The driving force for Technology Ttransfer was and still is proximity between students, university staff and enterprises: in this context in 1988 the Bremen Senate finally decided to supplement the university with a full technology park.

Infrastructural assets as the already existing highway next to the Park, the building of a new tram-trail to the Park (1998) or the planned connection to the federal railway-system were relevant success criteria. The building of an incubator (BITZ, Bremer Innovations- und Technologiezentrum) in 1988 by the economic development agency marks the key starting point for the rapid development of the Park.

All further development processes (today 20 scientific institutes – many financed by federal money) and location processes are the result of fast and highly consensual decision making processes in the city of Bremen taking into account all relevant administrative and legislative players.

In 2007 the city of Bremen realized a fall-back in the conception of the technology parc and improved efforts toward more urbanity: retail, a recreation area, housing, more restaurants, activities towards more frequency on streets especially in evening time, leisure sites (as a climbing hall) etc. were planned and realized.

At the same time the Technologiepark Uni Bremen Association rethought its mission and reinforced its activities towards networking between members, towards public relations and towards life and work of the workforce.

Other successful Technology Parks as Berlin Adlershof or Dortmund show a similar performance though they are centrally managed by a separate management company as are any other smaller and thematically confined parks in Germany.

The main reason for success in the Bremen Technology Park may be found in a threefold strategy that might apply also in emerging economies such as Tunisia and in any de-industrialized area as well:

- a) an early confined planning process;
- b) a fast following starting point in small scale establishment and continuous adjustment (enlargement) to the needs; and
- c) finally, relying on the basic concept of a very narrow interaction between students, scientists and (young/start up-) entrepreneurs who work in direct vicinity to the university to develop economic activities.

It would be interesting and useful to compare the establishment and the experiences of the Bremen Technology Park with the Technology Parks which were established in Tunisia.

Dr. Yildiray Ogurol, Director, Media Center, University of Bremen, Germany

Massive Open Online Course (MOOC): An Instrument for ETP and STI Capacity Building, Experiences from Universities in Bremen and Germany

Advances in ICT have changed almost every aspect of business, society as well as education and science. The traditional model of physical location based and face-to-face education is rapidly changing due to the availability of better teaching and learning methods using ICT and digital media (E-Learning). Blended Learning and Inverted Classrooms are two examples of innovative teaching and learning methods based on online content and they are a mix of face2face and online elements. Pure Online Courses exists for a long time in higher education institutions, but they are available usually for a closed user group with a limited number of participants. Massive Open Online Courses (MOOCs) are high quality, university-level courses accessible to a huge number of participants (massive) via the Internet (online), open to anyone in the world independent of their educational background and for free (open).

Many MOOC sites are already operating, e. g. to mention Coursera, Udacity and edX from USA, iversity, openHPI, and mooin from Germany. As an example, Coursera has more than 22 million enrolments from students across 570+ courses, representing 190 countries. One of the first popular MOOC “Introduction to Artificial Intelligence” from Sebastian Thun (co-founder of Udacity) had more than 160.000 enrolled students from all over the world at a time, with a completion rate of 13% (+20.000 students).

While MOOCs have experienced a big rise as an educational innovation, they are followed by scepticism too, but experts believe that they will continue to be a disruptive technology that will influence the future of many universities. However, they are still controversial discussions on the effectiveness and the potential of MOOCs, e.g. completion rates, didactics, certification, and sustainable business models. The German expert group for science and innovation (EFI) recommends perceiving MOOCs more as an opportunity rather than a risk for education in Germany, because they represent an important and useful addition to the teaching and research tools of universities. MOOCs can relieve the universities from the teaching of standard knowledge and create a scope for more research-oriented teaching.

Based on the report of UN Commission on Science and Technology for Development in 2015, low-income countries can utilize the full potential of MOOCs for the building and enhancing of human capacity. The leading universities are actively engaging in MOOCs for brand enhancement, pedagogic experimentation, recruitment and business model innovation. The impact would be enormous due to the potential of MOOCs to reach millions of students free of charge. With that, MOOCs could lead to wide range of educational innovation through large-scale online participation.

The survey on the use of MOOCs in Tunisia conducted in 2015 by the Centre for Professional Skills Development (CDCP, Tunisia) shows that there is a constant enthusiasm over everything that relates to the MOOC and gives a clear indication for a future breakthrough in online education and lifelong learning in Tunisia. MOOCs are an affordable teaching and learning method that can help to build skills for the knowledge economy effectively and to meet immediate hiring needs of local industry, especially where local institutions could not provide the capacity to develop and offer courses for a sufficient number of students. A successful implementation of MOOCs can improve the quality of the higher education system in Tunisia and support STI capacity building. There are many success factors, but most important is a sufficient infrastructure and a strategic partnership in which each organization’s MOOC is formally accredited by partner institutions.

Marco Lewandowski, Managing Director, LogDynamics Lab, BIBA - Bremer Institut für Produktion und Logistik GmbH, at the University of Bremen, Germany

Industrial Internet of Things: Enabling technology for smart products and factories?

