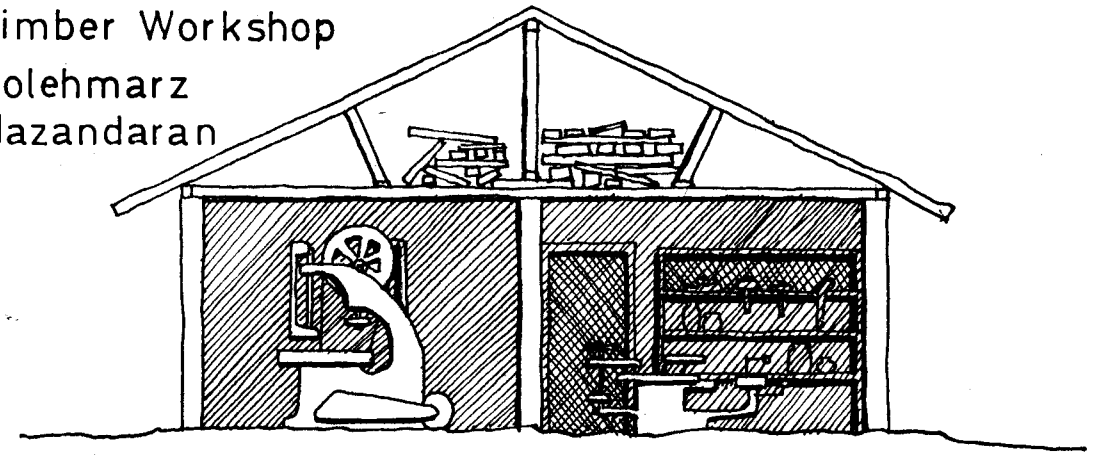
Timber Workshops

Almost every moderately sized settlement, such as the regional service centres mentioned earlier and many of the villages in the Caspian, have one or more timber workshops. These workshops saw up logs and produce doors, windows and simple wooden furniture. They also prepare timber for building and in many cases the wall and roof framing are done by a carpenter from the workshop. A typical workshop was studied in Dolehmarz, north of Sari, in Mazandaran. The workshop is a 9x12 m. space covered by a sheet metal roof. The south and east sides open onto the yard where uncut timber is stored. This is a small business set up by a partnership of three people, one of whom is also the carpenter. He has one assistant. This workshop has two main pieces of equipment, both run on electricity: there is a band saw used for cutting up logs, and another multi-use machine combining a circular saw, a planer, and a drill, which can also be used for making the mortice in mortice and tenon joints. These two machines amounted to two thirds of the capital cost involved in setting up the workshop. At the time of visiting this workshop, both pieces of equipment were out of action due to a power failure. This dependence upon a rather unreliable electricity supply severely hampers the effective operation of the workshop. In addition to this electrically powered equipment, there are a variety of hand tools. These include hand saws, hammers, screwdrivers, braces (a type of hand-drill), mallets, and set squares for fixing angles.

Some of the joinery produced in this workshop, such as tables were very carefully finished. Windows and doors are more loosely constructed with, in some cases observed, quite inaccurate jointing. The carpenter in this workshop said that they could produce one $2x2m^2$ window in one day, a door

