

## PROPOSAL TO ESTABLISH AN INSTITUTE FOR PRODUCTION INNOVATION

By: W. Kreuser\*

### 1. Introduction and Conclusion

The existing production in Tanzania is running on the basis of imported technology and equipment. Indigenous technologies are not yet available or ready for implementation.\*\* Without the availability of technologies developed within the country and to its own benefit there will be always serious obstacles with respect to adaptation of consumer goods and production equipment to the actual needs of the country and with regard to proper exploitation of local resources as well. Moreover the dependance on imported technologies is a permanent impediment for the development of creative powers and contradicts the policy of self-reliance.

Hence it is proposed:

- to establish an Institute of Production Innovation (IPI) and, because of reasons given in the following chapters, it is recommended
- to attach this Institute to the University of Dar es Salaam.

### 2. Mode of Operation of the Institute for Production Innovation (IPI)

The innovation process starts with product design consisting of calculation, drawings, descriptions containing the relevant data related to this product. But this is the first step only and it would be quite useless without follow-up, if innovation is being looked at from the view of practical implementation and economic benefit.

The second step is the manufacturing of a prototype. It gives further information but does not lead automatically to the final implementation. The prototype can be tested, it gives ideas on production possibilities, but it does not say very much about the particular arrangement of the production process and nothing about modification and improvement of the product itself which might be necessary in consequence of the optimization of itself into the innovation process. The prototype must be manufactured for a period of time in order to find out how production is to be arranged finally to meet technological and economical requirements and how the product can be adapted to these requirements. The testing of the product has to be supplemented by the testing of the production process of this product.

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\* Dean, Faculty of Engineering, UDSM.

\*\*"The local capacity to design tools and machines or to adapt imported technologies to local requirements is still very limited."

Tanzania Industrial and Mining Sector Survey, World Bank Report No. 647-TA of March, 1975.

Following these deliberations IPI is to develop on the request of customers products and production technology of items the manufacturing of which is desirable and feasible. It will perform this task by taking the following steps:

- Design and calculation of product
- Construction of prototype
- Testing of prototype
- Production design
- Test production
- Ammendment of product and optimization of production process
- Final product control.

IPI delivers to the customer the whole package consisting of product, production technology and detailed information on equipment, material and skills related to the production process of the product.

### 3. Location of IPI

Principally IPI can be located anywhere, provided that it is near to its customers. Consumption of power, water, materials is relatively small and does not put any problem with regard to the place to be chosen.

But strong reasons are speaking for the location in vicinity of the University (Faculty of Engineering). Many activities to be performed by IPI are similar to Faculty activities particularly on applied research and consulting. The Faculty has already to its disposal service laboratories excellently furnished to test materials and functions on request of customers. A close co-operation favoured by the vicinity of both institutions would be of mutual advantage.

#### IPI would benefit from the Faculty of Engineering as follows:

- The Faculty of Engineering is the producer of ideas worthwhile to be implemented by IPI.
- There is a certain capacity for design available at the Faculty which can be used by IPI.
- The Service Laboratories of the Faculty supposed to perform testing activities on request, can render their services to IPI, thus preventing that a second set of very complicated and costly equipment must be supplied for IPI.
- IPI not having at its own disposal experts on all fields of technology can make use of Faculty staff for special tasks as far as the Faculty is able to contribute (part-time assignment).
- IPI can draw manpower from the Faculty for special tasks on the basis of vocational employment of students.

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Round Eye Hoe



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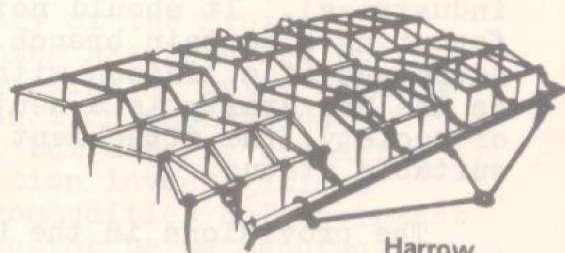
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The Faculty of Engineering would benefit from IPI as follows:

- New ideas on machines, products, processes developed up to a certain extent by Faculty staff and students, but being on paper only because of lack of staff, workshop facilities or otherwise, can be implemented by IPI (undergraduate and postgraduate projects included).
- By close co-operation with IPI the Faculty will be involved permanently in actual problems the solution of which is relevant for the development of the country (problem-oriented teaching).
- The service laboratories of the Faculty will profit from rendering their services to IPI by both getting experience and income.
- IPI offers working places for students during vacation time.