With the Internet of Things (IoT), everyday products become part of the global communication and information infrastructure so that they can interact with other things, people and IT-systems. This paradigm affects not only customer goods but also industrial environments as postulated by the Industry 4.0 paradigm change. Intelligent machines that connect vertically and horizontally in their environments will determine tomorrow's factories. This implies advanced analytics to investigate the use phase of complex technical goods anywhere and anytime, so that IoT provides a complete new way to create new business services around core products.

In a broad selection of industries like manufacturing, aviation, automotive or energy, sensors will enable things to see, hear and feel so that individual machines, fleets, and whole systems become intelligent. They become intelligent in a way that they are self-aware and context-aware, predictive, reactive, and social. The information of devices itself becomes intelligent, creating new types of creativity for people, manufacturer and operator.

In this presentation we raise the question about prerequisites that have to be fulfilled in order to transform businesses to new models and we accordingly present our (German) perspective towards reaching this aim and discuss opportunities and obstacles for Tunisia to get involved.

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Prof. Dr. Achim Gutowski, ISS Hamburg and Research Group on African Development Perspectives at IWIM Bremen, University of Bremen, Germany

Reindustrialization and Financing of STI in Enterprises – Institutional Support and Cases from the RIS Bremen and the NIS Germany

This contribution to the conference firstly highlights the important role of governmental institutional support towards the financing of Science,

Technology and Innovation (STI) in companies. Examples and cases from the city state Bremen with regard to the support within a regional innovation system (RIS) will explain how local institutions and organizations interact with enterprises in order to foster the development of STI. This support is crucial and important since empirical evidence shows that especially small and medium size enterprises (SME) often lack financial resources to develop innovations.

Secondly, the important role of several institutions and organizations within the framework of the national innovation system (NIS) in Germany in order to support the development of STI in companies financially is highlighted. Different national state and governmental programs exist in order to support the STI-development in the German private sector.

For a post-revolution transformational country such as Tunisia with rather scarce natural resources, limited STI-policies and being in the process of establishing institutional structures, the above mentioned practices and examples might be useful to build up sustainable innovation-driven strategies for long term dynamic economic growth.

Dr.-Ing. Jens Hoheisel, InnoWi GmbH, Bremen, Germany

The University of Bremen as a Regional Centre for Innovations, Inventions and Patents – What can Tunisian Universities learn from the Experiences of INNOWI GmbH?

InnoWi GmbH is a patent exploitation agency in Bremen and was founded in 2001. Today, InnoWi is responsible for the inventions and patents of 15 universities and academic institution in the north-western area of Germany.

The operational work of InnoWi started with the reform of the German Employee Invention Act. Before that reform, university professors had no obligation to disclose their inventions to their universities. This rule was called “professors’ privilege”. Since 2002, professors and all university employees have to disclose their inventions. Universities are obliged either to file a patent and to market a disclosed invention or to release all rights back to the inventor.

Now, universities required structures in order to evaluate inventions, to file patents, to manage patent portfolios and to commercialize inventions. Bremen and many other regions of Germany decided to commission highly specialized companies that provide all required services to universities – so called patent exploitation agencies.

In some aspects, the situation at that time could be compared with the present situation in Tunisia. Again, actions are needed to make the best use of scientific results for economic development of the country.

The services of InnoWi were supported by governmental funding since 2002. The work of InnoWi and other patent exploitation agencies and the funding programs have been evaluated many times. The presentation will summarize the results of the latest evaluations and transfer the findings for a possible implementation of a patent exploitation system in Tunisia. Reference is made to the financial, administrative and regional perspectives of patenting university inventions.

the findings for further funding initiatives. Another issue of the presentation is the process and division of work between universities and InnoWi as well as the cooperation of patent exploitation agencies within the German technology transfer network “Technologie//Allianz”.

Zied Ghrairi, Research Scientist at BIBA - Bremer Institut für Produktion und Logistik GmbH, at the University of Bremen, Germany

Development of Industrial Technologies for the Digital Age: Examples of European and National Research Projects

Industry is facing a historical turning point when considered on a global scale. The digital age comprises a new way of thinking regarding manufacturing and operations. Digital technologies are unlocking huge opportunities for companies to achieve an entirely new level of flexibility, efficiency and customisation. Taking the leap into the digital age is an opportunity especially for Tunisian industries such as phosphate, textiles and agriculture - not only to maintain and increase their competitiveness with all the jobs they provide, but also to enable new business models for medium-sized companies and start-ups. On long-term, this will lead to the creation of new jobs.

In order to prepare these conditions, manufacturing and operations in the Tunisian industry require a digital overhaul: The value chain must be redesigned and retooled, thus the workforce retrained. The presentation will provide a comprehensive overview of unique examples in EU and German research projects (FITMAN, CyPROS, InSA, ThroughLife, KIPro) dealing with the development and application of enabling technologies upon different industrial sectors such as feed production, automotive and maritime industry. The relevance of these projects for Tunisia will be examined.

