Profit Planning of an Enterprise Adopting Standard Costing

A Support of J.M.Keynes' Involuntary Unemployment

Yuichiro Hayashi*

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Abstract

Intending to graph an enterprise's income statement under standard costing, the author presented the managed gross profit chart, the 45-degree break-even chart and the break-even sales formula in Reference [1]. The result disproved the conventional D.Solomons' theory (Reference [2]) with the same intent as the author's. The author presents, in this paper, a method of making profit planning for an enterprise adopting the standard costing further developing the author's result of Reference [1]. Sales operating profit π^O is divided into a managed operating profit π^{MO} and an allocation profit π^{AC}. In the profit planning, it is illustrated that an incremental change of cost in manufacturing overhead cost is turned into an incremental operating profit.

The result presents basic expressions for an unemployment analysis. It is shown in the expressions that since the incremental costs term of the fixed costs including manufacturing overhead is not 0, the fixed costs term is an independent variable which does not change in proportion to the amount of the sales but varies depending on enterprise's will to make decision. Fixed wages are included in the fixed costs. Each incremental term, fixed costs increment, direct costs increment and sales operating profit increment makes a break-even chart with incremental sales amount. In the chart, they conflict with each other. When obtaining profit is given higher superiority than maintaining employment, dismissal must occur. This is the cause of the involuntary unemployment originally presented by J.M.Keynes.

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*President, Hayashi Construction, Inc., Ph.D. in Engineering, Company Address:1-6-6 Saiwai-cho, Sakata City, Yamagata-ken, 998-0023, Japan

1 Introduction

Standard costing as a term in practical accounting is more commonly used than **absorption costing**, therefore the former term is used hereinafter in place of the latter term.

In Reference [1], the author described methods of making break-even charts and presented a break-even sales formula for an income statement under standard costing, placing the main concept of the managed gross profit created by him in the center. There was a **45-degree break-even chart** and a **managed gross profit chart** in the charts. The theoretical treatment for the net carryover manufacturing overhead applied in inventories, η in the 45-degree break-even chart was hardest to understand and seemed most scholastically significant in Reference [1], because it provided grounds to disprove Solomons' theory presented in Reference [2]. Readers therefore might think that the central aim of the author's invention is for the treatment of η. However, the author's emphasis is not on this but on the presentation of the managed gross profit chart in standard costing. He opened the door to utilizing the chart in standard costing in place of the **marginal income graph** in **direct costing**.

Since the usage and the effectiveness of the managed gross profit chart were not presented in Reference [1], readers might doubt the significance of the chart in practical business. The author created the managed gross profit chart theory almost 15 years ago. From then on he has actually used the chart in real business management in his own company and disclosed the chart to company members. However he could not reach a satisfactory utilization of the chart. The reason is that the author himself did not know secrets, for years, which were hidden in the managed gross profit chart. In the present depression in Japan, making his own enterprise's profit plan became even more important, therefore he had to further study the utilization of the gross profit chart.

Through the studying, the author found the following: the concept of the allocation of the manufacturing overhead as fixed costs expresses the real quantity of works done by workers and equipment; the manufacturing overhead applied closely relate to the operating profit. The author thinks that the result of this research has an important significance for methods of enterprise profit planning and profit control in the coming future. The order of superiority between standard costing and direct costing will be naturally determined by this paper and Reference [1].

In an enterprise profit planning, employment and dismissal are inevitably included. The results of this paper will be a basis of disproving the production theory in **Walras' general equilibrium theory** and a support to **Keynes' logic of the involuntary unemployment**.

Direct costing does not include direct standard costing in this paper. Except as otherwise specifically indicated, the term **workers** or **members** includes all employees and employers who receive remuneration from enterprises. Finance-related enterprises are not included in the enterprises targeted. He initially asserts that management accounting is a means of providing information for a business management, and of informing successive profit condition to managers, but it is not a means which presents a way to boost profit. Since the basic theories by Leon Walras and John Maynard Keynes are presented in any economics textbooks, their references were omitted.

2 Derivation of the managed gross profit chart

The derivation of the managed gross profit chart is presented in Reference [1] in detail. In order to let this paper be independent from the reference, hereinafter the derivation will be simply introduced along with the reference. Notations are almost the same as those used in the reference, but are slightly changed in some cases.

The term **managed operating profit** is used in this paper. The definition of the term is different from that of the "operating profit on an income statement". Thus, we call the latter profit the **sales operating profit.** When the term **profit** only is used, it means a broad sense of profit. When net profit is targeted, the term **net profit** is used. The symbol (ϵ) is added to any symbol X like $X(\epsilon)$ to show that $X(\epsilon)$ is a figure on a final income statement. Superscripts X and Y are used when cost items concern **goods sold** and **goods manufactured**, respectively. The super-script C in the symbol $A^{CX}(\epsilon)$ is used in order to show that $A^{CX}(\epsilon)$ is **manufacturing overhead applied** for **manufacturing overhead** $C_m(\epsilon)$.

Table 1 is an income statement for sales operating profit, where **SG&A expenses** denotes **selling, general and administrative expenses**. It is assumed that $D_m^X(\epsilon)$ and $G(\epsilon)$ are actual costs.

Table 1 Income statement-1 for sales operating profit

Item	Debit	Credit
Sales		$X(\epsilon)$
Manufacturing direct cost (actual)	$D_m^X(\epsilon)$	
Manufacturing overhead applied	$A^{CX}(\epsilon)$	
Cost variance	$\delta^{CX}(\epsilon)$	
SG&A expenses (actual)	$G(\epsilon)$	
Sales operating profit	$\pi^O(\epsilon)$	

In Table 1, **cost variance** $\delta^{CX}(\epsilon)$ is given as follows:

$$\begin{aligned}\delta^{CX}(\epsilon) &= C_m(\epsilon) - A^{CY}(\epsilon) \\ &= C_m(\epsilon) - (A^{CX}(\epsilon) - \eta^{CX}(\epsilon))\end{aligned} \tag{1}$$

$$\begin{aligned}\eta^{CX}(\epsilon) &= A^{CX(-)}(\epsilon) - A^{CY(+)}(\epsilon) \\ &= A^{CX}(\epsilon) - A^{CY}(\epsilon)\end{aligned} \tag{2}$$

, where the symbol $\eta^{CX}(\epsilon)$ is called the "**net carryover manufacturing overhead applied in inventories**" or **NCMOAI**.

From Eq.(1), Table 1 is equivalent to Table 2. Needless to say, $\eta^{CX}(\epsilon)$ expresses an influence of manufacturing overhead, on sales operating profit, which has been allocated to both beginning and ending inventories.

Table 2 Income statement-2 for sales operating profit

Item	Debit	Credit
Sales		$X(\epsilon)$
Manufacturing direct cost	$D_m^X(\epsilon)$	
Manufacturing overhead	$C_m(\epsilon)$	
NCMOAI	$\eta^{CX}(\epsilon)$	
SG&A expenses	$G(\epsilon)$	
Sales operating profit	$\pi^O(\epsilon)$	

The **manufacturing full cost** $E(\epsilon)$ of goods sold is defined as follows:

$$E(\epsilon) = D_m^X(\epsilon) + A^{CX}(\epsilon) \tag{3}$$

We define the **managed gross profit** $Q^M(\epsilon)$ as follows:

$$\begin{aligned} Q^M(\epsilon) &= X(\epsilon) - E(\epsilon) \\ &= X(\epsilon) - (D_m^X(\epsilon) + A^{CX}(\epsilon)) \end{aligned} \tag{4}$$

Further, the **managed operating profit** $\pi^{MO}(\epsilon)$ is defined as follows:

$$\pi^{MO}(\epsilon) = Q^M(\epsilon) - G(\epsilon) \tag{5}$$

Table 1 shows that the **sales operating profit** $\pi^O(\epsilon)$ is obtained from the following:

$$\begin{aligned} \pi^O(\epsilon) &= X(\epsilon) - (E(\epsilon) + \delta^{CX}(\epsilon) + G(\epsilon)) \\ &= Q^M(\epsilon) - (\delta^{CX}(\epsilon) + G(\epsilon)) \end{aligned} \tag{6}$$

Table 2 expresses the following:

$$X(\epsilon) = D_m^X(\epsilon) + C_m(\epsilon) + \eta^{CX}(\epsilon) + G(\epsilon) + \pi^O(\epsilon) \tag{7}$$

If the **manufacturing direct cost** $D_m^X(\epsilon)$ as an actual cost equals $A^{DX}(\epsilon)$ as a standard direct cost, $E(\epsilon)$ expresses a standard cost. In companies adopting a standard costing system, manufacturing work site persons work regarding $E(\epsilon)$ as the manufacturing cost control target; sales site persons work regarding $Q^M(\epsilon)$ as the profit management target.

Eq.(6) is equivalent to Table 3.

Table 3 Income statement-3 for sales operating profit

Item	Debit	Credit
Managed gross profit		$Q^M(\epsilon)$
SG&A expenses	$G(\epsilon)$	
Cost variance	$\delta^{CX}(\epsilon)$	
Sales operating profit	$\pi^O(\epsilon)$	

From Eq.(6) and Eq.(4), we obtain:

$$\pi^O(\epsilon) = Q^M(\epsilon) + A^{CX}(\epsilon) - (C_m(\epsilon) + \eta^{CX}(\epsilon) + G(\epsilon)) \tag{8}$$

Eq.(8) is equivalent to Table 4.

