# VALUE:
## A B2B Closed Bidding Game

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## ABSTRACT

*The game VALUE's objective is the learning of value generation in a business-to-business context. It supports six student-run decision making teams that respond to requests for a quote produced by 25 computer-run firms that need numerical controlled vertical milling machines. Each milling machine requires five attributes to perform its designed tasks. Each attribute has three mutually exclusive variations; akin to good, better or best. In the simulation, each student-run firm, manufactures a single milling machine with the specific set of attributes to best meet the demands of the student-run firm's selected set of purchasers. The computer-run purchasing firms only accept bids on milling machine that meet or exceed its stated requirements. After matching the needs of the selected possible customers, each student teams prices their bid offering. A bid consists of the set of milling machines with the require attributes and a per unit price FOB at the team's loading dock. The information regarding all winning bids will be provided to all student-run teams after the winning bids are awarded. At the beginning of each round, student-run teams have its financial statements updated and will receive the release of a new set of "Requests for a Quotes" or a RFQ.*

## WHAT IS A "REQUEST FOR A QUOTE?"

The process of releasing RFQs to potential is wide-spread in business to business marketing. A request for quotation is a standard business process whose purpose is to invite suppliers into a bidding process to bid on specific products (Dian Pradhana Sugijarto, et al 2008). It is type of bidding solicitation in which a company or organization asks outside vendors to provide a cost quote for the completion of a particular product. A "request for a quote" is a variation of a request for a proposal (RFP) (Investopedia.2015). In an article Beil and Wein (2003) noted "…*a manufacturer who uses a reverse, or procurement, auction to determine which supplier will be awarded a contract. Each bid consists of a price and a set of non-price attributes (e.g., quality, lead time). The manufacturer is assumed to know the parametric form of the suppliers' cost functions (in terms of the non-price attributes), but has no prior information on the parameter values.*" Quote from the abstract. The process of selecting the lowest bid price is known in the trade as a reverse auction.

There are two distinct methods in which B2B purchasers determine a seller. The original method was a head-to-head bargaining round between the buyer and the seller, where the product specifications were thrashed out and then the price of the product(s) was negotiated. This process was conducted with separate vendors. The second method where the potential buyer determined the specifications and sent a "request for bid" to multiple possible suppliers. The simulation VALUE models the latter. In a 2010 article, Schoenherr and Mabert explained these differences as follows: *"Purchasing professionals in today's business-to-business (B2B) markets can choose between conducting bid solicitations and negotiations using an online or an offline process. One dominant type of online procurement has been the online reverse auction, which has received both praise and criticism. However, the choice between an online reverse auction and alternate offline procurement methods cannot be taken lightly."* Quote from the abstract. The firm by firm negotiations are conducted between firms is acute when firms are doing co-development; A classical entrepreneurial interaction. Extending a RFQ is typical when the purchaser understand his needs and is looking for the lowest possible price.

RFQ are usually not advertised publicly, and are used commonly for items built to known specification. Suppliers respond to a RFQ with firm quotations and generally the lowest-priced quotation is awarded the contract (The business dictionary 2015). It is more likely to occur in situations where products and services are standardized, since this allows the soliciting company to compare the different bids easily. It is also more likely to be used when the soliciting company knows the volume of products that it wishes to purchase. A bid stipulates the price a seller is willing to accept for a product and the quantity of that product to be sold at that price. In the simulation VALUE, the computer plays the part of the buyer and in each request for a quote, it is assumed that the buyer has already received responses from a RFP and now knows its minimum requirements for the vertical milling machines that the purchasing firm needs.

## THE GAME

VALUE has six (parameter) manufacturing firms (Alpha,

# EXHIBIT 1
## A CNC VERTICAL MILLING MACHINE



Beta, Gamma, Delta, Epsilon, and Zeta). These are student-run teams with three to five players per team. The virtual money in this game "parameter" indicates that the value may be changed by the game administer before the start of any game is a Currency unit$. Teams require participant communication and students to learn the art of discussion of concepts and ideas as well as group decision making. The team players determine the levels (there are three levels for each attribute) of five attributes for their firm's single product. Each firm produces only one numerical controlled, vertical milling machine (these machines are used to manufacture other machines). Exhibit one shows a numerical controlled milling machine. After the attributes are added, the manufacturing costs are determined. Then, each team needs to determine their offering price for each bid they submit. Since the customers are requesting quotes, there are no fixed prices, identical machines are allowed to be priced differently in each quote, based on expected competition. At its start, VALUE has twenty-five (parameter) computer-controlled firms that need to purchase milling machines during each round of play. Each required attribute has three levels, similar to the concept of good, better and best. The computer assigns the purchasing firms' minimum level of each required attribute and the number of milling machines to be demanded by each student-run company. If any purchasing firm does not receive a qualified bid, it drops out of the marketplace. If every purchasing firm receives at least one acceptable bid, the marketplace expands by two (parameter) new firms in the next round. Thus, the marketplace

grows or shrinks, depending upon the decisions made by the set of student teams. This is a modern version of the "Tragedy of the commons" problem.