4. Status of IPI

On the one hand IPI is in need of independence to serve the differentiated clientele (ministries, parastatals, private industries). It should not be attached to a single organization favouring a certain branch or group only. On the other hand the advantage of a liaison with the Faculty of Engineering is obvious. As the University is a neutral institution, serving all parts of society, the attachment to University will give IPI the most suitable status.

The provisions in the University Act 1970 with respect to "Institutes" would be suitable for the functioning of IPI if IPI is granted the necessary independence with respect to administration of funds needed for its own running. It is the idea, that after a period of establishment and consolidation, when IPI will depend on funds given by donor organizations, IPI should be able to live on its own income drawn by consulting activities. There would be no sense in establishing an institute of that kind if there were no demand for its services worthwhile to be compensated by an adequate income.

5. Fields of Activities

IPI, at least in the period of inception, should not take complicated problems the implementation of which is costly and doubtful because qualified personnel is lacking in factories to manufacture those products. It should confine itself to relatively simple technologies applicable and feasible now and in the near future. Small-scale and medium-scale industries will be customers of IPI, not large-scale industries using completely imported technology and know-how.

On the other hand IPI should serve as many branches as possible. As a result of these considerations IPI needs a universal outfit, avoiding complicated and specialised machines.



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But it must be capable to execute all operations for manufacturing of prototypes and testproduction on a limited scale. In order to avoid machines being idle the testproduction can be maintained and the product can be sold until the customer is taking over. This procedure contributes to the financial efficiency of IPI.

Although any branch playing a role within the country's development should profit from the advisory function of IPI the scope of activities needs to be limited at least for the initial period of establishment. Therefore it is being recommended to start with activities furthering the extension of Metal Working Industries.

Within the Five Year Plan to come the government of Tanzania is giving priority to the extension of metal working industries. The existing enterprises on that sector (about 70 with more than 10 employees, out of them some with more than 100 and two with more than 300 employees) are not at all capable to consume the steel production expected to commence in southern Tanzania in the 1980's.\*

The Metal Industry Development Task Force \*\* (MIDTF) under the Chairmanship of the Principal Secretary of the Ministry of Economic Affairs and Development Planning has been set up to prepare plans for the extension of the existing metal working industry not only by mobilization of production facilities already available but not fully utilized, but also by preparing the establishment of new plants. In addition investigations are underway with respect to industrial commodities and equipment imported hitherto from abroad but eligible for being manufactured locally.

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\* "The Planning Commission has decided that development of iron ore resources of Tanzania is an important feature of the long-run strategy for industrializations. This means that production of semi-finished steel is planned to commence in 1980's for the steel industry.

In preparation for this development, the period of the Third Plan must be used to develop the metal using industries, so that the local market for semi-finished steel is built up to provide the maximum forward linkage for the steel industry."

(Ministry of Economic Affairs and Development Planning  
February, 1975).

\*\* The Dean of the Faculty of Engineering is a member of the MIDTF.

These planning activities even if performed carefully and comprehensively need to be supplemented by technological advice and detailed information on implementation, otherwise the entire operation will get stuck. Even factories principally interested in taking up production of new articles will be reluctant to do so unless all details on know-how, equipment, skills, etc. are provided for. Nobody is going to take the risk of a new production unless he can be sure that his endeavours will be awarded by success. The Institute for Production Innovation is the central consulting organization to provide the wanted information and to close the gap between planning and implementation.