Table 4 Income statement-4 for sales operating profit

Item	Debit	Credit
Sales		$Q^M(\epsilon)$
SG&A expenses	$G(\epsilon)$	
Manufacturing overhead applied		$A^{CX}(\epsilon)$
Manufacturing overhead	$C_m(\epsilon)$	
NCMOA in inventories	$\eta^{CX}(\epsilon)$	
Sales operating profit	$\pi^O(\epsilon)$	

For profit planning, $A^{CX}(\epsilon)$ is determined based on an allocation basis. In charting Eq.(8), classifying the following two cases for $A^{CX}(\epsilon)$ is possible:

(1) $A^{CX}(\epsilon)$ is proportional or quasi-proportional to sales $X(\epsilon)$. The manufacturing overhead applied of this case is called the "**1st kind of manufacturing overhead applied**", and the notation of $A^{CXI}(\epsilon)$ is used.

(2) $A^{CX}(\epsilon)$ is constant or quasi-constant in relation to $X(\epsilon)$. The manufacturing overhead applied of this case is called the **2nd kind of manufacturing overhead applied**, and the notation of $A^{CXII}(\epsilon)$ is used.

According to the above-mentioned classification, the following notations are defined:

$$\begin{aligned} A^{CX}(\epsilon) &= A^{CXI,II}(\epsilon) \\ &= A^{CXI}(\epsilon) + A^{CXII}(\epsilon) \end{aligned} \tag{9}$$

If we adopt this classification given by Eq.(9) for Eq.(8), and denote $Q^M_\xi(\epsilon)$ the value $Q^M(\epsilon)$ at which the relation $\pi^O(\epsilon) = 0$ is satisfied in Eq.(8), $\pi^O(\epsilon)$ is represented as follows:

$$\pi^O(\epsilon) = Q^M(\epsilon) - Q^M_\xi(\epsilon) \tag{10}$$

Eq.(10) is transformed to the managed gross profit chart shown Fig.1. In the figure, the notation $f(\epsilon)$, given by Eq.(11), is called the **managed fixed cost**.

$$f(\epsilon) = f_C(\epsilon) - A^{CXII}(\epsilon) \tag{11}$$

$$f_C(\epsilon) = C_m^{I,II}(\epsilon) + \eta^{CXI,II}(\epsilon) + G(\epsilon) \tag{12}$$

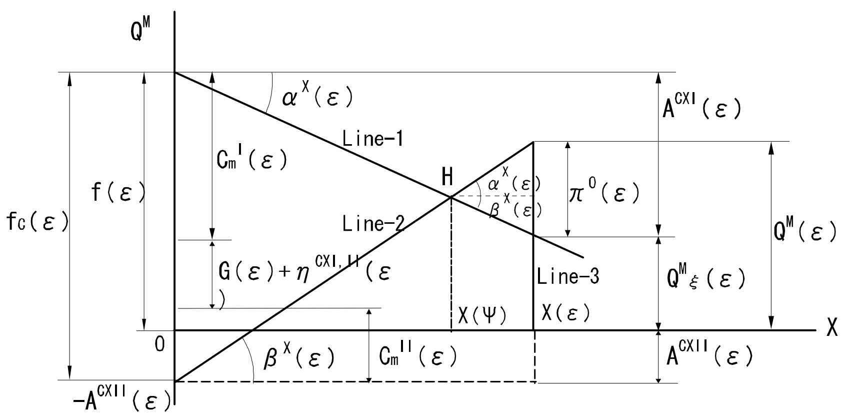

Fig.1 Managed gross profit chart

Line-1 shows Eq. (13). The line is referred to as the "**marginal managed gross profit line**".

$$Q^M_\xi(\epsilon)/f(\epsilon) + X(\epsilon)/(f(\epsilon)/\tan\alpha^{XI}(\epsilon)) = 1 \tag{13}$$

$$\tan\alpha^{XI}(\epsilon) = A^{CXI}(\epsilon)/X(\epsilon) \tag{14}$$

$$Q^M_\xi(\epsilon) = f(\epsilon) - X(\epsilon)\tan\alpha^{XI}(\epsilon) \tag{15}$$

Line-2 shows Eq.(16). The line is referred to as the "**managed gross profit ratio line**". It should be noted that the slope $\tan\beta^X(\epsilon)$ of Line-2 is not equal to the profit ratio $Q^M(\epsilon)/X(\epsilon)$ in the defined technical term when $A^{CXII}(\epsilon)$ exists.

$$Q^M(\epsilon) = -A^{CXII}(\epsilon) + X(\epsilon)\tan\beta^X(\epsilon) \tag{16}$$

$$\tan \beta^X(\epsilon) = (A^{CXII}(\epsilon) + Q^M(\epsilon)/X(\epsilon) \tag{17}$$

Line-3 shows Eq.(6). The line is referred to as the "**managed gross profit line**".

Expressing Fig.1 as a 45-degree line break-even chart, we obtain Fig.2.

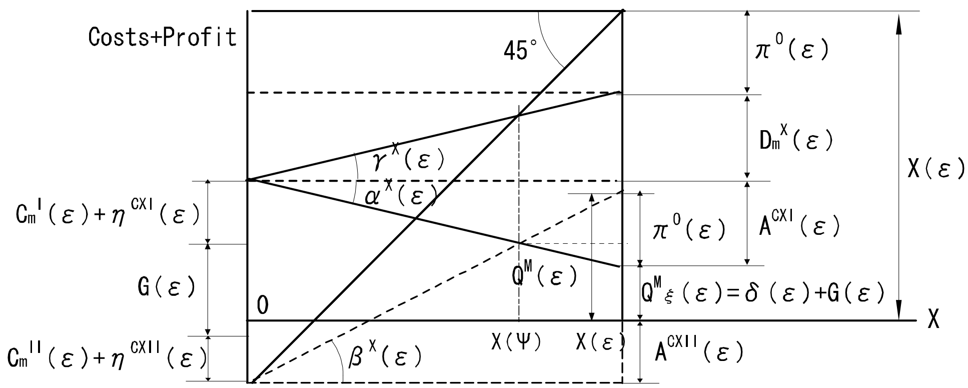

Fig.2 45-degree line break-even chart

Although more analytical development of the managed gross profit chart theory will be done in the following here we shall write up advantages of the profit control by means of the managed gross profit chart taking in advance the analytical results shown below.

- The break-even sales is expressed in the chart. This advantage is the same as in the marginal profit graph in direct costing.

- Since the proportion of direct costs in the conventional 45-degree break-even chart in direct costing is very large compared to that of profit, it is not easy to look at as a profit chart. The direct costs area is cut out in the managed gross profit chart. The profit area is therefore enlarged so that the chart is easy to use as a profit chart. This gives the same advantage in the marginal profit graph.

- As shown in the managed gross profit chart (Fig.6), the sales operating profit $\pi^O(\epsilon)$ can be conceptually divided into the managed operating profit $\pi^{MO}(\epsilon)$ and the allocation profit $\pi^{AC}(\epsilon)$. Therefore, we can make a profit plan separately taking into consideration both $\pi^{MO}(\epsilon)$ obtained by a decrease of external purchase costs and $\pi^{AC}(\epsilon)$ obtained by further use of internal resources.

- Referring back to the author's business experience, it is very difficult to make 'technical employees and sales workers' or job site members who did not have accounting education realize the meaning of profit. This really overwhelms accounting employees in an enterprise. For example, for calculating operating profit, we should first subtract direct costs as well as manufacturing overheads, which were changed into variable costs (allocation costs), from sales; next we should subtract selling, general and administrative expenses (SG&A expenses) from the difference. In this operation, both the expenses which are controlled in field offices or work sites, and those which are controlled in central offices are mixed. Therefore, it is hard for work site members to realize the meaning of final profit i.e. sales operating profit. The sales gross profit or the managed gross profit defined in this paper is, in fact, earned by virtue of the site members' efforts under their own profit control responsibility. For that reason, the author further says that they are in many cases terminologically under the misconception that the gross profit is close to a final profit. This stems from the problem of where the origin to measure a profit for profit control should be put. If we indicate f.e. the managed operating profit (any profit is allowable) for a profit control goal by use of the SG&A expenses ratio $G^V = X \tan \varsigma_0$ shown in Eq.(a1) in the Appendix, the origin of profit controlled by work site members gets near to the origin of sales operating profit. Thus, the profit control executed by work site members comes close to that of sales operating profit on final accounts, thereby a same profit control goal can be shared between work site members and executive officers.

3 Conditions of the basic management accounting system needed to utilize the managed gross profit chart

■ Withdrawing the adoption of the 2nd kind of manufacturing overhead applied $A^{CXII}(\epsilon)$

When we want to make use of standard costing for practical business management and to use it for methods of theoretical economic analyses, the author gives, from his experience, the basic items that he thinks necessary:

(a1) In standard costing, appropriate cost centers as accounting responsibility units in order to aggregate both standard and actual costs should be set up.

(a2) In standard costing, manufacturing overhead applied should be allocated to goods sold and inventories during an accounting period depending on a previously determined allocation basis.