After the bids are submitted, the computer then checks to see if each bid meets the minimum requirements. This is a conceptual point that differentiates B2B marketing from consumer based marketing. Only after the product meets the needs of the buying firm, it selects the minimum quote. It then creates a purchase order and transfers the required money to the firm that won the bid. VALUE repeats the process until all the firms' bids have been processed.

A minimum number of six rounds will be needed for the game's participants to understand the learning concepts of this simulation. The conceptual key point is that firms only purchase products that meet or exceed their minimum requirements differently in other context where the customer is not a business company.

Firms only purchase products that meet or exceed their minimum requirements.

## CONSTRAINTS

1. Each student team may only submit 10 (Parameter) quotes.
2. Each bid costs the student team Cu$1,000 (Parameter) to produce.
3. Each student team has an upper limit of the production of

## TABLE 1
## THE PROCESS OF RUNNING THE GAME VALUE

| | Each computer modeled buying firm | | Each student team |
|---|---|---|---|
| 1 | has its needed product configurations determined and the number of machines it will need to purchase in the current round. | 1 | selects which buying firms they wish to submit their bids, then it needs to configure their firm's machine to fit the needs of all of its expected customers. After that, it determines a bid price for each of its potential customers. |
| 2 | | 2 | |
| 3 | | 3 | |
| . | | | |
| . | | . | |
| . | | . | |
| 5 | 2 Twenty-five is the initial number of purchasing firms. | 10 | Ten is the maximum number of bids a manufacturing firm may tender. |

200 (Parameter) milling machines per round. If a student team finds it has accepted bids above its capacity of 200 units, it must sub-contract the production of these additional milling machines at a cost of Cu$ 1,000 (Parameter) above its contract price. Thus, they have a loss of Cu$ 1,000 on each machine, they need to sub-contract the manufacture of the excess milling machines.

4. Each student team occurs a corporate overhead of Cu$ 25,000 (Parameter) per round.

5. The firm purchases media for advertising purposes at the rate of 0.5% (Parameter) of sales during the previous round and it spend 1% (parameter) of the precious round sales on industrial trade shows.

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## EXHIBIT 2
## THE INCOME STATEMENT

For Round n

| | |
|---|---|
| Sales (units) …….…..…….….……………………………………….. | XXX |
| | |
| Sales (Cu$) ………………………………………………………. | xxx,xxx |
| Manufacturing. Costs (Cu$)………………………………………… | xxx,xxx |
| Advertising Costs* (Cu$) ………………………………………… | xxx,xxx |
| Promotions Costs* (Cu$) (Trade shows and associated costs) …….. | xxx,xxx |
| Costs of producing bids (Cu$) (1,000 per bid)  …………………….. | x,xxx |
| Corp Overhead (Cu$) (Excluding advertising and promotional costs …. | xxx,xxx |
| Uncovered Manufacturing Overhead** (Cu$) (Resulting from lost bids) | xx,xxx |
| Subcontracting Cost[#] (Cu$)  …………………………………………. | xx,xxx |
| Resulting from bidding jobs that are in excess of capacity. | |
| Depreciation Cost (Cu$)  ………………………………………… | xx,xxx |
| | ======= |
| Profits (or Losses) (Cu$)  …………………………………… | xxx.xxx |
| INCOME Tax (30% of net profit)[##] (Cu$)  …………………………. | xx.xxx |
| | ============ |
| Round's After Tax Profits (or losses) (Cu$) ……………………….. | xxx,xxx |

\* Advertising and promotional costs are treated as corporate overhead but shown separately in this statement.

[#] Unrecovered bid costs are an indicator of Bid Efficiency.

[##] When the firm has losses, the firm receives a return of prior paid income tax.

