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An Evaluation of Automation for Stock Exchange Firms

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THE SECURITIES INDUSTRY

In his annual report of the New York Stock Exchange for the year 1956, Mr. Funston said, "The Exchange community must continue to expand its educational, sales, and merchandising facilities; must keep its costs low by adapting modern facilities and equipment to the needs of the securities industry; and must work continuously to attract and train young people of talent and promise." In previous annual reports, Mr. Funston had mentioned the first and last of these, but the need to keep costs low was introduced this year for the first time.

ADVANCING COSTS

This emphasis on costs is largely a recognition of the constantly increasing clerical cost with which the country has been faced. The increased cost is compounded of the expanding need for clerical effort and the decreasing productivity of the individual which seem to be in evidence everywhere. A good segment of the expanded clerical force is a reflection of the sharp growth of credit and investment activities in which the securities brokerage firms play such an important part.

EXPANDED ACTIVITIES

Let me refresh your memories with a few statistics. The average daily round-lot volume on the New York Stock Exchange in 1946 was 1.4 million shares; in 1956 it was 2.2 million, an increase of 60 per cent. The number of offices of brokerage firms grew from 1,400 in 1947 to 2,400 in 1957, an increase of 70 per cent. The estimated number of shareholders of publicly held corporations increased by one-third during the four years from 1952 to 1956, to over 8,500,000. And the number of producing personnel of brokerage firms doubled during the ten years from 1947 to 1957. It stands to reason that this increase from 12,000 to 24,000 producers was bound to cause increased activity in the back office. I don't have figures for earlier years, but the number of non-producing (and I don't like that word any better than you do) – the number of non-producing

employees of member firms increased by over 1,100 during the year 1956 alone.

The expanded volume of trading is only one reason for the increased activity. As you are well aware, the services provided by brokerage houses to their clients or customers are increasing. The custody of securities, for example, often entails many expenses resulting from such activities as the collecting and transmitting of dividends, preparing and mailing of statements, and the handling of proxies. Another example is the providing of investment counsel, which requires expenditure for research and portfolio analysis.

COUNTERING RISING COSTS

There have been a number of developments in recent years which hold promise for stemming the tide of advancing costs – in the office as well as in the factory. These developments might all be grouped under the heading of "automation." Before turning to a discussion of how automation as it applies to the brokerage field might be evaluated, I would like to take a brief look at what it is.

AUTOMATION

Automation has been acclaimed by some as the "second industrial revolution." I believe the development of mass production techniques during the 1920's was similarly acclaimed, as have other advances. It is a healthy sign that people are impressed with the technological advances of their own time, as we are with the harnessing of the electron as a practical tool. The real significance of these advances is the furnishing of more and more services and goods with less and less time and effort, thus freeing people for new industries to provide more goods and services. This pace of technological improvement has been rising in a sort of geometric progression. Automation is the latest example of this rising pace of advancement, which may be considered as evolutionary rather than revolutionary.

The word "automation" means different things to different people. The word is attributed to Del Harder of Ford Motor Company, who used it ten years ago to describe the automatic handling of work between manufacturing operations. The word took hold so quickly that it has been used in a great many ways to describe new levels of mechanization. To different people it means such different things as automatic handling, self-regulation, the automatic control of automatic machinery, feedback control, and mechanization of paperwork.

For our purposes we might distinguish two types of automation. One is the automatic processing of material. The other is the automatic processing of information. We are interested in the first only to a limited extent, since brokerage firms do not process material in the usual sense. We are much more interested in the processing of information.

For Materials

The "materials" of brokerage houses are the stocks and bonds which come into their possession. I'm afraid I can't report much progress in the automatic processing of those certificates. The time may come when certificates can be read by machines and the necessary information recorded automatically, when the certificates may be obtained from the files by machine, and when they can be counted by machine. Punched-card certificates would permit this automatic processing, using conventional punched-card equipment. Beginning only two weeks ago, Series E Savings Bonds are being issued in punched-card form. There are also possibilities in the use of adaptations of newly developed equipment for character-sensing or code-sensing. One type of equipment, now receiving the attention of the banking fraternity, senses or reads standard Arabic numerals printed on checks in magnetic ink. Any of these approaches requires the cooperation of the issuers of the securities. To be of much practical value, any method would have to be adopted by a fairly large number of issuers, and would have to be standardized. I'm not sure that there would be enough advantage in mechanical processing to provide sufficient incentive to get the necessary joint action among brokers and transfer agents.

So much for the processing of material. The processing of information presents a different picture.

For Information

Recent developments in Wall Street in the automation of information handling include the use of electronic data-processing machines, further use of the concept of integrated data processing, and improved communications equipment. Some applications of these developments are to be described later in this seminar, so I'll limit myself to a few general remarks.