(a3) In adopting the 2nd kind of manufacturing overhead applied shown in Eq.(9), there remains a problem to be solved. Here, we abandon the 2nd kind of manufacturing overhead applied and we adopt only the 1st kind of manufacturing overhead applied.

(a4) It should be recognized beforehand whether the type of the costs generated in a cost center of manufacturing overhead is a fixed cost type (like manufacturing overhead) or a variable cost one(like direct costs). The calculating method to make graphs for both cases is the same. The difference between types does not result in profit errors for either method. However, recognizing the difference is important for understanding the shape of each cost line.

(a5) Treatment of $\eta^{CX}(\epsilon)$ is not so important during profit planning. $A^{CX(-)}(\epsilon)$ is obviously included in the inventories at the beginning of period. When one wishes to make a profit plan at the beginning of period or to execute its plan during the period, one can use a proper estimate value including 0 for $A^{CY(+)}(\epsilon)$. In a theoretical economic analysis, one can assume $\eta^{CX}(\epsilon) = 0$ excepting the special case of analyzing an influence of commodity inventories.

(a6) It should be recognized that the cost variance is not an error correcting value for the profit which is calculated with both standard and actual costs, but is an important constituent factor in sales operating profit.

(a7) It should be recognized that the sales operating profit comprises of the combination of the following items: allocation profit, managed operating profit, net amount of manufacturing overhead applied in inventories, a decreased amount in managed fixed costs and a decreased amount in direct costs.

(a8) The concept of the **allocation of manufacturing overhead** is that of **turning fixed costs into variable costs**. The costs of manufacturing overhead applied as variable costs are in fact the results worked (operated) by a manufacturing overhead department's workers and equipment. In order to express enterprise activities, one should recognize that standard costing, which has the means of allocating fixed costs (workers and equipment costs) to inventories, is more reasonable than direct costing which does not have such means.

The basic item (a3) will be explained. The reason that the author set up the 2nd kind of manufacturing overhead is that there are both variable and fixed costs in actual costs, so that he adopted the same classification in the manufacturing overhead applied. Consider that there is a machine A and a factory building B in a manufacturing overhead as fixed costs. Depreciations as fixed costs are generated both in A and B. However, properties of the facilities are different from each other. Although A's quantity of work varies in proportion to the enterprise's sales, and the quantity of work is like a direct cost i.e. allocated cost, but its payable cost is like a fixed cost i.e. the actual cost. B's operation is that the building merely exists and maintains the working environment regardless of the sales. The author had considered that we should have adopted the 1st and the 2nd kind of manufacturing overhead for A and B's facilities, respectively. This classification will naturally provide motivation for the department members using A's facility to earn profit, because their quantities of work will directly connect to an increase of profit.

However, as shown in Fig.1, the 2nd kind of cost vertically shifts the left side end point of the managed gross profit ratio line from the origin to the other point which is $A^{CXII}(\epsilon)$ distant from the origin. The amount of the managed gross profit should theoretically be measured from the X axis, hence the definition of the managed gross profit ratio should be Q^M/X and should not be $(Q^M(\epsilon) + A^{CXII}(\epsilon))/X(\epsilon)$. From this point, a troublesome problem arises in profit control using the managed gross profit ratio. On the other hand, there is no problem on the following profit controls: for the case using the sales operating profit π^O/X; for the case using the managed operating profit π^{MO}/X or for the case using combination of Q^M with Q^M_ξ. Although the author himself has not yet resolved this problem, he will go forward without setting up the 2nd kind of manufacturing overhead leaving the problem as an assignment to be solved in the future by setting up the following assumption.

Assumption 1 The 2nd kind of manufacturing overhead department is not set up.

Thus, expressing Fig. 1 with only the 1st kind of manufacturing overhead applied gives Fig.3 where $Q^M(\epsilon)/X(\epsilon)$ equals $\tan\beta^X(\epsilon)$.

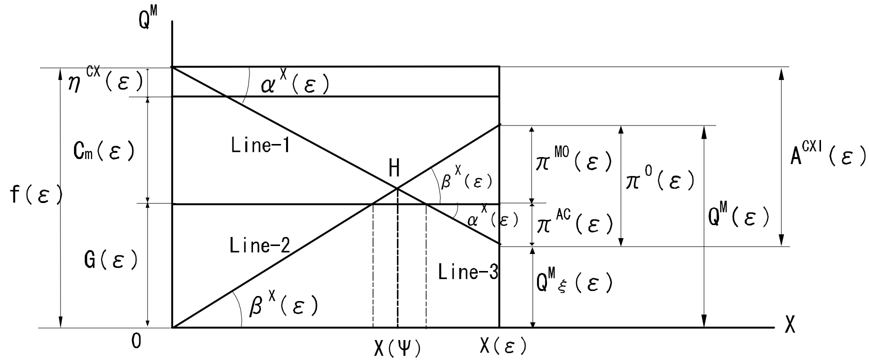

Fig.3 Managed gross profit chart where $A^{CXII}(\epsilon) = 0$

In Fig.3, the notation $A^{CX}(\epsilon) = A^{CXI}(\epsilon)$ and the following notations are used:

$$f(\varepsilon) = \eta^{CX}(\epsilon) + C_m(\epsilon) + G(\epsilon) \tag{18}$$

$$\pi^O(\epsilon) = \pi^{AC}(\epsilon) + \pi^{MO}(\epsilon) \tag{19}$$

$$\pi^{AC}(\epsilon) = A^{CX}(\epsilon) - \big(C_m(\epsilon) + \eta^{CX}(\epsilon)\big) \tag{20}$$

$$\begin{aligned}\pi^{MO}(\epsilon) &= Q^M(\epsilon) - G(\epsilon) \\ &= X(\epsilon) - \big(D_m^X(\epsilon) + A^{CX}(\epsilon)\big) - G(\epsilon)\end{aligned} \tag{21}$$

Transforming Fig.3 into a 45-degree chart gives Fig.4.

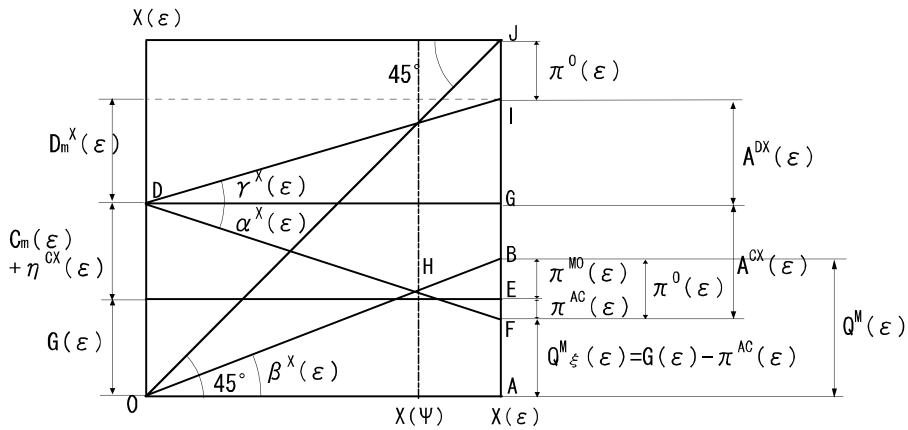

Fig.4 45-degree break-even chart

■ **Treatment of the manufacturing direct cost $D_m^X(\epsilon)$ as standard cost**

In general standard costing, direct costs are also determined by standard costs. Let $A^{DX}(\epsilon)$ be the standard costs in $D_m^X(\epsilon)$ department with the actual direct costs $D_m^X(\epsilon)$; $\delta^{DX}(\epsilon)$ be the cost variance for $D_m^X(\epsilon)$; $\eta^{DX}(\epsilon)$ be the net carryover direct cost applied in inventories. Then, $\delta^{DX}(\epsilon)$ is expressed in the same way as Eq.(1):

$$\delta^{DX}(\epsilon) = D_m^X(\epsilon) - (A^{DX}(\epsilon) - \eta^{DX}(\epsilon)) \tag{22}$$

Consequently, the way of treating direct costs is the same as the manufacturing overhead. The different point is that if $\eta^{DX}(\epsilon) = 0$, the value of $\delta^{DX}(\epsilon)$ is always nearly 0 regardless of $X(\epsilon)$. Even if $\eta^{DX}(\epsilon) \neq 0$, treatment of $\eta^{DX}(\epsilon)$ is the same as $\eta^{CX}(\epsilon)$. The concrete treatment at a closing account is specified in the cost accounting standards. Basic items (a1), (a2), and (a4) describe this. In this paper, Assumption 3 will be set up in the next section, so that the problem for the cost variance in direct costs is not treated in this paper.

If someone gives arbitrary cost allocation $A^{CY(+)}(\epsilon)$ at a closing adjustment, the value of $\eta^{CX}(\epsilon)$ will change, then the profit of the current period will surely change. However, tax laws prohibit such a behavior. In addition, since we cannot determine the final value of $A^{CY(+)}(\epsilon)$ until a closing date, we must use an estimate value for $A^{CY(+)}(\epsilon)$ in establishing a current income plan or executing profit control during the period. Basic item (a5) describes this.

