Wooded land became a commodity. a) wood lots are held by farmers for their heating and building needs; wood consumption gradually outstrips local supply, b) wood is commodified and adds to the market value of the land it grows on; improved distribution brings remote wood sources into easy reach, c) surplus farming liquidates the forest as a cash crop, forests displaced by more lucrative crops or forests are planted and managed to maximize quantity of lumber of a normative quality using imported species.

Wooded land was revalued. a) the fertility of the land for agriculture is judged by the quality of the trees growing on it, b) the aesthetic and recreational value of wooded land increases, the remaining forests are protected; newly discovered materials such as oil and steel used for heating and building, c) certification of forestry management and land practices allows for material choice by consumers based on ecological and ethical values.

2.2.3 Wood Construction: Automization and Vocation

The argument now shifts from wood production, *automation* and *vocation* are considered in the realm of house construction – the change in skilled work of the builder multiplying and simplifying building connections and the change in *vocation* and organization of these builders.

Work of joining displaced. a) round logs are shaped by hand, sometimes only as necessary, into flat surfaces and right angles for joinery, every joint is custom made to suit size of timber and geometry of connections, b) shaping for custom joinery becomes repetitive similar joints of low quality and skill, mortise and tenon jigs, and machinery used to make standardized joints, c) nailed butt joints in lumber becomes standard, simpler, and repetitive requiring less skill.

Framing trade introduced. a) home-owners built their own or employed local or itinerant joiners, a lengthy process, b) joinery gradually disappears; the new trade of framing is established, extensive publications explain technique and possibilities to the public, c) new site organization improves the speed of erection and uses teams of framers; the tools are inexpensive, accuracy simple to achieve and the framing trade easy to learn.

2.2.4 Wood Construction: Positioning and Initiative

North American wood frame construction is a conventional or customary system of building that resists exact description and precise definition in legal documentation or engineering calculation. Nevertheless, builders and house-owners are constrained by the total system of production and consumption. Builders working within the integrated system of production and consumption use its flexibility to *position* themselves for competitive advantage.

Building becomes predetermined. a) building contracts, if used at all, refer to the plan, a nearby house, or exterior appearance; no dimensional constraints or conventions,

cladding, and plaster finishes fit all sizes, some shops specialize in components such as windows and supply local trade, b) many houses are built with mail-order plans and specifications referring to the balloon frame; four foot module established perhaps by standardized length of lath, sash, and door manufactures ship components nationwide c) no drawings of the method of construction, drawings show overall house form and any exceptions to convention; sheet goods such as plywood and drywall necessitate sixteen inch spacing, many parts of the building such as roof trusses become components, shipped assembled; construction system is the armature for modern plumbing, electrical, insulation systems.

Simpler building supports *initiative*. a) adaptation of European construction practices to suit North American conditions, b) ease of erection by owner and helper, the construction system can be easily clad in the trappings of different styles, c) method of building widely known, allows easy renovation and repair by homeowners supported by extensive supply network. (Do It Yourself is an industry.)

2.2.5 Normative Tendencies of Systems of Production

If past experience is a guide, then the technological system of wood production will co-opt any new challenge to its stability. When local differences cause discrepancies or suggest new values for international standards of wood production, the power of North American trade prevails. The conjunction of apparently opposed forces is directed to its advantage. For instance, international trade and green building certification argue for standards, tending towards global standardization rather than local and diverse practices (Cavanagh and Kroeker, 2005). Several examples during the history of its development demonstrate this integrative tendency. Problems of construction or wood production, when resolved, have caused a more integrated system of production and consumption.

Since wood is natural, its internal properties vary according to its growth history. Moisture causes dimensional change. Relatively stable when growing or 'cured,' it shrinks in the process of curing. Shrinkage is accommodated both in wood production and in construction. Changes in moisture content influence the strength of wood and this has to be accommodated as well.

Strategies chosen to constrain shrinkage in wood during production – a) the carpenter cuts trees in winter and leaves them to season for a year or two, b) trees are only seasoned enough to mill, and then seasoned as lumber after milling, c) kilns are used to dry lumber to specific moisture contents – tie production to a specific method of construction – a) green timber is used to tighten some joints as the wood cures and shrinks, b) shrinkage is minimized through seasoning or in finishes that tolerate movement, c) the construction technique minimizes the systemic impact of shrinkage, predominantly perpendicular to the linear structure, by minimizing the total amount in the line of bearing.

The seasonal imperative for felling trees for timber in the winter diminished in at least three ways: sap-rich spring and summer wood could be more easily cured