Taking into account these deliberations IPI should start to provide innovation facilities for fabrics involving metal working industries. The substitution of goods (such as metal- and wood-working tools, pumps, locks, fittings etc.) by local products would save a considerable amount of foreign currency.

To enable IPI to pursue these objectives it should have the following sections:

1. Design office
2. Tool making section
3. Foundry and hot forming section
4. Wood working section\*
5. Test production
6. Store
7. Administration (Marketing, purchase, accountancy, etc.).

It has already been mentioned that IPI, on the long run, must live on its own income. Therefore an administration with purchase and accountancy section needs to be provided. In addition one should consider a marketing expert to be attached to IPI although the identification of demand for a product to be developed is not up to IPI. Demand identification cannot be overestimated because the costs for innovation and production must always be considered against the actual demand.

It is being stressed that the limitation of IPI to the metal working and wood working\* sector is only a temporary one. The scheme must be open to any extension which might be required by government or industry. There are already ideas concerning the extension of IPI with regard to the development of new building materials.

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\* Wood-working tools consist partly of steel parts provided by metal working industries.

## 6. Principles of Co-operation between IPI and the Faculty of Engineering

The objectives of the Faculty of Engineering are as follows:

- The education and advanced training of engineers....
- Research in the interest of a suitable exploitation of natural resources and development in Tanzania.
- Consulting, controls, and other scientific co-operation in the area of technology, and in its application in the country.

It has already been pointed out in chapter 3 (location of IPI) that research and consulting activities within the Faculty are similar to those pursued by IPI. But also with regard to Engineering education there are aspects bringing IPI close to the education programme of the Faculty.

In any case, the notion "innovation" is connected with creative activities which are significant for institutions on university level. Such activities are executed and cultivated by the academic staff (research, consulting) and are a purpose of teaching as well. Without a certain amount of creativity developed in the course of study the engineer to come will not be equal to the tasks expecting him later on in his professional life. The term creativity needs not to be connected with spectacular inventions only but also with problems of daily engineering work when a break-down has to be dealt with in the factory or when a product has to be adjusted to the particular circumstances of the country.

The creative activities exercised permanently within IPI will influence the Faculty of Engineering by way of co-operation and will contribute to creativity training of engineering students. But the parallelism of aims and the identity of aspirations on some fields should not lead to the merger of the institutions.

Both parties, the Faculty of Engineering and IPI as well, should not be forced to take additional loads as a result of co-operation which might jeopardize their original and specific tasks. But there are needs on both sides which cannot be met but by co-operation with the other party. Thus, co-operation is an essential support enabling the parties to benefit from each other. The natural tendency towards co-operation and the vicinity of the institutions will ensure that the Faculty is being fed continuously with problems relevant for industrial development, and that research and teaching activities are being kept close to the actual demand of the society.

The following measures are proposed to ensure proper and effective co-operation between IPI and the Faculty of Engineering:

- The Faculty will have its representatives in the Board of IPI and vice versa.

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- Faculty experts, on request by IPI, may be appointed project leaders to direct innovation projects on their special fields pursued within IPI. They will take full responsibility for the time of their appointment.
- Possibilities are to be provided for the exchange of staff between both institutions in connection with special tasks which can be fulfilled better in the other institution.
- The exchange of services and the financial compensation will be subject to particular regulations between the institutions.
- Provisions should be made for students (undergraduate and postgraduate) to participate in IPI activities in case such participation is desirable.