Basic items (a6), (a7) and (a8) relate to significance of profit. The cause of making profit is deeply associated with operations done by workers and equipment in an enterprise. This mechanism has been concealed in standard costing. We can not understand what profit is, until we disclose the secret. Thus, we discuss this mechanism in detail in the next section.

4 Forming a profit plan using standard costing

4.1 Basic equations for profit planning and application of the managed gross profit chart

■ Managed gross profit chart and marginal profit graph

Let us show an application of the managed gross profit chart to make profit planning. The chart shown in Fig.3 is still a little complicated. Thus, the following assumptions are added.

Assumption 2 $\eta^{CX}(\epsilon) = 0$ or $A^{CX(-)}(\epsilon) = A^{CY(+)}(\epsilon)$.

Assumption 3 Allocation systems are not adopted for both $D_m^X(\epsilon)$ and $G(\epsilon)$ departments, and both costs are actual costs.

Using these assumptions changes Eq.(7) and Eq.(2) to the following:

$$X(\epsilon) = D_m^X(\epsilon) + C_m(\epsilon) + G(\epsilon) + \pi^O(\epsilon) \tag{23}$$

$$\pi^{AC}(\epsilon) = A^{CX}(\epsilon) - C_m(\epsilon) \tag{24}$$

Regardless of these assumptions, both Eq.(19) and Eq.(21) remain unchanged. When $\eta^{CX}(\epsilon) \neq 0$, $C_m(\epsilon)$ should be replaced with $C_m(\epsilon) + \eta^{CX}(\epsilon)$ in Eq.(23).

The relationship of Eq.(23) is expressed in Fig.5, under Assumptions 1, 2 and 3, where $\tan\gamma^X(\epsilon) = D_m^X(\epsilon)/X(\epsilon)$.

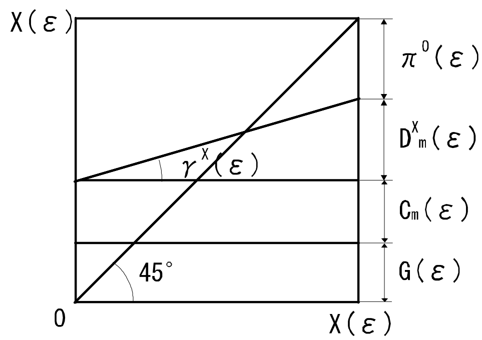

Fig.5 Graph of Eq.(23)

If we adopt Assumptions 1, 2 and 3 in order to make profit planning for the standard costing, calculated costs and profit in each income statement due to the standard costing and the direct costing become the same as each other. The largest difference in accounting operation between standard and direct costing is that the former has a means of allocation of manufacturing overhead to goods sold but the latter does not have the means. The manufacturing overhead applied directly influences the valuation of inventory asset values and indirectly influences the determination of the cost value of $C_m(\epsilon)$ as the modification value $\eta^{CX}(\epsilon)$.

Does the allocation of manufacturing overhead to goods sold have such a small significance? If it is so, the difference between the two costing systems is that one side has a means to evaluate the costs of inventories for the manufacturing overhead but the other side does not. If we can find other characteristics, there will be large differences in thoughts between the two accounting systems.

Under assumptions 1, 2 and 3, Fig.3 is transformed into Fig. 6:

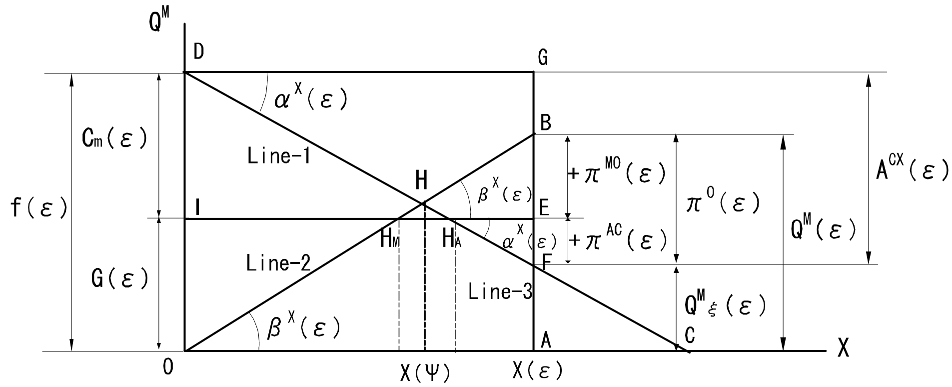

Fig. 6 Managed gross profit chart where $\eta^{CX}(\epsilon) = 0$

A **marginal profit graph** in the direct costing is shown in Fig. 7. In addition, the fixed costs in direct costing are defined as the value further subtracted variable costs from $f(\epsilon)$. However, this operation does not affect the main logic in this argument, $f(\epsilon)$ is also regarded as fixed costs in direct costing.

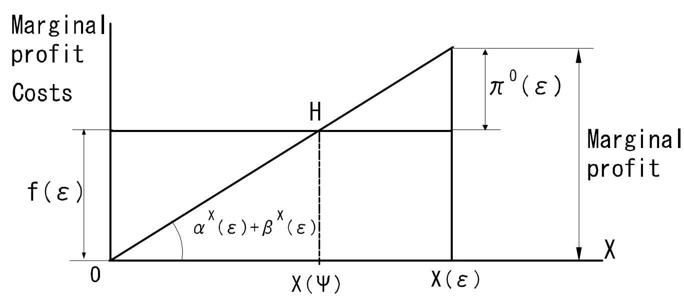

Fig. 7 Marginal profit graph in direct costing

■ **Division of $\pi^O(\epsilon)$ into $\pi^{MO}(\epsilon)$ and $\pi^{AC}(\epsilon)$**

Since we discuss hereinafter the profit planning dividing $\pi^O(\epsilon)$ into $\pi^{MO}(\epsilon)$ and $\pi^{AC}(\epsilon)$, we will review the graphic expression process for $\pi^{MO}(\epsilon)$ and $\pi^{AC}(\epsilon)$ in Fig.6. The triangle OAB expresses $Q^M(\epsilon)$ shown in Eq.(4). The concept of $Q^M(\epsilon)$ is that of the **managed gross profit** or that of the sales gross profit which is calculated by using $A^{CX}(\epsilon)$ in place of $C_m(\epsilon)$. $\pi^{MO}(\epsilon)(= Q^M(\epsilon) - G(\epsilon))$ or the triangle H_MEB is the **managed operating profit**. From Eq.(23), we find that $\pi^O(\epsilon)$ is obtained from the following procedure:

$$
\begin{aligned}
\pi^O(\epsilon) &= X(\epsilon) - (D^X_m(\epsilon) + C_m(\epsilon)) - G(\epsilon) \\
&= X(\epsilon) - (D^X_m(\epsilon) + A^{CX}(\epsilon)) + A^{CX}(\epsilon) - C_m(\epsilon) - G(\epsilon) \\
&= Q^M(\epsilon) - (C_m(\epsilon) + G(\epsilon) - A^{CX}(\epsilon)) \\
&= \text{triangle } OAB - \text{triangle } OCD
\end{aligned}
\tag{25}
$$

Viewing Fig. 6 and Fig. 7, it is immediately obvious that although Fig. 6 gives the information that $\pi^O(\epsilon)$ consists of $\pi^{MO}(\epsilon)$ and $\pi^{AC}(\epsilon)$, Fig. 7 does not have such information. Here we name $\pi^{AC}(\epsilon)$ the **allocation profit**.

Let us confirm that in Fig.6, the managed operating profit $\pi^{MO}(\epsilon)$ is obtained from the profit graph which is made of the triangle OAB and the line IE whose cost is $G(\epsilon)$; the allocation profit

$\pi^{AC}(\epsilon)$ is obtained from the profit graph which is made of the triangle FGD and the line IE whose cost is $C_m(\epsilon)$. As shown in Fig. 6, the concept of $\pi^{AC}(\epsilon)$ is the same as the cost variance.

The divided profit graphs will be separately shown in Figs. 8 (a) and (b).

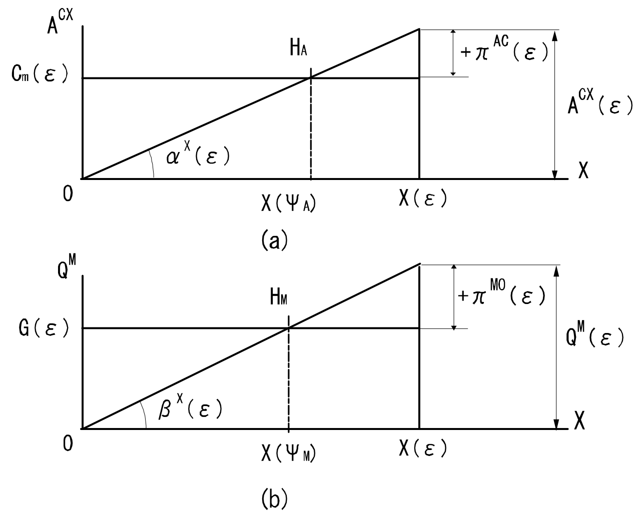

Fig. 8 Division of $\pi^O(\epsilon)$ into $\pi^{MO}(\epsilon)$ and $\pi^{AC}(\epsilon)$

Fig. 8 (a) is the **allocation profit chart** and Fig. 8 (b) is the **managed operating profit chart**. Under given $X(\epsilon)$, $C_m(\epsilon)$ and $G(\epsilon)$, the break even point of $\pi^{AC}(\epsilon)$ is H_A and $\pi^{AC}(\epsilon)$ is determined by $\tan\alpha^X(\epsilon) = A^{CX}(\epsilon)/X(\epsilon)$. The break even point of $\pi^{MO}(\epsilon)$ is H_M and $\pi^{MO}(\epsilon)$ is determined by $\tan\beta^X(\epsilon) = Q^M(\epsilon)/X(\epsilon)$.