The introduction of electronic computers or electronic data-processing equipment came at a time when the mounting tide of paperwork seemed ready to overwhelm us. Heralded as a revolution in the office, EDP offers the opportunity to stem this tide by automating large segments of paper-

work, thus relieving the pressure caused by the shortage of office help. The introduction of EDP also coincided with an awakening interest in paperwork on the part of industrial management. Management had long treated sales, production, research, engineering as favored children, and the office as an orphan. Management suddenly awoke to the realization that this orphan was a very costly child, and began to pay some attention to it. Whether the Wall Street back office has been similarly treated as an orphan you know better than I, but I see now a great deal of interest and attention on the part of management in back-office operations.

The first electronic data-processing machine in a brokerage house was installed only a year and a half ago. It is an IBM 650 using punched cards. There are now six card-650's in operation in brokerage firms and two others are on order.

The only electronic data processing system operating with magnetic tape to be installed in a brokerage house thus far is also an IBM 650, which was delivered six months ago. IBM tells me that nine more of these machines are on order for delivery within the next two years. As you know, the 650 is a medium-sized machine – if you can describe a system renting for over $100,000 a year in that way. Two IBM 705's are on order, one for delivery early in 1958, and the other for delivery in 1959. The 705 is IBM's large-scale electronic system designed for business data processing, the "giant brain" of the Sunday supplement.

Unlike electronic data processing, the phrase "integrated data processing" does not mean a specific type of equipment. IDP is a concept aimed at reducing the amount of repeated copying of information for various purposes. It often takes the form of recording the information in the first instance in a medium – punched cards or punched paper tape – that can be sensed by machine. In Wall Street this principle has been used for many years – in the tub files for securities, for example, or in the exchange of punched cards between brokers and the clearing houses to simplify the comparison of trades. The printing of confirmations in branch offices around the country by means of data automatically converted from trade cards to paper tape and automatically transmitted by wire is another example.

But the concept can be applied to other areas. Cash and security blotters, for example, could be typed on a machine that also produces punched cards or tape to eliminate manual key-punching. And if the blotters are prepared in a branch office, the punched tape could be used for automatic transmission to the main office, where a second tape would be automatically converted to cards.

One of the major developments in wire communications is automatic switching equipment which permits messages to be routed to their proper destinations as directed by codes in the messages. Use of such equipment would provide a means of getting orders from branches to the floors of the exchanges (New York, American, Chicago, Toronto) or to the desks of the over-the-counter traders without manual retransmission in the wire room. It would also permit execution reports to be sent directly to branches from the exchange floor.

It is possible to monitor this direct transmission in a central location to pick off information on orders and trades in punched tape, which can then be used with punched-card or electronic equipment to provide a system of mechanical matching and maintenance of open-order files, at least in part. And the tape punched with trade information could, of course, be used for mechanical preparation of confirmations. So we see that communications and IDP are intimately related, and the most effective use of both may well be tied into the use of electronic equipment.

As with electronic equipment, some beginnings have been made in the areas of IDP and more effective use of communication facilities, but it's only the beginning.

VALUE OF AUTOMATION

The title of my comments is somewhat misleading. It would please me greatly if I could now give you an evaluation, in concrete terms, of automation as it affects Wall Street. We can reach some conclusions from progress to date, but for the most part we have to look ahead and use a considerable amount of conjecture. And predictions can be wrong. I read the other day about two caterpillars who were crawling along together munching grass. When a butterfly flew past overhead, one of the caterpillars said, "They'll never get me up in one of those things."

A year or so ago electronic data processing was still largely unproven. There was a great deal of faith, but also a great deal of skepticism. Developments in the last year in Wall Street, as in business in general, have proven that electronic equipment can perform not only tasks previously performed by other mechanical methods, but also tasks previously performed by humans. It can perform these tasks at fantastic speeds, and with a degree of accuracy never before attained. However, there is a limit to what machines can do, since they cannot use judgment or discretion; nevertheless the tasks which have so far been assigned have not, in my opinion, challenged the ability of this equipment.

MEASUREMENT

The measure of the value of automation is of course in its effect on profits – which to a considerable extent means the effect on costs. I believe it's much too early to expect any sound measurements of pay-off. I get the impression, however, that results to date indicate that the economic effects are not far different from what were anticipated a year ago.

Looking into the future, it is difficult to put automation for Wall Street in proper perspective so that we don't exaggerate its importance.

It seems fair to say that to be of value to a firm, automation must increase income, or decrease costs and thus increase net income. It has been said that the principal value of office automation is in providing better and faster information to permit better management – for planning, scheduling, and control. I think of the farmer who was asked by his college-graduate son if he didn't want to learn how to farm better. His reply was, "Son, I don't farm now half as good as I know how." The value to management of better and faster information depends on management.

Automation might provide better service to clients or customers, and increase income by attracting a larger volume, but I believe this must be a factor of limited value.

ULTIMATE CONCERN

So basically we are looking for lower costs – or its counterpart, a stabilization of present costs. We are properly always looking for profit improvement through cost reduction, but I believe it would be a mistake to hope for deep cuts in costs by means of automation. We must keep in mind that stock brokerage deals in services – not goods. The opportunity for gain from automation is much smaller than in a manufacturing enterprise. For another thing, brokerage firms are not large organizations. There are only a few which can individually afford the large investment necessary for the required equipment. Please don't misunderstand me. I don't mean that such cuts in cost are not worth striving for, but they may be much less than you might be led to expect from the amount of attention that has been given to this subject. The reduction in costs which may be achieved by some firms will be much less than in others and the great majority of firms will not be able to obtain any direct benefits.