Professor Emeritus Dr. Karl Wohlmuth, Director of the Research Group on African Development Perspectives, IWIM, University of Bremen, Germany

Deindustrialization, Reindustrialization and the Contribution of Coherent Industry and STI Policies: What are the Tasks ahead for Tunisia?

In the presentation key issues of Tunisia's economic transformation are discussed. The Tunisian Government is on the way to design a new development model so as to overcome the pre-revolution economic structures and modalities of policy-making. Based on the HRV (Hausmann/Rodrik/Velasco) decision tree to find out the most binding constraints to growth, the Tunisian government argues that "low appropriability" is the most important factor causing low private returns to economic activities. Other factors are not considered as binding constraints to growth in Tunisia, such as human capital, infrastructure, innovation, finance, macro and micro risks. The reduction of private returns of investors - by Ben Ali type regulation of sectors, corruption, political connectivity, preference for state companies, lack of competition, privileges for off shore enterprises, strict labour market legislation, high social security contributions and taxes, etc. - is emphasized as characterizing the old development model. The view that "low appropriability" is the main factor causing problems, such as insufficient growth of firms, high unemployment, premature deindustrialization, unequal regional development, and lack of structural transformation, is evaluated.

In the next step the management of deindustrialization in Tunisia is discussed. The question is if the decline of the manufacturing share in GDP and in overall employment was managed adequately, by avoiding overly protective and regulatory policies and emphasizing offensive and pro-active measures. Although the deindustrialization process is considered as starting at lower levels of income and at lower shares of employment than in former decades, a country such as Tunisia can do a lot to consolidate and develop core manufacturing sectors and niches in the deindustrialization process. The contribution of STI policies towards managing pro-actively the deindustrialization process is quite important. In Tunisia, the innovation efficiency (ratio of innovation inputs to innovation outputs), the "knowledge triangle" and the "knowledge circulation", and the incentives to enterprises for increasing innovation output and product complexity matter. In the presentation these crucial issues are discussed, as the pro-active management of deindustrialization also impacts on the feasibility and outcome of much needed reindustrialization policies.

In a further part of the presentation the concept of reindustrialization is discussed, by applying it to the case of Tunisia. The concept is increasingly used in advanced economies, but also in emerging economies and in Africa. Four types of reindustrialization with focus on Tunisia are presented and discussed: Reindustrialization via Other Economic Sectors, such as Agriculture, Mining/Oil/Gas, and Services; Reindustrialization via Initiatives at Regional Development and Regional Integration; Reindustrialization via Deeper Integration into Global Value Chains; and Reindustrialization via Green Growth Development Strategies. Although these four strategies are complementary, the overall impact on inclusive growth may be considered as great.

A combination of these four reindustrialization strategies may lead to an overall decline of unemployment, to employment creation for young people and tertiary education graduates, to improved skills development systems, to an acceleration of deeper global and regional economic integration, and to more spatial equality by reducing the horizontal and vertical income distribution problems. It is discussed to what extent such reindustrialization strategies are taken up in Tunisia and what the prospects are. It is asked how great the potentials for these four reindustrialization routes in Tunisia are, and under what circumstances and policies such a holistic reindustrialization process could be initiated. A new and effectively working Tunisian development model as aimed at by the Tunisian Government is requested for such a process to become reality. New STI policies and investment policies follow from these assessments. It is asked how innovation and investment promotion policies have to look like so as to facilitate a start of reindustrialization in Tunisia.

Prof. Dr. Hans H. Bass, Institute for Transport and Development, City University of Applied Sciences, Bremen, Germany

“Tunisia’s Progress in Integration into Global Value Chains – Some Remarks from a Global Perspective”

The complexity of a country’s exports and the favorable integration of its enterprises into global value chains (GVC) and international production networks play the decisive roles in the catching-up processes of today’s open economies.

During the first decade of the millennium, Tunisia’s export structure displayed the highest complexity of all African economies. However, this achievement could not sufficiently be used for further progress – on the contrary, Tunisia is losing ground vis-à-vis competitors from other regions. Furthermore, Tunisia is

a prominent example of African economies successfully integrating into the world economy with Tunisian enterprises finding niches in various global value chains (GVCs). Tunisia's overall backward integration into GVCs lies well above the African average. However, it has not increased as dynamically as in other African economies and other world regions.

For a country to fully reap the benefits of GVC integration, its enterprises need to dynamically upgrade their position in a given chain and to develop linkages to domestic producers by local sourcing which will help to distribute knowledge and innovations across the domestic economy. In addition, it is imperative to progress from existing chains to neighboring chains and thus increase the complexity of the export structure and broaden the basis for economic development.

Adopting the classic three-stages approach to develop economic policies as formulated by Tinbergen, this presentation starts with an evaluation (diagnosis) of the complexity of Tunisia's export structure and the country's Tunisia's current integration into GVCs, then turns to a prognosis and concludes by offering policy recommendations.