Although $\pi^O(\epsilon)$ has been divided into $\pi^{MO}(\epsilon)$ and $\pi^{AC}(\epsilon)$, this does not mean that any independent variable has increased. Under a given allocation basis, $\pi^{AC}(\epsilon)$ is a dependent function of $X(\epsilon)$. Although it is so, Fig.8 shows the following: if $X(\epsilon)$ increases over the point H_A, we have $\pi^O(\epsilon) = \pi^{MO}(\epsilon)+\pi^{AC}(\epsilon)$; if $X(\epsilon)$ decreases below the point H_A, we have $\pi^O(\epsilon) = \pi^{MO}(\epsilon)-\left|\pi^{AC}(\epsilon)\right|$.

■ Significance of the allocation profit $\pi^{AC}(\epsilon)$

What significance does the existence of $\pi^{AC}(\epsilon)$ have in enterprise activities? $A^{CX}(\epsilon)$ has been provided in order to distribute $C_m(\epsilon)$ to inventories. At a closing account, since $A^{CX}(\epsilon)$ in its current period naturally does not equal $C_m(\epsilon)$, a cost variance arises. This cost variance is used as an error modification value for the determination of the current manufacturing overhead. Is $\pi^{AC}(\epsilon)$ then merely the error modification value for $\pi^O(\epsilon)$, or is it an important and actual constitutive factor in $\pi^O(\epsilon)$?

$C_m(\epsilon)$ comprises of (a) **labor costs** and (b) **machinery and equipment costs**, as fixed costs in the manufacturing overhead department. Henceforth the term "manufacturing overhead department" is replaced by the term "$C_m(\epsilon)$ **department**", and the term "machinery and equipment" is replaced by the term **equipment**. The author's view for $A^{CX}(\epsilon)$ is as follows:

- $A^{CX}(\epsilon)$ expresses the quantity of works which has been done in proportion to the amount of $X(\epsilon)$ by both workers and equipment in $C_m(\epsilon)$ department.

- Although the **allocation profit** $\pi^{AC}(\epsilon)$ means the **capacity volume variance** in accounting, $\pi^{AC}(\epsilon)$ is virtually profit (or loss).

This will be explained. $A^{CX}(\epsilon)$ is nearly a proportional function of $X(\epsilon)$. Even if a rate of capacity utilization for $X(\epsilon)$ exceeds a denominator level, $C_m(\epsilon)$ department workers and equipment actually work and provide products. The value of the quantity of works is regarded as actual manufacturing overhead costs during the interim period. A good's price is determined by regarding $A^{CX}(\epsilon)+D_m^X(\epsilon)+G(\epsilon)$ as the goods costs, and then the good is sold. $A^{CX}(\epsilon)$ is recovered as a cost from $X(\epsilon)$. For this reason, the production cost $A^{CY(+)}(\epsilon)$ before goods sold are used as cost values in inventories.

As mentioned above, in this process, the work volume in $C_m(\epsilon)$ department is a proportional function to $X(\epsilon)$, but payable costs for the works are not. Fixed wages are paid for the workers depending on fixed wage contracts due to their job type. For the expense of equipment, lawful depreciation is allowed as a current cost. Consequently, $C_m(\epsilon)$ as the total costs becomes a fixed cost. Although it is said that equipment does indirect cost tasks, but in fact it does principal ones in proportion to $X(\epsilon)$. The cost difference between $A^{CX}(\epsilon)$ and $C_m(\epsilon)$ remains at the enterprise the owner of the equipment. Thus, the residual money is changed to the term **sales operating profit** and becomes a part of financial resources for enterprise growth

In order to increase $\pi^{AC}(\epsilon)$, at least the break-even sales given at the position H_A should be achieved. After that, the more the sales increases, the more $A^{CX}(\epsilon)$ over the point H_A is turned into a part of $\pi^O(\epsilon)$. The less the purchase of equipment in $C_m(\epsilon)$ department is, the more enterprise can recover its investment fund with small sales.

The more production factors in $C_m(\epsilon)$ department work, the more $A^{CX}(\epsilon)$ will increase. Therefore, $\pi^{AC}(\epsilon)$ means the sales operating profit which is acquired when the expenses of $C_m(\epsilon)$ department are held down to the minimum, and the enterprise make the equipment and workers work to the maximum. A means to increase $\pi^{AC}(\epsilon)$ is actually carried out in enterprises which adopt 2 or 3 shifts-work system to make machinery run to the maximum.

The above-mentioned description shows that production factors in $C_m(\epsilon)$ department work varying proportionately to $X(\epsilon)$. However, the quantity or scale of both workers and equipment in $C_m(\epsilon)$ department is really limited in the real business management. Suppose that an enterprise has an appropriate-size costs $C_{m0}(\epsilon)$ for an appropriate amount of sales $X_0(\epsilon)$ with profit $\pi_0(\epsilon)$. (1) If $X(\epsilon)$ decreases less than $X_0(\epsilon)$ holding $C_{m0}(\epsilon)$ constant, the profit for the decreased $X(\epsilon)$ will fall less than $\pi_0(\epsilon)$. (2) If $C_m(\epsilon)$ increases larger than $C_{m0}(\epsilon)$ despite that $X(\epsilon)$ holds $X_0(\epsilon)$ constant, the profit for $X_0(\epsilon)$ with increased $C_m(\epsilon)$ will decrease. These phenomena deeply relate to the **decreasing returns to scale** in economics. Here the author point out that $\pi^{AC}(\epsilon)$ is limited by the law of the decreasing returns to scale.

By the way, the value of the function $\pi^{AC}(\epsilon)$ of $X(\epsilon)$ varies depending on a way of allocation basis. However, this influence is cancelled between $\pi^{AC}(\epsilon)$ and $\pi^{MO}(\epsilon)$, and it does not affect, as a result, the value of $\pi^O(\epsilon)$.

■ Significance of the managed operating profit $\pi^{MO}(\epsilon)$

In Fig.6, $\pi^{MO}(\epsilon)$ is most important. The reason is that $\pi^{MO}(\epsilon)$ shows a result of profit earning ability of work site persons in an enterprise. $\pi^{MO}(\epsilon)$ is a kind of operating profit which is calculated using $D_m^X(\epsilon)+A^{CX}(\epsilon)$ as manufacturing costs in goods sold. $\pi^{MO}(\epsilon)$ is really a management target for manufacturing work site persons. When $\pi^{AC}(\epsilon)>0$, from Eq.(20), $A^{CX}(\epsilon)$ is calculated higher than the fixed cost $C_m(\epsilon)+\eta^{CX}(\epsilon)$ by $\pi^{AC}(\epsilon)$, so that $\pi^{MO}(\epsilon)$ is calculated lower than $\pi^O(\epsilon)$ by $\pi^{AC}(\epsilon)$ keeping $\pi^O(\epsilon)$ unchanged in Eq.(19).

Direct cost $D_m^X(\epsilon)$ comprises of (c) **labor costs** in $D_m^X(\epsilon)$ department and (d) **material purchases cost**. The labor cost of direct cost workers is calculated from the expression "hourly wage×labor hours which correspond to quantities of goods produced". If the quantity of production exceeds the maximum production, the direct cost workers will be increased or additional material purchases will be required. Otherwise, the production will stop. Therefore, the sum of the expenses becomes a variable cost.

$X(\epsilon)$ comprises of both consumption goods C and capital goods I as final goods, allowing for intermediate goods P. The amount of C is determined in price negotiations between enterprises and consumers. Total wages are determined in wage negotiations between workers and enterprises. The share of incomes among workers and enterprises varies depending on the power relationship. This phenomenon is characteristic in businesses under free competition in capitalist countries. Consequently, $\pi^{MO}(\epsilon)$ will be a result of the survival competition between demand and supply, in capitalist societies.

Let us consider an enterprise where production capacity including workers is normal, that is, $\pi^{AC}(\epsilon) = 0$ holds for sales $X(\epsilon)$. Profit is the growth of assets corresponding to equity capital excluding stock issue. If we regard the enterprise as an animate being, $\pi^{MO}(\epsilon)$ will express the further survival power for growth among the enterprise's business competition.

4.2 Relationship between incremental profit and other incremental production factors

■ **Relationship between incremental fixed costs and profit**

From Eq.(11) and Eq.(12), we obtain:

$$f(\epsilon) = C_m(\epsilon) + G(\epsilon) \tag{26}$$

The managed fixed cost $f(\epsilon)$ is not the literal fixed cost (a constant) in an accounting period but is a variable cost (independent variable). $f(\epsilon)$ does not vary in proportion to the volume of $X(\epsilon)$ but changes independently of the volume of $X(\epsilon)$ depending on changes of **human will** which is an independent variable. The term human will means "**human will to make decision in enterprise management**".