INDIRECT BENEFITS

The fact that the exchanges are cooperative efforts suggests that automation might provide indirect benefits to all members. An example is the proposal by Ebasco Services, now under study, that members be provided

with reports of trades completely computed and balanced. You should continue your efforts to reduce the cost of providing a securities market through cooperative effort, not limiting the improvements to mechanization. There may be as much to gain through such joint endeavors as a central securities depository.

POSSIBLE EFFECTS OF AUTOMATION

What is likely to be the effect of the ability of some firms to adopt automation while others cannot? The ability of some firms to reduce costs cannot be translated by them into a larger volume through lowered commissions, because minimum rates are established. They are in a position to provide free services, however, which can have the same effect as lower commissions.

There is a variety of advantages of automation in addition to direct cost reduction through the replacement of clerks by machines. The reduction in personnel should come in departments where turnover is high, and should accordingly bring about a reduction in the costs of training and supervision. The reliability of the equipment will bring about a virtual elimination of processing errors, since the data will be untouched by human hands. The capacity of the equipment will permit absorption more readily of peak loads which strain a system largely dependent on people. And the ability of electronic equipment to make decisions in accordance with criteria established in advance means that management can expect more uniformity of treatment of the variety of situations that present themselves than could be expected from large numbers of clerks interpreting instructions as they see fit. There will still be need for judgment in handling the exception, however.

LIMITATIONS

But there are limitations to the use of automation. The foremost, of course, is the cost. Not only is the equipment costly to rent or to buy and maintain, but the costs of conversion to an automated system are high. Conversion embraces rethinking and planning the system of data processing, programming and equipment, developing detailed procedures, retraining personnel, rearranging office layout, running the old and new systems in parallel, and transferring replaced personnel. By cutting corners, some of these costs can be reduced, but only, I believe, at the risk of considerable sacrifice in the results achieved.

The inflexibilities of automatic equipment should not be overlooked.

Revisions in procedures cannot be made quickly or easily. And the fixed investment or rental cannot be reduced readily if the volume of business contracts.

The effect of office automation on people is not easy to evaluate. It should remove a large part of the less challenging clerical work, thus relieving a certain amount of monotony. On the other hand, there are many people who are well satisfied with dull, routine jobs, who would be frustrated by higher-level positions. I believe we can find a place for these in any system, and automation will permit an upgrading of personnel who want more challenge. It would appear that the present shortage of clerical help should eliminate any concern about those whose jobs will be taken over by machines. At most a temporary dislocation will result, and it would appear that the firms are willing to absorb the cost of this dislocation.

I don't want to exaggerate the importance of potential breakdown, but it would be an omission if I did not mention it. The possibility should be evaluated, and reasonable provision should be made to protect against harmful effects of a breakdown by making plans for alternatives in advance.

SUMMARY

I will try to summarize in a few words my evaluation of automation as it applies to Wall Street. Automation might be defined as a concept of the organization of work, providing a constantly rising level of mechanization to operations which are repetitive in character – clerical as well as manual. The principal function of automation then becomes the setting aside of those transactions or situations which require judgment and therefore human attention. Automation is thus a continuation of the effort to increase effectiveness. The aim of automation, therefore, is not automation, but improvement. Some firms will have the ability – through sufficient capital and sufficient management ability – to use automation effectively. Others, largely because of insufficient volume, will not be able to move to as high a level of automation, except through cooperative effort.

Some firms which should not adopt automation will nevertheless do so, and others will use it at less than its full effectiveness, because of failure to establish sound objectives and to plan adequately. And in either case even the firm's management may not be aware of the shortcomings, since it may not have any way of measuring results. Some firms will lag behind others in the use of automation, as a result of the concentration of management's attention on other matters.

But on the whole, there will be continued progress toward more effi-

cient service for the investor. The past year has seen much progress, and the next year will see much more. These firms which can and do mechanize further will have a competitive advantage over the smaller firms but it should not be so great as to have a drastic effect on the smaller firm. This effect will be felt through the ability of the larger firms to provide an expanding range of services to their customers – even though agreement may be reached for some of such services to be rendered by the larger firms on behalf of the smaller firms for a fee. It is well to remember, however, that the customer is the judge of the value of the service; the smaller firm will always be able to compete as long as it provides personal attention to the customer's problems.

In automating, attention will be given first to further mechanizing of areas which are already mechanized in some degree. Then automation will move into other areas. The two areas that seem to provide the greatest opportunity for mechanization are the credit functions – receiving and maintaining proper security; and the cashier's functions – making the best use of cash and securities with the least effort.

The uncertainty and confusion of two years ago have largely been replaced by a feeling of confidence that automation and electronics have a part to play if the approach is sound. The time of the medicine men who tried to sell office automation as a cure-all has gone.

In conclusion, I think it is safe to say that automation is here to stay.