Timber Workshop
Dolehmarz
Mazandaran



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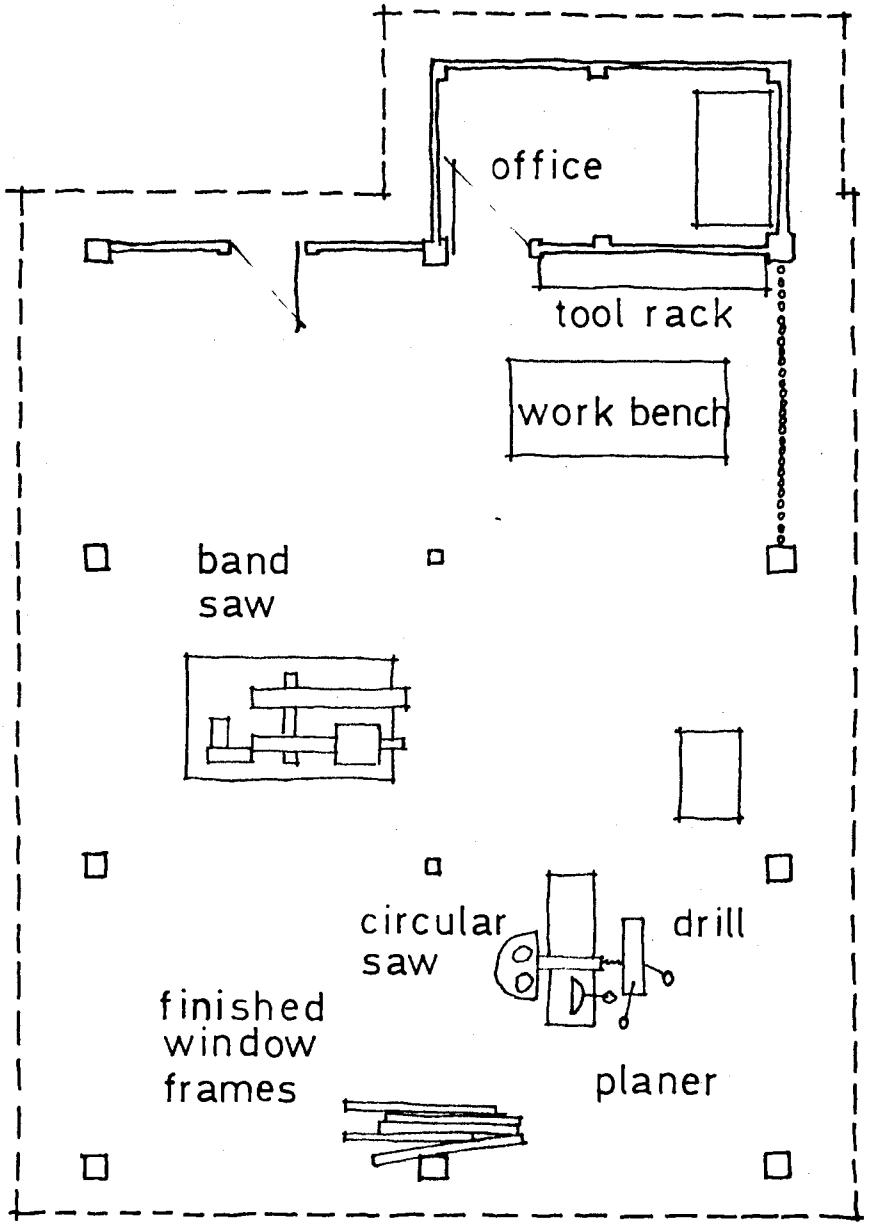

plan

in slightly more than one day, and that they could prepare the timber for a roof truss framework to cover two 3x4 m^2 rooms in one day - all using locally grown poplar. Imported foreign timber and local forest timber is used. The latter is cheaper but often inferior in quality. Another carpenter interviewed said that wood produced locally warps and is therefore only used in simple construction and paper making. The warping of local timber is most likely the result of the way in which the log has been cut and stored.

A major point of criticism of this and many other workshops is the improper storage of timber. Uncut and semicut logs are stored out of doors in direct contact with the ground and exposed to both sun and rain. It has already been pointed out that proper seasoning and preservation of timber would improve the lifespan and quality of woodwork. For a minimal additional cost, shelter could be provided and seasoning could be carried out along the lines suggested.

Small workshops of the type described here are an important source of rural income and employment. They are also flexible enough to meet the variety of woodworking requirements in the area.

Small woodworking shop in Rezvandeh, producing doors, windows and furniture.

Carpentry tools hanging on the wall of a workshop.