This will be explained in Fig.9, where the items with the notation (ϵ) are the data at the end of period on an original profit plan and the items with (ρ) are new data at the end of period on a new profit plan.

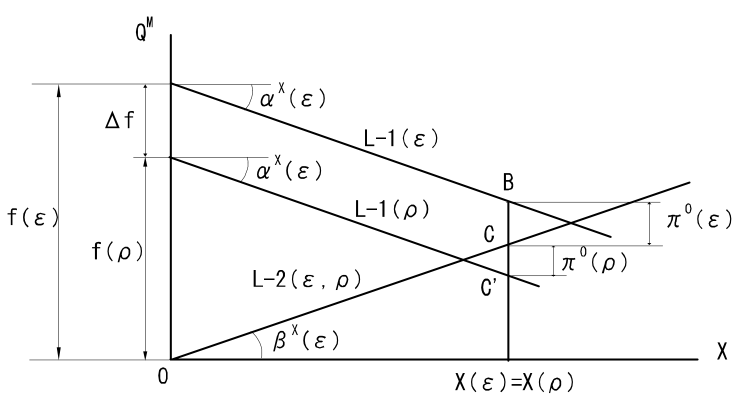

Fig.9 A change of Δf in a management plan

Suppose that the operating loss $\pi^{O}(\epsilon)(< 0)$ on the original plan is the segment BC in the figure. If we cannot expect an increase of sales and gain in profitability in the new plan, we must put

$f(\rho) = f(\epsilon) - \Delta f$ in order to turn the loss into a positive profit, decreasing $f(\epsilon)$ by $\Delta f (> 0)$. Then, $\pi^O(\rho)$ is given on the segment CC' and shown as follows:

$$\pi^O(\rho) = \Delta f - \left|\pi^O(\varepsilon)\right| \tag{27}$$

Since both $C_m(\epsilon)$ and $G(\epsilon)$ are included in $f(\epsilon)$, a cut in fixed labor costs is included in Δf. This cut will be made by means of dismissal or decreasing the wage rate. As a result, the loss BC $\pi^O(\varepsilon)$ will turn into the profit CC' $\pi^O(\rho)$.

In an enterprise, $C_m(\epsilon)$ comprises of $C_m(\epsilon)$ department workers(for factory administration, physical distribution management and information management etc.) and depreciation expenses of equipment. Because of the job type of the workers in $C_m(\epsilon)$ department, the work volume of the workers is flexible. Even if the property of the workers is so, cutting their jobs from $f(\epsilon)$ below their maximum job ability will in normal cases result in a decrease of production capacity.

However, if the enterprise can create a new effective job method maintaining the cut of Δf, adding any ingenuity, to recover the original job quantity in $C_m(\epsilon)$ department, and if it can constantly continue the new method, Δf will change to the constant profit of $\pi^O(\rho)$ from the relevant accounting period to successive years. This implies that although the job quantity done by the workers until the last year in $C_m(\epsilon)$ department has increased from f to $f + \Delta f$, wages for the workers will not be paid from this year to the following years. That is to say, the incremental job quantity due to the streamlining in $C_m(\epsilon)$ department has been turned into the term profit. This is an effect of technical innovations.

■ Relationship between incremental direct costs and profit

Hereafter, the term $D_m^X(\epsilon)$ **department** is used in place of the term direct costs department. $D_m^X(\epsilon)$ comprises of **material purchases** $P_m^X(\epsilon)$ and **direct labor costs** $W_m(\epsilon)$ as follows:

$$D_m^X(\epsilon) = P_m^X(\epsilon) + W_m(\epsilon) \tag{28}$$

First, note that although $D_m^X(\epsilon)$ is recovered through $X(\epsilon)$, the whole amount of $D_m^X(\epsilon)$ is paid out. Therefore, the profit planning due to $D_m^X(\epsilon)$ is mainly targeted to raise the direct cost department workers' efficiency and to decrease the material purchases.

The working structure of $D_m^X(\epsilon)$ department will be considered. In the case where the fluctuation of production quantity is not so large, the more products are high-quality, the more the total number of workers comes close to a constant. Since wage payment is virtually hourly wages, despite any wage contract, the workers' wages are paid for the total labor hours. In any enterprise, they cannot produce goods over the manufacturing maximum capability which is determined by the number of workers except in the case where workers are replaced with purchased materials. In short, the number of workers is a constant and the cost of their total wages is a variable in proportion to $X(\epsilon)$. Thus, we have:

$$W_m(\epsilon) = L^F \cdot w^F \cdot t^X(\epsilon) \tag{29}$$

, where w^F =hourly wage (a constant), $t^X(\epsilon)$ = total labor hours(a variable) and L^F = number of workers (a constant).

Consider Eq.(6) as an original profit plan, at the beginning of an accounting period, where the symbol (ϵ) is used. Further consider another new profit plan changed from the original plan, at the end of the accounting period, which is the same as Eq.(6) but the symbol (ρ) is used in place of the symbol (ϵ). Then the new expression becomes:

$$\pi^O(\rho) = Q^M(\rho) - (\delta^{CX}(\rho) + G(\rho)) \tag{30}$$

If we apply the symbols (ρ) in place of (ϵ) to Eq.(4), we obtain:

$$Q^M(\rho) = X(\rho) - \left(D_m^X(\rho) + A^{CX}(\rho)\right) \tag{31}$$

We define the difference $\Delta\pi^O$ between $\pi^O(\rho)$ and $\pi^O(\epsilon)$ as follows:

$$\Delta\pi^O = \pi^O(\rho) - \pi^O(\epsilon) \tag{32}$$

If we assume that $X(\rho) = X(\epsilon)$, $G(\rho) = G(\epsilon)$, $\delta^{CX}(\rho) = \delta^{CX}(\epsilon)$, $A^{CX}(\rho) = A^{CX}(\epsilon)$ for both ϵ and ρ plans, we have, from Eqs.(32), (30), (6) and (28),:

$$\begin{aligned}\Delta\pi^O &= Q^M(\rho) - Q^M(\epsilon) \\ &= \Delta Q^M \\ &= -\Delta D_m^X \\ &= -\left(\Delta P_m^X + \Delta W_m\right)\end{aligned} \tag{33}$$

The relationship between these equations is shown in Fig.10 where $\Delta\pi^O$ has a positive value.

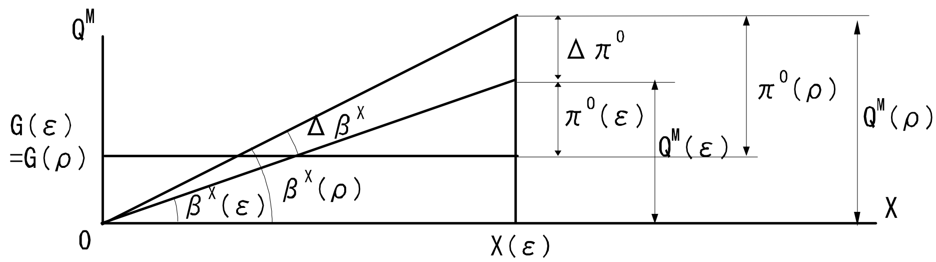

Fig.10 $\Delta\pi^O$ caused from a decrease of $D_m^X(\varepsilon)$ costs

Eq.(33) shows that ΔP_m^X and ΔW_m are directly transformed into $\Delta\pi^O$ in the same way as in the manufacturing overhead case. Suppose that in this case the wage cut ΔW_m has resulted from this year's greater efficiency in machinery than the last year's. Then, the decreased wages will change into a permanent π^O in proportion to $X(\epsilon)$ from this year. This implies that although the workers' work volume W_m measured with monetary value will increase from W_m to $W_m + \Delta W_m$, payable wages W_m will remain unaltered. That is to say, the improvement of production efficiency in $D_m^X(\epsilon)$ department is transformed into the term profit, a monetary value. This shows that the human will and wisdom's operations can be turned into profit.

If a decrease of the direct labor costs has been carried out with a decrease of payable labor wages or of material purchases without improvement of production efficiency, coercing powers, which are also powers due to human will, have been turned into π^O by social power relationships. When the above-mentioned decrease of the labor wages cannot yet cover the loss with a decrease of the variable labor wages, ΔL^F or a quantity of dismissal of the workers will be carried out.

The above-mentioned model was for the case where managed gross profit rate $\tan\beta^X$ changed under a constant amount of sales $X(\epsilon)$. This condition similarly holds in a recession in the case where sales $X(\epsilon)$ decrease when β^X is a constant. The latter case should involve a dismissal for the workers as far as enterprises want to ensure getting a profit π^O in the recession. The profit π^O obtained by a cut in direct costs is proportional to the amount of $X(\varepsilon)$.

5 Basic equations for the unemployment analysis presented by enterprises' accounting

The author thinks that answers to unemployment problems are the greatest theme in economics. Basic equations to analyze the unemployment problem will be presented. We cannot immediately present the equations in the concept of the national economic accounts, because, in this paper, capital goods and consumption goods are not separated; production factors are not formally defined; the concepts of government and financial assets have not been introduced. If we regard Eq.(23) as an aggregated result of all the enterprises in a country. $X(\epsilon)$ expresses final products; each item in the right hand side of the equation expresses a unit of aggregating production factors; finally the aggregation of the items expresses GVA.