7. Training Activities with IPI

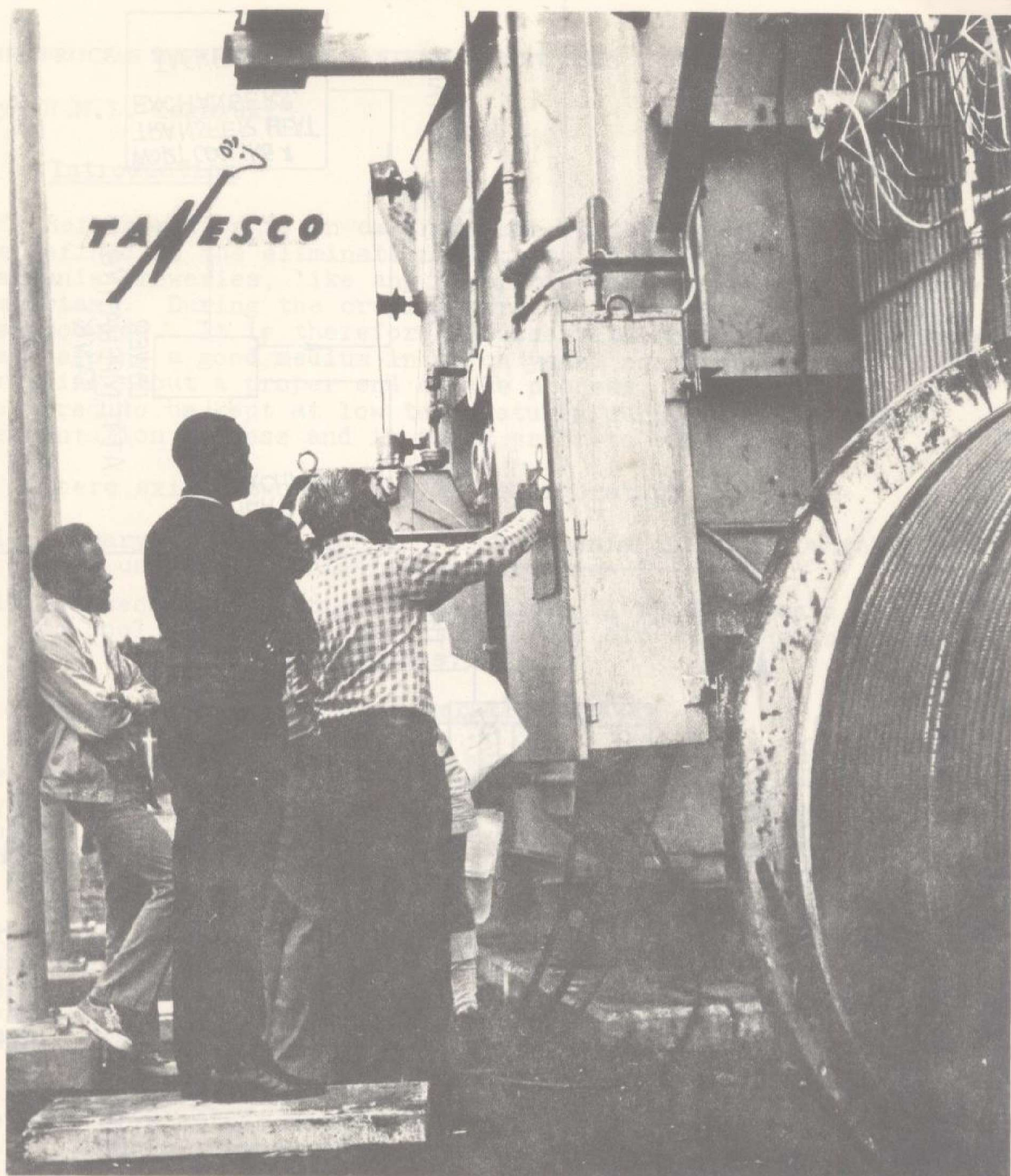
When IPI is requested by a customer to develop a certain product and the production technology to manufacture this product, a representative of the customer, who is to implement this production later on, should be allowed to participate in the innovation process. This representative, trained on the job for a limited period and thus being prepared for the final implementation of the production will be great help.

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The operative activities exercised permanently within IPI will influence the development of the production technology and the production process. The representative of the customer should be allowed to participate in the innovation process. This representative, trained on the job for a limited period and thus being prepared for the final implementation of the production will be great help.

The following measures are proposed to ensure an effective co-operation between IPI and the Faculty of Engineering and Technology. The Faculty will have its representatives in the Board of IPI and vice versa.





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Fig. 1

THE AMMONIA-ALCOHOL CIRCUITS REFRIGERATION-TBL by H. Mberwa