Proposed New Building Industries

1. Use of Agricultural Wastes for Building Panels:

Locally available wood and agricultural wastes can be used for a variety of particle board panel type materials. Such panels can be utilized as wall partitions or in corrugated form as a roofing material.

Certain chemicals, lignin and furfural, which are present in both wood and agricultural wastes, can be employed as binders. In the natural state these chemicals bind together plants' cellulose fibers to form the rigid woody structure, and when extracted can be used as binders for fiber or particle boards or other moulded wood products.

Natural Binding Resins present in Waste Products*1

Plant Material	% Lignin	% Furfural
Wood	24 to 28	-
Rice Hulls	40.0	12.0
Corn Cobs	30.4	22.0
Corn Stalks	-	16.5
Cottonseed Hulls	-	20.0
Bamboo	29 to 35	-

The panel production process requires resin to be extracted from the initial waste wood or agricultural residue. Usually wood or other fibrous materials are chipped, softened, mixed with resin, and wet formed into sheets before it can be pressed into panels*2. Chemicals can be added to make the material resistant to fungus and insects. Coatings can later be added to panels for water or fire resistance.

1* Encyclopedia of Chemical Technology, 1967.
2* Nat.Acad.of Sciences, Roofing in Developing Countries: Research for New Techniques, 1974, pp.41-4.

While raw materials are readily available in the Caspian for panel making and the production process is relatively simple, equipment needed for pressing and mixing is costly. For this reason small scale production of these materials may not presently be feasible. Research could be carried out to develop simple equipment for small scale production of panels.

2. Bricks from Rice-Husk Ash:

Rice mills are found widely in the Caspian Region. Most large villages in rice growing areas support such mills, which operate as small scale industries. The output from these mills is not only shelled rice but two qualities of residue. The first is the outer husk or hull, which is normally discarded. The second is the inner bran or skin from the rice kernel, which is commonly retained and sold as cattle fodder. Rice husks are generally burned in a waste area outside the mill, in order to reduce their volume before disposal. Mill owners interviewed said that this ash has no market value and can be considered as an almost free by-product. The heat lost in burning husks can also be considered waste energy. However, the waste heat could be channelled to fuel boilers which could run the rice mill's mechanical equipment; or husks could also provide supplementary fuel for lime building. Incidentally, in the initial burning of rice husks about 20% volume is lost.

Experiments have been carried out in Egypt on the utilisation of rice husk ash in combination with lime for building blocks. Lime is, as well, a plentiful and inexpensive material in many parts of the Caspian. Lime can be seen as an alternative to cement in the small scale block making industry which exists on a decentralized level throughout most of the central part of the Caspian coast. Lime on its own normally produces products which are somewhat weaker than concrete ones. Lime products, on the other hand, are well suited to damp environments and will set to a very hard consistency in the presence of water. Concrete blocks show the weathering effects of the Caspian's heavy rainfall. Lime's strength properties can be considerably improved with the addition of "podzolic" materials such as rice husk ash. It was, furthermore, found in the Egyptian experiments that the

amount of lime required could be greatly reduced by the addition of common salt (magnesium chloride); salt is locally available in the Caspian region.

Material for block making consists of 84% husk ash residue, 8% slaked lime and 8% common salt (reduced to a liquid form). Blocks or bricks can be manually formed or mechanically pressed. The Egyptian experiments show favourable properties in : light weight, compressive strength of 30 kg./cm.^{2}, fire resistance, and the easy application of masonry mortars and renders. It was additionally found that the resulting cost of lime-rice ash bricks was only about a quarter of the cost of common fired building bricks. Similar savings can be expected in the Caspian if the production of ash-lime bricks was developed as an alternative to concrete block and fired bricks.

The authors have collected samples of rice husk ash and lime from different locations in the study region, in order to carry out experiments on the production of building blocks. It is proposed that the development of such a material could be the basis of decentralized village industries in the Caspian Region, utilizing already available waste materials to meet local shelter needs.

A.Maksoud, etc., Making Bricks from Rice-hull Ash, 1977.