When $\eta^{CX}(\varepsilon) = 0$, basic equations for unemployment analysis problem are incremental equations which are shown, from Eq.(23), Eq.(24), Eq.(25) and Eq.(19), in the following:

$$\Delta X = \Delta D_m^X + \Delta C_m + \Delta G + \Delta \pi^O \tag{34}$$

$$\Delta \pi^O = \Delta \pi^{AC} + \Delta \pi^{MO} \tag{35}$$

$$\Delta \pi^{AC} = \Delta A^{CX} - \Delta C_m \tag{36}$$

$$\Delta \pi^{MO} = \Delta X - \left(\Delta D_m^X + \Delta A^{CX}\right) - \Delta G \tag{37}$$

$$\Delta D_m^X/\Delta X + \Delta \pi^O/\Delta X + \Delta C_m/\Delta X + \Delta G/\Delta X = 1 \tag{38}$$

Eq.(34) is expressed in Fig.11.

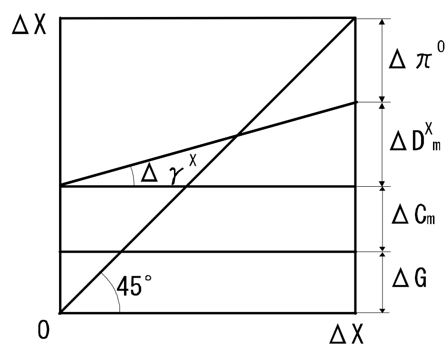

Fig.11 graph of Eq.(34)

We cannot change the difference formula Eq.(38) to a differential equation of X. The reason is that D_m^X is a function of X as far as employment in D_m^X is maintained but π^O, C_m and G are not. In capitalist societies, C_m and G are intrinsically functions of both (a) **an increase and a decrease of wages due to human will i.e. dismissal and employment** and (b) **the fixed wages that are paid without being in proportion to a work volume**. In capitalist societies, the cumulative difference formula shown in Eq.(34) runs economies.

Conditions and explanations that should be added to the expressions above and Fig.11 are as follows:

(b1) The relationships between each item in Eq.(34) are carried out in a single accounting period.

(b2) C_m and G in Eq.(34) are variables which do not fluctuate by changes of variable X but vary by changes of enterprises' will to make decision for dismissal and employment. Therefore, $\Delta C_m \neq 0$ and $\Delta G \neq 0$. Consequently, since there is no identifying combination of goods quantities with prices of goods and production factors, to satisfy $d\pi^O/dX = 0$, the **profit maximization in production** does not hold. That is to say, the economic equilibrium condition claimed by Walras' general equilibrium theory does not exist at least in societies where dismissal and employment are freely carried out in production.

(b3) Each item in the right hand side of Eq.(34) and ΔX in the left hand side forms the break-even chart shown in Fig.11. In the figure, ΔX takes positive and negative values including 0; it should be noted that γ^X is also a variable.

(b4) Under given ΔX, incremental fixed costs $\Delta C_m + \Delta G$, incremental direct cost ΔD_m^X and incremental operating profit $\Delta\pi^O$ conflict with each other in the break-even chart under the social consciousness of which item should be given priority on the vertical axis. When obtaining profit is given higher superiority than maintaining employment, dismissal is carried out. This is the cause of the involuntary unemployment originally presented by J.M.Keynes. From this reason, the sticky property of the workers' wage price is not the first cause of **involuntary unemployment** in Keynes's theory.

6 Conclusive remarks

(1) According to the reference [1], the managed gross profit chart under standard costing is shown in Fig.1 and the 45-degree line break-even chart is represented in Fig.2. In the reference, the author set up the 2nd kind of manufacturing overhead applied $A^{CXII}(\epsilon)$, in a manufacturing overhead department, which was a fixed cost type in the reference. In order to construct a production theory of enterprises in economics, we should not set up $A^{CXII}(\epsilon)$, as explained in the item (a3).

(2) As shown in Fig.3 the managed gross profit chart and in Fig.4 the 45-degree line break-even chart, the sales operating profit π^O is separated into the allocation profit π^{AC} and the managed gross profit π^{MO}. As shown in Fig.8, both π^{AC} and π^{MO} can be separately represented.

(3) As explained in section 4.2 ■ Relationship between incremental fixed costs and profit, the managed fixed cost $f(\epsilon)$ given in Eq.(26) is a fixed cost in the sense that a change of $f(\epsilon)$ is not proportional to a change of $X(\epsilon)$ in an accounting period. Δf the amount of a decrease of $f(\epsilon)$ can be turned into a profit depending on enterprise's independent will to make decision Therefore the expression $\Delta f = 0$ does not hold in economic analyses.

(4) The basic expression for enterprises' production analysis is Eq.(7) in the case where $\eta^{CX}(\varepsilon) \neq 0$ or Eq.(23) in the case where $\eta^{CX}(\varepsilon) = 0$. The basic expression for unemployment analysis is Eq.(34) which is an incremental expression of Eq.(23). Eq.(34) is equivalent to Fig.11. Since the profit maximization equation does not exist, as shown in explanation (b2), the production theory in Walras' general equilibrium theory does not hold.

(5) As explained in the item (b4), unemployment is caused by the conflict between $\Delta\pi^O$ and the other items in Fig.11 in a given ΔX. This is the cause of the involuntary unemployment originally presented by J.M.Keynes.

(6) We cannot turn the difference formula Eq.(38) into a differential equation of X assuming $dC_m/dx = dG/dx = 0$ in capitalist societies. In capitalist societies, the cumulative difference formula shown in Eq.(34) runs economies.

Postscript

The purpose of a cost control as a management accounting tool is to give a learning tool to perform an efficient way of working. That of a profit control is to give a tool to visibly see and deal with rapidly changing business fluctuations. Since the profit control directly leads to the implementation of managerial decisions, speed is crucial at a business judgement time-point. From this viewpoint, if we can find a method in which executives themselves can predict a profit at the accounting end within about 30 minutes and explain it to all others concerned, that method will be the most effective. The purpose of this paper is not to provide a method to draw complex profit graphs, but to give the understanding for executives themselves to quickly and logically develop their own way of projecting profit margins.

In this paper, the author revealed that the general equilibrium state, between production and consumption, claimed in Walras' general equilibrium theory does not exist in societies where dismissal and employment are freely made. The reason is that in these societies, fixed wages are not functions of sales but functions of the (independent variables) enterprises' will to make decisions. Therefore, the involuntary unemployment claimed by J.M.Keynes inevitably arises. However, the main reason is not the stickiness of wage prices but the conflict between enterprises' profits and workers' wages, or between enterprises' will to make dismissal and social thoughts against dismissal. Does the equilibrium state then exist in societies where employment and dismissal are not freely made, i.e. socialist societies? We cannot answer the question using only the unemployment analysis. The answer will be given in a following paper.

References

[1] Hayashi, Yuichiro, "ACCOUNTING SYSTEM FOR ABSORPTION COSTING", United States Patent, Patent No.: US 7,302,409 B2, Date of Patent: Nov. 27, 2007.

[2] Solomons, D., "Break-even Analysis under Absorption Costing", The Accounting Review, July 1968, pp.447-452.

Notations

A^{CX}	manufacturing overhead applied in goods sold	α^X	angle of A^{CX}/X= α^X= α^{XI}
A^{CXI}	A^{CXI}=A^{CX} when A^{CXII}=0.	β^X	angle of $Q^M/X = \beta^X$ when $A^{CXII} = 0$
A^{CY}	manufacturing overhead applied in goods produced	γ^X	angle of D^X_m/X when D^X_m=A^{DX}
$A^{CX(-)}$	A^{CX} carried forward from the previous period	δ^{CX}	cost variance of C_m
$A^{CY(+)}$	A^{CY} carried forward to the next period	δ^{DX}	cost variance of D^X_m
A^{DX}	direct cost (standard cost)	(ϵ)	data of income statement
C_m	manufacturing overhead(actual cost)	η^{CX}	net carryover manufacturing overhead applied in inventories
D^X_m	direct cost(actual cost)	η^{DX}	net carryover direct cost applied in inventories
E	full cost of goods sold (standard cost)	π^{AC}	allocation profit
f	managed fixed cost	π^{MD}	managed operating profit of D^X_m department
L^F	number of workers in D^X_m department	π^{MO}	managed operating profit
G	selling, general and administrative expenses	π^O	sales operating profit
super script I	1st kind of C_m department	(ρ)	data of changed new profit plan
super script II	2st kind of C_m department	(ψ)	break-even sales
Q^M	managed gross profit		
P^X_m	materials purchases		
t^X	total labor hours of D^X_m department workers		
Q^M_ξ	the value of Q^M when $\pi^O(\epsilon) = 0$ is satisfied.		
W_m	direct labor wages		
w^F	hourly wages of direct laborers		
X	sales		

Appendix

■ Sales operating profit control

When one intends to undertake profit control by using the managed gross profit chart shown in Fig. A1, one should keep a careful watch on the right hand side of the break-even sales X_H in good economic times, but on the left hand side of X_H in bad economic times.