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## EXHIBIT 3
## THE BALANCE SHEET (CU$)

Assets (End of round n)

| | |
|---|---|
| Cash | xx,xxx |
| Prior Book value of Manufacturing Equipment | xxx,xxx |
| Depreciation on current Manufacturing Equipment | xxx,xxx |
| Value of purchases of added capacity | xx,xxx |
| Current value of Manufacturing Equipment | xxx,xxx |
| Other assets and the value of intangibles | xxx.xxx |
| | ======= |
| Total Assets | xxx,xxx |

Liabilities (End of round n)

| | |
|---|---|
| Debts | xxx,xxx |
| Owners' equity at the beginning of this Round n | xx,xxx |
| Current Profits (or losses) | xxx,xxx |
| Owners' equity at the end of Round n | xxx,xxx |
| | ====== |
| Total Liabilities | xxx,xxx |

## STARTING THE GAME
## WITH PRACTICE ROUNDS

Two practice runs should be played to get the all the teams up to speed. For the first practice phase four computer-controlled firms requiring milling machines that only require two attributes in the marketplace...There are two student-run decision teams and the practice runs the simulation for two rounds, but it generates the starting position for round three. The second practice phase uses five computer-controlled firms needing milling machines with three attributes. The second practice round also has only two student-decision teams, and it runs the simulation for only two rounds and generates the starting position for round three. The practice rounds will be played using a training set of rounds.

## THE FINANCIAL STATEMENTS

### The Income Statement

Each firm will report using simplified financial statements assuming the firms operate on a cash basis and do not carry inventory and the buyers pay for the milling machines by wire transfers directly to the bank. The milling machines are not placed inventoried, but are picked-up from their dock by a transport agency immediately after the number of machines for each bid has been manufactured. The income statement is shown in Exhibit 2.

### The Balance Sheet

Like the Income Statement the Balance Sheet is in simplified form as shown in Exhibit 3

### The Operations Report

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│                  EXHIBIT 4                       │
│            THE OPERATIONS REPORT                 │
│                                                  │
│             Capacity Limits (Units)              │
│                                                  │
│ Current capacity in units at the end             │
│ of the current round.                    x,xxx   │
│ Purchased capacity in round n-1           xxx    │
│                                        _____ │
│ Capacity at the beginning of the next round. x,xxx│
│                                                  │
└─────────────────────────────────────────────────┘
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## MILLING MACHINE VARIABLE
## COATS AND THE DISTRIBUTON
## OF MANUFACTURING OVERHEAD

A base unit charge of 8,000 CUs (parameter) will be assigned for each unit manufactured. A base unit is a fundamental vertical milling machine on which the five attribute are added, The costs of these levels of the five required attributes are and shown in Table 2.

All costs in Table 2 are parameters, and the names of the attributes may also be altered to better fit the needs of the game administrator before the game starts.

In addition to the variable cost. Each milling machine has an assigned manufacturing overhead assigned to it. Each firm's unit manufacturing overhead is 100 CUs (parameter) times the firms' current unit capacity divided by the total number of machines needed to fulfil all of the submitting bids. If the firm does not win one or more of its submitted bids, the lost overhead allocations appear as a cost on the firm's current round's Income Statement.

The calculation of each firm's unit manufacturing overhead is determined as follows:

One hundred CUs (a parameter) times the firms' current capacity divided by the needed capacity to fulfil all of the demand resulting from the submitting bids. If the firm does not win one or more of its submitted bids, the lost overhead allocations will appear as an expense on the firm's monthly Income Statement.

The software for the game VALUE has a built-in calculator that will provide the unit manufacturing cost of the anticipated demand for the new milling machines on a per-unit basis. This cost includes the base machine cost plus the cost of the five attributes at the levels selected by each student team.

In the initial round, the corporate overhead is 25,000 CUs (parameter) per round, but this cost is not allocated to each machine produced.

Each firm has an initial capacity of producing 1000 (Parameter) units

At the end of each round VALUE produces a list of winning bids, the bid per unit price and the number of units sold under each bid.

It will also identify all sub-contracted manufacturing. It also generated an abbreviated income come statement and balance sheet for each firm.