This chart can be also used for sales operating profit control. For this, we should change the profit target from the concept of gross profit to that of operating profit. That is to say, we should change SG&A expenses, which are by nature fixed costs, into the form of a variable cost at the beginning of period.

We define, at the beginning of period, variable SG&A expenses G^V in the following:

$$G^V = X \tan \varsigma_0 \tag{a1}$$

, where $\tan \varsigma_0 = G_0/X_0$, $G_0 =$ "assumed SG&A expenses at the beginning of period" and $X_0 =$ "assumed sales at the beginning of period". Further, we define "actual SG&A expenses at the end of period" $G = \overline{EJ}$ and "variable SG&A expenses at the end of period" $G^V = \overline{DJ}$. "Managed sales operating profit using G^V" $\pi^{VMO} = \overline{BJ}(= Q^M) - \overline{DJ}(= G^V) = \overline{BD}$. Denoting the "error $\overline{DE}$ caused from estimating π^{MO} to be π^{VMO}" $\Delta\pi^{VMO}$, we have $\Delta\pi^{VMO}$ in the following:

$$\begin{aligned} \Delta\pi^{VMO} &= X \tan \varsigma_0 - G \\ &= G_0(X/X_0) - G \end{aligned} \tag{a2}$$

Consequently, we have:

$$\pi^O = \pi^{VMO} \pm \left|\Delta\pi^{VMO}\right| \pm \left|\pi^A\right| \tag{a3}$$

When we always use expected "actual SG&A expenses G", we don't need this treatment.

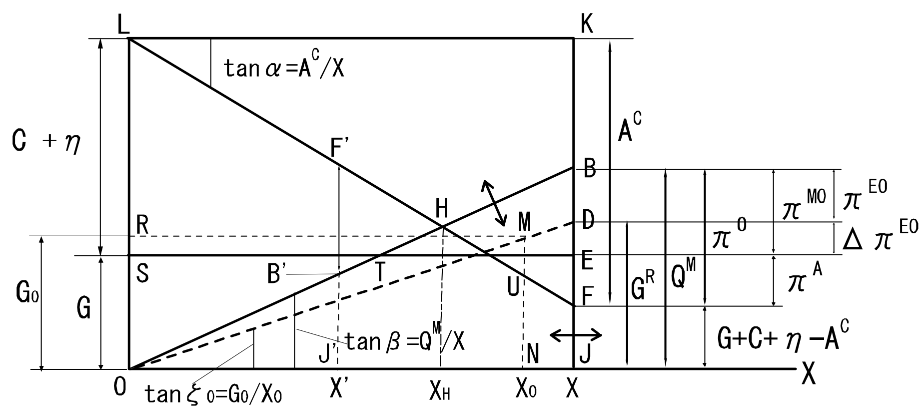

Fig. A1 Sales operating profit control

■ The break-even chart under standard costing for practical profit control

Judging by responses to the profit charts under standard costing from accounting staff and other section staff, the author recommends using the profit chart obtained through the following procedure. An income statement based on manufacturing costing is shown in Table A1 where the cost variance values in the table are set up with slightly swollen values. At a closing date, the effect of the 'net carryover manufacturing overhead applied in inventory' η is already considered in each item in the statement. The managed gross profit Q is calculated with standard costs. A^D should theoretically equal $\overline{A^D}$; A^C should equal $\overline{A^C}$ too. Table A1 shows that A^D does not always equal $\overline{A^D}$ (nor A^C does $\overline{A^C}$) in an actual statement for various reasons.

Table A1 Income statement

	Item	Debit	Credit
1	Sales		$X = 100$
2	Manufacturing direct cost (standard cost)	$A^D = 75$	
3	Manufacturing overhead applied (standard cost)	$A^C = 10$	
4	(Managed gross profit)	$Q = 15$	
5	(Managed gross profit)		$Q = 15$
6	Manufacturing direct cost depart.	$D = 74$	$\overline{A^D} = 76$
7	Manufacturing overhead depart.	$C = 9$	$\overline{A^C} = 13$
8	SG & A expenses (actual cost)	$G = 11$	
9	Sales operating profit	$\pi = 10$	

Since it is near impossible to chart Table A1 exactly, for simplicity, the cost variance in the manufacturing direct cost department is included into the manufacturing overhead department because the cost variance value is by nature small. Thus, we have Table A2:

Table A2 Profit chart data 1

	Item	Debit	Credit
1	Sales		$X = 100$
2	Manufacturing direct cost (standard cost)	$A^D = 75$	
3	Manufacturing overhead applied (standard cost)	$A^C = 10$	
4	(Managed gross profit)	$Q = 15$	
5	(Managed gross profit)		$Q = 15$
6	Manufacturing overhead applied depart.	$C = 9$	$\overline{A^C} = 13$
7			$\overline{A^D} - D = 2$
8	SG & A expenses (actual cost)	$G = 11$	
9	Sales operating profit	$\pi = 10$	

In order to graph the managed gross profit chart we must make the credit value $\overline{A^C}+\left(\overline{A^D} - D\right) = 15$ in rows 6 and 7 coincide with the debit value $A^C = 10$ in row 3. For this purpose we define the variance Δ (the credit is positive) between the two values as $\Delta =$ [credit value$\left(\overline{A^C} = 13\right)$ in row 6 +credit value$\left(\overline{A^D} - D = 2\right)$ in row 7 − debit value$\left(A^C = 10\right)$ in row 3 = 5] and subtract $\Delta\,(= 5)$ from both accounts in rows 6 and 7. Thus, we obtain Table A3. In this table, $C(graph)(= 4)$ is a corresponding actual cost to the debit value $A^C(= 10)$ in row 3 in place offor $C\,(= 9)$ for drawing the graph.

Table A3 Profit chart data 2

	Item	Debit	Credit
1	Sales		$X = 100$
2	Manufacturing direct cost (standard cost)	$A^D = 75$	
3	Manufacturing overhead applied (standard cost)	$A^C = 10$	
4	(Managed gross profit)	$Q = 15$	
5	(Managed gross profit)		$Q = 15$
6	Manufacturing overhead applied depart.	$C(graph) = C - \Delta = 4$	$A^C = 10$
7	SG & A expenses (actual cost)	$G = 11$	
8	Sales operating profit	$\pi = 10$	

Letting $D(graph)$ stand for the 'corresponding actual direct cost', in place of D, for drawing the graph, $D(graph)$ is obtained so that it satisfies Table A4:

Table A4 Profit chart data 3

	Item	Debit	Credit
1	Sales		$X = 100$
2	Manufacturing direct cost	$D(graph) = 75$	
3	Manufacturing overhead applied	$C(graph) = 4$	
4	SG & A expenses (actual cost)	$G = 11$	
5	Sales operating profit	$\pi = 10$	

Letting the total fixed costs $C(graph)+G$ be denoted $F(graph)$, we have Fig.A2, the break-even chart under standard costing. We understand from Fig. A2 that when Δ is positive, costs decrease i.e. profit increases. Note that Fig. A2 is never a profit chart under direct costing but only under standard costing.

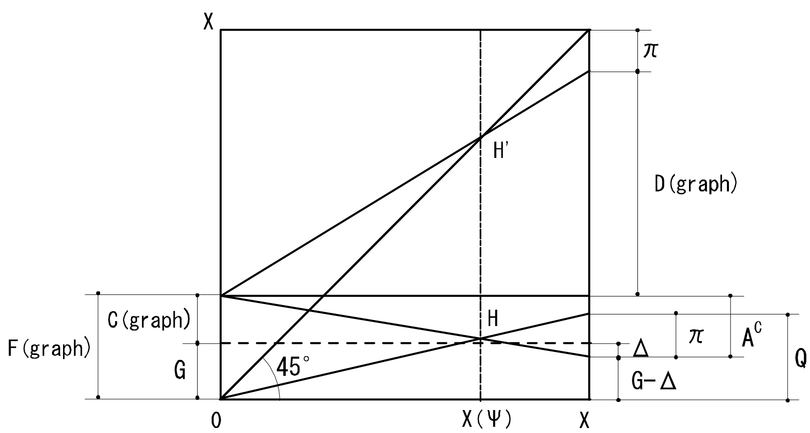

Fig.A2 Break-even chart under standard costing

The break-even sales $X(\chi)$ under standard costing is obtained in the following:

$$X(\chi) = F(graph)/(1 - D(graph)/X) \tag{a4}$$

In Fig.A2, both the 45 degree chart and the managed gross profit chart are drawn. The reason that the author recommends to use Fig.A2 is as follows:

- In the 45 degree chart, the sales, all the costs and the profit are expressed. Since the 45 degree chart resembles the break-even chart under direct costing, accounting staff easily understand its meaning. However, since the managed gross profit is not drawn in the chart, the work site staff who calculate the managed operating profit with the managed gross profit cannot use it. Therefore, for the work site staff the 45 degree chart itself becomes meaningless.
- Since the managed gross profit is drawn in the managed gross profit chart, the work site staff can use the chart for profit control. However, neither accounting nor work site members can understand how the graph has been obtained.

Consequently, the author recommends drawing the two graphs in the single chart. In addition, when we use only the managed gross profit chart, any horizontal scale size is possible. For profit control the author further recommends that targeted sales should be realizable; the managed operating profit ratio using Fig.A1 should therefore be targeted.