The usual mark-up over manufacturing costs for top-of-the-line models is 40%. Middle-of-the-line products are typically

## TABLE 2
## THE ATTRIBUTES THEIR CAPABILITIES AND THEIR COSTS

| Attribute | low | medium | high |
|---|---|---|---|
| Work table area #1 Marginal Cost | 500x500 mm Cu$ 1,000 | 1000 x 600 mm Cu$ 1,500 | 1400 x 700 mm Cu$ 2,000 |
| Training Costs #2 Cost per contract Marginal Cost | 1 Day Cu$ 2,000 | 2 Days Cu$ 4,000 | 3 Days Cu$ 6,000 |
| Tool magazine capacity #3 Marginal cost | 12 tools Cu$ 600 | 18 tools Cu$ 1,000 | 24 tools Cu$ 1,500 |
| Power of the #4 spindle drive motor Marginal Cost | 7.5 kw Cu$ 1,500 | 11 Kw Cu$ 2,500 | 15 kw Cu$ 3,000 |
| x/y/z axis travel .#5 Marginal Cost | 500/500/500 mm Cu$ 2,000 | 750/600/600mm Cu$ 4,000 | 1000/700/700mm Cu$ 6,000 |

are marked-up 33% and bottom-of-the-line milling machines classically carry a 25% mark-up (Mfg. cost * mark-up = asking price), but of course this is a historical value.

## THE LESSONS TO BE LEARNED

1. Group discussion and group decision making are major lessons to be learned.
2. VALUE's reduction of the firms was requesting bids, if all firms do not receive acceptable bids, will teach a valuable lesson that firms must accommodate the total marketplace. This decline is an example of a modern day "Tragedy of the Commons."
3. They will learn that sealed bids and contract sales make a difficult marketplace and firms in the operating environments with high levels of uncertainty.
4. They will learn that a price is an effective tool but

only after the product meets or exceeds the needs of the customers.

Note that in this simulation purpose is to teach some fundamentals of businesses operating in a sealed bidding environment. The effects Advertising and Promotion are not included as a cost associated with the products sold and they are treated as corporate overhead in this simulation. This phenomena may be true in some B2B contexts such as occurs in a bidding for contracts type of business.

(One copy of this form will be E-mailed to each student team at the beginning of every round)

In the bid document the items in bold will be obtained by pull-down menus embedded in the form. Underlined items will be printed by the compute and the data in these items will be obtained from the computer files. Items in italics need to be entered by the bidding team. When this form is completed to the satisfaction of the student

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### EXHIBIT 4
### THE OPERATIONS REPORT

**Capacity Limits (Units)**

| | |
|---|---|
| Current capacity in units at the end of the current round. | x,xxx |
| Purchased capacity in round n-1 | xxx |
| Capacity at the beginning of the next round. | x,xxx |

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### EXHIBIT 5
### RFQ FORM

**This is an announcement for a request for a quote.**

Miami Manufacturing, Inc.   8900 Aaron Drive   Miami, FL  33127
Phone:  785-555-9674   Email: MMI@att.net

**Request for a Quote**

We are accepting bids for   45 CNC Vertical Milling Machines
Specifics:
Attributes:   Work table area   1000 x 600 mm
1 Training day
Tool magazine capacity   12 Tools
Power of the spindle drive motor   7.5 kW
X/Y/Z axis travel   500/500/500 mm

All bids must be in our corporate offices no later than by 5 PM on the last day of round #n and all machines must be delivered on or before 8 AM on the last day of Round # (n).

We are willing to accept attribute specifications of greater than our minimum requirements, but no bids will be acceptable for milling machines with attributes less than our minimum specifications.

team, the "Submit" Button is clicked. That submits the bid and next bid form appears. When the student team gets to their last bid, they click the button marketed "No more bids", which signals the team will submit no more bids. The computer then displays the following message on the screen: ALPHA COMPANY, Do you wish to expand capacity in round N+2? And it includes the check boxes YES and NO. If the team checks yes, then the form to expand capacity is displayed.

After that that has been completed for all student teams, the round ends and the next rounds "Request for bids" are produced. The files for the game contains 50 Firm names and addresses, including phone numbers and Email address in a file that may be altered by the game's administrator.

## The website to try and to evaluate the game VALUE

www.simulationgaming.technology.com/value

## EXHIBIT 6
## BID SUBMISSION FORM

Bid document for: **Miami Manufacturing, Inc.**    **8900 Aaron Drive, Miami, FL 33127**
          **Telephone: 785-55 9674 Email** MFI@att.net

ALPHA, Inc. is pleased to submit the following bid.

The number of CNC vertical mill machines required: 45
Attribute Specifications:
          Work Table area    1000 x 600 mm
          1 Training day per machine
          Tool magazine capacity    12 Tools
          Power of the spindle drive motor    7.5 kW
          X/Y/Z axis travel    500/500/500 mm

ALPHA Inc.'s bid price is:   *xxx,xxx Cu$* per unit.

| **Submit the bid** | **No more bids** |
|---|---|

## REFERENCES

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